An exploration of barriers to implement lean in the emergency level of the Brazilian public healthcare system

By

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A Doctoral Thesis

Submitted in partial fulfilment of the requirements
for the award of
Doctor of Philosophy of Loughborough University

June 2017

Loughborough University

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Glossary

A&E	Accident and Emergency
ANS	National Regulatory Agency for Private Health Insurance
BRICS	Brazil, Russia, India, China and South Africa
BPR	Business Process Re-engineering
BPI	Business Process Improvement
BHU	Basic Health Unit
CPI	Corruption Perception Index
CONASS	National Council of Healthcare Secretary
DMAIC	Define, Measure, Analyse, Improve and Control
DPMO	Defects Per Million Opportunity
ED	Emergency Department
ER	Emergency Room
EC	Emergency Care
EFQM	European Foundation Quality Model
ECU	Emergency Care Unit
FHP	Family Health Programme
FCP	Federal Council of Physicians
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GNI	Gross National Income
ISO	International Organization for Standardization
IPEA	Institute for Applied Economic Research
IBGE	Brazilian Institute of Geography and Statistics
NHS	National Health Service
RQ	Research Question
TPS	Toyota Production System
TQM	Total Quality Management
PI	Process Improvement
P&L	Profit and Loss
USA	United States of America
UK	United Kingdom
USD	United States Dollar
UHS	Unified Health System (Brazilian Public Healthcare System)

WHO	World Health Organization
VSM	Value Stream Mapping
WT	Waiting Time

Acknowledgements

Finally, I am writing this section of my PhD. I have to say that my eyes are full of tears to start writing this very final part of my thesis; it is a mix of feelings, but those who come to my mind now are happiness, achievement, relief, pride, legacy, fulfilment, belonging, and a little bit of sadness to leave this University. During this journey I had bad and good moments, and these people that I will mention here were part of this emotional roller-coaster.

When you achieve such a high level of education in your life you cannot forget where you came from, because this is part of who you are and helps to explain where you are. I remember that day that I was probably 10 years old and my family back in Brazil struggled to provide very basic things for all of us, and believe that God put good people in our lives that helped us. I am proud to say that I came from the bottom, and that I know how difficult life can be, but when you grow up 'with nothing' you become proud of the minimum achievements in life, first job, first degree, first car, first house, and now a doctoral degree, the first person in my entire family to achieve such a level of education. I always saw education as a way out from poverty and consequently a way to improve my future. Not surprisingly, I dedicated the last 14 years of my life to higher education; since my first degree I never stopped, and all these efforts pay off today when I am finishing this thesis.

I want to say thank God who certainly helped and guided me during this journey. I certainly underestimated the emotional part of this PhD, but He helped me and I know He looks after me every day.

A very special thank you full of love to my parents. I know that the decisions that they made in the past changed the course of my life. They are lovely and down to earth people, and I love you from depth of my heart, and I dedicate this thesis to you my doctors in life. I also would like to mention Fran, she always supported me and was part of this dream, even though life changed our paths. I am still grateful to you and everything that you have done for me. Finally, my brother and sister and sister-in-law, even away, you were always in my heart, which is also true for the rest of my family. In a special note, I would also like to dedicate this research in memory of my beloved Grandmother. She spent the last months of her life using the public healthcare system in Brazil, and I believe that somehow it influenced my desire to improve people's lives in these places.

To my best friend Epi, who accidentally became my big brother. I will miss you, dude; thank you for everything, you and Vicky made my life happier in this cold island, and I learnt a lot with you, and I have the best memories from our time together. I hope our friendship lasts forever.

My helpful supervisors, Dr Nicola Bateman and Professor Zoe Radnor, they have a perfect combination of perspectives as supervisors. I learnt a lot with you two, and I will always be proud to say that I am your former PhD student (if this title exists). Thank you for the opportunity to work alongside you, it was priceless. I also would like to thank the examiners, Dr Sharon Williams and Dr Janet Harrison. I could not be happier to have you as examiners, bringing your experience in lean, healthcare and in Brazilian public healthcare. I am sure that your feedback will be what I need to finish this journey.

To my friends, they are so many that I cannot name them all here, from those that I met in the gym, my judo club, to the ones with whom I started this journey or we became friends in the PhD office, thank you for being part of my life. Somehow you helped me and it is going to be weird not to be around you, but you are now part of my life and I will value our friendship.

I want to say thanks to the happy people of Brazil that pay their taxes and somehow gave the chance to come to the UK under the CAPES scholarship, who I also want to say thank you. To the UTFPR that believed on me and gave me a sabbatical to undertake this PhD.

Finally, I would like to thank all those who made my life easier at Loughborough University. This is special to 'my girls' Aly and Tracey, but I would like to extend to all staff members and academics that helped me during this journey, a massive thank you.

The summary of this journey is that it was not easy (not at all), but it was fun and enjoyable, one experience that I will certainly take for the rest of my life, and who knows, maybe one day I will be back. I finish with a quote from Confucius, which I saw written on the wall of the Pilkington Library on my first day here, and I feel in love with it:

> *'Tell Me and I Will Forget; Show Me and I May Remember; Involve Me and I Will Understand'* (Confucius, 450BC)

Publications

Conference Papers:

- Leite, H., Bateman, N., Radnor, Z. (2016). 'Organizational barriers and enablers that affect the lean journey: a case of emergency healthcare areas in Brazil'. Thriving in Turbulent Times, British Academy of Management Conference, September 6th – 8th, Newcastle, UK.

- Leite, H., Bateman, N., Radnor, Z. (2016). 'A classification model of the lean barriers and enablers: a case from Brazilian healthcare'. Interactions, 23rd EurOMA conference, May 17th – 22th, Trondheim, Norway.

- Leite, H., Bateman, N., Radnor, Z. (2016). 'Lean implementation and sustainability: a classification model of the main organizational barriers and enablers'. 'Innovative Operations in an Information and Analytics Driven Economy'. POMS 27th Annual Conference, May 6th – 9th, Orlando, USA.

- Leite, H., Bateman, N., Radnor, Z. (2017). 'Barriers to lean implementation and sustainability in healthcare, an exploration beyond the ostensible'. 'Global Operations: Social Good, Emerging Horizons and Technology. POMS 28th Annual Conference, May 5th – 8th, Seattle, USA.

Abstract

The overarching aim of this thesis is to understand the barriers to implement lean in the emergency level of the Brazilian public healthcare system (UHS). As one of the BRICS countries, Brazil as a developing country has challenges in terms of education, infrastructure and healthcare. Thus, this research aims to bring lean into this context and investigate the constraints of a future lean implementation in the UHS. The UHS presents several operational and non-operational problems. These problems constrain the system and affect the patients. Lean is a well-known approach that has been applied around the world with special focus in developed countries. However, these initiatives have also experienced several barriers that act to inhibit the lean journey. Scholars and practitioners have investigated these barriers, however approaches that show the deeper causes, especially in healthcare, are still scarce. Thus, this brought an opportunity to carry out original research about the barriers that constrain the lean implementation in a different context.

To achieve the aim of this thesis, a qualitative and inductive approach based on a single case study in the emergency level of the UHS was undertaken. This approach is supported with the interpretivist philosophical stance adopted by the researcher. To access the data, interviews and observations were carried out; these approaches were used in different ways in four different sources of data collection: one emergency care unit (ECU); one emergency department (ED); lean management consultants; and staff members from a lean private hospital. The data from these sources was triangulated and analysed using thematic analysis.

The results show that there are two types of barriers that might constrain the lean implementation in the UHS. The first type of barrier is entitled ostensible, as they are well known within the literature. The other type of barrier is entitled underlying and they have a great influence of the stakeholders' behaviour and UHS management style, which act as restraining forces against process improvement. Furthermore, these underlying barriers were identified as the real causes of the ostensible barriers.

This research provides both theoretical and practical contributions. The theoretical contribution brings a new body of knowledge based on findings related to identification of the underlying barriers that constraint the lean implementation in the UHS; the contextual contribution was also addressed in this study as there is no research about lean barriers in this setting; finally the field of forces in healthcare (based on force field analysis (Lewin, 1951) was developed to understand the interplay between underlying barriers, restraining forces

from stakeholders and UHS, and the creation of the ostensible barriers. The practical contribution provides support for lean practitioners and management consultants about the impact of the Brazilian public administration model in the lean journey, as well as the impact of the underlying barriers in the lean journey. Finally, a set of propositions was developed based on outcomes that emerged during the development of this research.

1. Chapter 1 – Introduction

1.1. The Brazilian public healthcare issues

The healthcare system in Brazil is divided into private and public. The public healthcare system, also widely known as the Unified Health System (UHS) (*Sistema Unico de Saude – SUS*), is responsible for providing healthcare assistance free of charge for over 75 per cent of the Brazilian population (150 million people) (ANS, 2013).

Free access to the Brazilian public healthcare system is a constitutional right, according to article 196 of the Constitution of Brazil (1988): 'health is a right of every citizen and a duty of the State'. Thus, the system is 100 per cent funded by the government resources, which together with federal government, states and municipalities support the administration of these resources in three different levels of the system: preventive, emergency and high specialization.

The preventive level is responsible for the first and basic contact with a physician and preventive medicine. The access to this service is by appointment either via the Family Health Programme (FHP) (*Programa Saude da Familia – PSF)* or the Basic Health Units (BHU) which is equivalenet to British GPs (Municipal Secretary of Health, 2014).

The emergency level is the 'open door' area of the UHS; it is responsible for urgent care and emergencies 24/365, and no appointment is requested to access the services, the patients use the service as they please (Gomide *et al.,* 2012; Ludwig and Bonilha, 2003). At this level, the Emergency Care Unit (ECU) (*Unidade de Pronto Atendimento – UPA)* and Emergency Department (ED) are responsible for providing the services.

The third level of the UHS is responsible for dealing with high specializations, such as chemotherapy, cancer treatments, complex surgery, transplant and specialized tests, including others. As this level of care requires specific and specialized resources, the government has an agreement with the private healthcare system and outsources part of these services (Feitosa, 2012; Kligerman, 2000).

A system such as the UHS which has to provide wide coverage of healthcare services presents a series of operational problems that affect patients (Dickson *et al.*, 2009). The main operational problems in the UHS that affect service delivery are complaints related to waiting and queues to receive treatment, which includes seeing a physician and performing tests (Piola *et al*., 2009; Solla and Chioro, 2008). As the emergency level is an 'open door' area with high presence of patients and problems mentioned above (Connas, 2003; Ipea, 2011;

Ludwig and Bonilha, 2003). The next section will address applications of lean as an approach to ease such operational problems in healthcare.

1.2. Lean in healthcare

The lean philosophy has its roots in the manufacturing sector. In the mid-50s, the Japanese company Toyota developed an unique system focused on waste elimination and creation of value for the customer, which was later adapted and called lean thinking (Womack *et al.,* 1990; Womack and Jones, 1996).

The benefits of lean also started to motivate other areas to attempt a similar approach, such as banks, hospital, offices, logistics, airline companies, hotels and public services, and others (Allway and Corbett, 2002; Bicheno, 2008; Bowen and Youngdahl, 1998; Radnor *et al.,* 2006; Song *et al.,* 2009; Swank, 2003).

The healthcare area emerged as one of the most promising areas for lean implementation; the literature includes several research studies developed in this area (Brandao de Souza, 2012; Mazzocato *et al*., 2010; Radnor, 2010b). The main results after lean implementation are related to cost reduction, process improvements, time savings, improvements in time of patient admission, reduction of patient and staff walking, increase in patient satisfaction, improvements in patient safety, increase in teamwork, less overtime and lower mortality, among others (Cima *et al.,* 2011; L'Hommedieu and Kappeler, 2010; Mazzocato *et al.* 2010; Radnor *et al.,* 2006; Van Lent *et al.,* 2009; Weinstock, 2008; Yousri *et al.,* 2011).

Regardless of all the benefits that lean brings to the context in which it is implemented, the literature also shows that the lean journey (implementation and sustainability) faces several barriers that inhibit the success of the project. Some of the main barriers to implementing lean are: resistance to change to something new/scepticism, including leaders' resistance; poor communication; lack of resources and budget constraints; lack of understanding of the potential benefits and personal and organizational cultural issues (Bhasin, 2011; Brandao de Souza and Pidd, 2011; Deloitte and Touche, 2002; Lean Enterprise Institute, 2007; Kundu and Manohar, 2012; Radnor *et al.,* 2006). A comprehensive list of barriers will be presented later in this study (Section 2.7).

1.3. Research context

Regardless of all the operational problems identified in the UHS (Section 1.1), finding initiatives of process improvements, such as lean, undertaken to ease this situation and

improve the processes are still a challenge in public healthcare in Brazil (Brandao de Souza, 2009). The lack of lean initiatives appears to be a problem related to developing countries, as several research studies related to lean implementation have been carried out in developed countries, such as Australia, the United States and the United Kingdom (Ben-Tovim *et al.,* 2008; Brandao de Souza, 2009; Womack *et al.,* 2005). This shows that lean has been implemented in these contexts and others, demonstrating that common operational problems, such as the ones found in the UHS, can be tackled by lean with positive results (Mazzocato *et al*., 2012; Naik *et al.,* 2011; Radnor *et al.,* 2006; Ryan *et al*., 2013). This situation in the UHS with its concentration of problems and limited lean implementations, draws an opportunity to carry out an original research study about future lean implementations in the UHS, which will be presented in the next section.

1.4. Research aim

The situation discussed in the section 1.3, which combines limited lean implementation together with the operational problems in the Brazilian public healthcare system, raises a discussion about the barriers that lean initiatives would face in the UHS. Therefore, this research will focus on an investigation of the barriers to implement lean in the emergency level of the UHS. Therefore, to access the data, a single case study will be undertaken in the emergency level of the UHS. The data collection methods used are interviews and observations with four different sources: ECU and ED in the UHS, and lean consultant managements and staff members from private hospital which implemented lean.

To summarize, the aim of this study is '*to understand the barriers to implement lean in the emergency level of the Brazilian public healthcare system (UHS)*'.

It is anticipated that this research will provide empirical evidence about the type of barriers that lean might face in the UHS.

1.5. Structure of the thesis

This thesis has been organized into seven chapters; each chapter has specific aims that will contribute to the research objective, as follows:

Chapter 1 – Introduction: this chapter presents the overall context of the research, providing a summary of the UHS and lean in healthcare. Furthermore, it shows the research aim and the structure of the thesis.

Chapter 2 – Literature Review: This chapter addresses a comprehensive literature review about Brazil and a group of similar developing countries, the Brazilian public healthcare system and its issues, lean approaches in healthcare, main lean barriers and justification of research in the UHS.

Chapter 3 – Methodology: this chapter explains how the data will be accessed, it also includes identification of the paradigm, research design (problem, purpose, question), research justification, research methodology which defines the single case study followed by interviews and observations as methods to collect the data, sampling and data analysis strategy.

Chapter 4 – Case Study Findings: this chapter focuses on the categorization of the findings from the data collection in four sources: source one, UHS site 1 – (ECU); source two, UHS site 2 – (ED); source three, lean management consultants; source four, lean private hospital – lean team. A summary of the interview process is also presented in this chapter.

Chapter 5 – Data Analysis: this chapter tackles the interpretation of the findings by providing evidence of the data analysis. It combines data from the four sources, which include data from interviews and observations. This process is undertaken based on thematic analysis and development of thematic maps; this will present the strong themes that emerged.

Chapter 6 – Discussion: this chapter provides a discussion of the results, which includes the current literature, underlying barriers and stakeholders interplay, force field analysis literature and related to the barriers to implement lean, and finally the answers to the research questions.

Chapter 7 – Conclusion: this chapter presents the conclusions of the thesis which includes in-depth discussion of the contribution to the knowledge and practice, addressing the main research question and answer, development of propositions, presentation of the research limitations and suggestions for future research.

2. Chapter 2 – Literature Review

2.1. Introduction

Maintaining the stability of the global economy is possibly one of the biggest challenges that leaders are facing in the twenty-first century. Some examples are the United States subprime mortgage financial crisis, Eurozone recession and new powerful players such as emergent countries.

Jim O'Neill, from Goldman Sachs, wrote a seminal paper entitled 'Building Better Global Economic BRICs' (Neill, 2001), where he reports analysis about the future of the global economy, highlighting an emergent bloc of BRIC countries: Brazil, Russia, India and China. In 2010, South Africa joined this group, forming the now widely known acronym BRICS (Hervieu, 2011).

According to Wilson and Purushothaman (2006), the BRICS could become a very important source of new global spending in the not-too-distant future. As an example of this power, they suggest that these emergent economies taken together could be larger than the G6 by 2039. Onis and Kutlay (2013) reported in their research that BRICS had a remarkable growth performance after the crisis, in comparison with the slow recovery of the United States and European Union. The authors also cite the creation of 'near-BRICS' countries, comprised of Mexico, South Korea, Turkey, Indonesia and Malaysia, as examples of developing countries' power in the global economy.

The current economic situation of BRICS was summarized by the United Nations Conference on Trade and Development (2013, p.13). According to this report, 'the BRICS countries continue to be the leading sources of FDI (foreign direct investment) among emerging investor countries. Flows from these five economies rose from $7 billion in 2000 to $145 billion in 2012, accounting for 10 per cent of the world's total'. Moreover, in the list of the world's largest economies in 2012, only South Africa was not ranked among the ten main countries (The World Bank, 2014).

The BRICS have similarities, not just in terms of economic growth, but crucial challenges in the bases of national development, such as education, infrastructure, healthcare and corruption (Bird, 2006; Jain, 2006; Habib and Zurawick, 2006; Kedia *et al.*, 2006). Although, it is correct to affirm that there are different levels of urgency in each nation, some of these challenges are more critical in specific countries than in others. Moreover, examples from developed countries demonstrate that improvement in the situation is possible; indeed,

BRICS countries need to initiate the changes, face the problem, understand the solution and implement it with a sense of urgency.

The healthcare system is reported by several authors as one common issue for these countries. Healthcare operations are struggling with the high cost in a great number of countries around the world (Briggs, 2009). Some countries are dealing with this issue by implementing new methods and techniques to improve their operations and increase productivity (Mazzocato *et al.*, 2010). In addition, Radnor (2010a) cites lean philosophy as a management practice which is adopted by many companies in both manufacturing and services.

Lean philosophy (Womack *et al*., 1990) has already been widely implemented in manufacturing companies. However, service areas such as healthcare companies are taking advantage of this knowledge and implementing lean concepts within the hospitals' operations (Brandao de Souza, 2012; Mazzocato *et al.*, 2010; Radnor, 2010b).

The relevance of lean philosophy in healthcare is reported by Kim *et al.* (2006) as one of the methods that can help to improve hospital process. Approaches based on lean principles in healthcare settings, particularly in hospitals, are reported to have a significant impact on quality, cost and time and satisfaction of both staff and customers (Papadopoulos *et al.*, 2011). Nevertheless, approaches and results in this area are modest compared to manufacturing companies, and can vary according to countries and regions.

Section 2.3.1 shows that developed countries, for example, have a reasonable number of cases published about lean healthcare implementation and developments (Brandao de Souza, 2012). In contrast, analysis in developing countries shows that the number of lean implementations published is lower (Figure 1). Following examples of developed countries, increases in lean implementation in emergent nations might represent taking advantage of the benefits that lean can bring with its results (Brandao de Souza, 2012; Engelund *et al.,* 2008; Kim *et al.,* 2007; Niemeijer *et al.* 2010; Mazzocato *et al.,* 2010; Yousri *et al.,* 2010). Moreover, this is an alternative to addressing and handling healthcare challenges in BRICS.

Considering Brazil as a developing country and a BRICS country, the literature shows a considerable number of problems and a lack of lean initiatives in the Brazilian public healthcare system. At this point, the aim of this study is to understand the barriers to implementing lean in the emergency level of the Brazilian public healthcare system (UHS).

This chapter is organized as follow. First, there is an analysis of BRICS challenges. Section 2.2 is concerned with the healthcare system in BRICS. Section 2.3 is a review of lean philosophy in healthcare, followed by a comparison of lean healthcare implementation in

BRICS and developed countries. Section 2.4 addresses Brazil and its healthcare system. Section 2.5 narrows the research focus to open door areas. Section 2.6 justifies the research in Brazilian healthcare. Section 2.7 addresses the barriers to implementing lean. Finally, Section 2.8 provides a summary of the chapter.

2.2. BRICS challenges

Financial indicators are one of the keys that made BRICS countries widely known as emergent economies; also these are indicators that measure developed countries. Wilson and Purushothaman (2006) advocate that some institutions such as education, the legal system, government bureaucracy as well as the healthcare system, affect the growth and efficiency of the economy.

Some indicators in developing and developed countries in healthcare are summarized in Table 1. This table was built to consider the main economic and resources indicators, as well as outcomes in the healthcare area. To facilitate comprehension of the data, the developed countries were organized in alphabetical sequence, and BRICS according to their acronym.

An examination of Table 1 shows that BRICS together had in 2015 a gross domestic product (GDP) of about $16.4 trillion, approaching the world's largest economy, the United States, GDP of around $18 trillion (United Nations Statistics Division – National Accounts, 2017).

Gross national income (GNI) is another indicator that must be tackled in this analysis. Australia has the highest GNI within the group of developed countries, with $60,050 per capita. Comparing that amount with the highest level in BRICS – Russia with $11,720 – there is a relevant gap between these two groups in this area (The World Bank, 2017). This gap is not only related to economic indicators, but also to healthcare expenditure and investments.

The World Bank (2017) indicates that GDP's expenditure in healthcare, in the group of developed countries, is 11.8 per cent on average, almost double that of BRICS countries with 6.8 per cent on average. Some countries in each group have different responsibilities for these numbers. Table 1 shows that the United States has a high investment in healthcare, with 17.1 per cent of GDP, which represents more than double the average spent by developed countries. Meanwhile, among emergent countries, India has the lowest rate of expenditure in healthcare – only 4.7 per cent of GDP – half that of South Africa, which holds the highest level among BRIC countries, at 8.8 per cent.

Table 1 – Key indicators in healthcare, BRICS compared with developed countries

Countries		Economic Indicators				Resources Indicators			Output
		GDP-USD Trillion (2015)	GNI per capita (2015)	Health expenditure total (% of GDP) (2014)	Health expenditure per capita (2014)	Psysicians per 1,000 people	Nurses and midwives per 1,000 people	Hospital Beds per 1,000 people	Life expectancy at birth, total (years) - (2015)
Developed Countries	AUSTRALIA	1.3	$ 60,050	9.42	$ 6,031	3.2	9.6	3.9	82
	UNITED KINGDOM	2.8	$ 43,700	9.1	$ 3,934	2.2	9.5	3	81,6
	UNITED STATES	18	$ 55,980	17.1	$ 9,402	2.4	9.8	3	78,74
Developing Countries	BRAZIL	1.8	$ 9,990	8.3	$ 947	1.8	6.4	2.4	74,67
	RUSSIA	1.3	$ 11,720	7.1	$ 892	4.3	8.5	9.4	70,9
	INDIA	2	$ 1,590	4.7	$ 74	0.6	1	-	68.34
	CHINA	11	$ 7,900	5.5	$ 419	1.8	1.7	3.5	75,9
	SOUTH AFRICA	314bn	$ 6,080	8.8	$ 570	0.8	-	2	57.44

Sources: Adapted from the following sources: BRICS – Joint Statistical Publication 2013 – BRICS; The World Bank: Health system; World Health Organization; United Nations Statistics Division – National Accounts.

The health expenditure per capita is the sum of public and private health expenditures as a ratio of total population. Comparing the two groups of countries, the differences related to financial resources spent per person are substantial. According to the World Health Organization (2017), the developed countries altogether spent $6,455 per capita on average. In comparison, emergent countries altogether spent only $580 per capita on average. This represents less than 10 per cent of the amount spent in the developed countries. To clarify this low number, Brazil, China, Russia and South Africa spent $707 per capita on average, a low amount when compared to United Kingdom expenditure for example, with $3,934 per capita. However, the lowest amount is India with $74 per capita (Table 1).

Physicians and nurses are important and specialized human resources which support the patient's treatment and well-being. Following the trends of this study, which shows a discrepancy between the groups of developed and developing countries, the average numbers of physicians in BRICS are low with 1.86 per 1,000 people against 3.03 physicians in developed countries. The trend remains when the analysis is about nurses and midwives; the average rates are 4.4 against 9.63 nurses and midwives per 1,000 people (The World Bank, 2011). No information was found for South Africa, therefore this country was excluded from this analysis. In terms of workforce indicators, the numbers depict a struggling situation in BRICS when compared with the rates in developed countries. Such a situation has a direct impact on patient satisfaction and the quality of service delivered.

This pattern of low indicators in developing countries is repeated not only when the analysis is about the number of hospital beds. It presented a similar level in both groups, with a slight difference for BRICS with 3.5 hospital beds per 1,000 people (BRICS – Joint

Statistical Publication, 2013), against 3.3 in developed countries (The World Bank, 2011). The numbers could be better for BRICS, however in this analysis, India was excluded, because no information was found.

After these analyses of economics indicators, the next indicator is about life expectancy. The gap between developed and developing countries in terms of expenditure and investments in healthcare might reflect the life expectancy average. According to the World Health Organization (2017), people in BRICS countries have a life expectancy of about 69.4 years; the figure for developed countries is around 80.7 years.

Providing adequate healthcare assistance is one of the challenges that BRICS have to address in order to achieve continuous and sustainable growth. It can improve the population's wellbeing and increase life expectancy; there is a challenge to manage the costs related to it. Between several problems in developing countries, it is important to highlight that healthcare is not the only and major challenge, however it is an important issue that directly affects the growth of the economy (Wilson and Purushothaman, 2006). Compared with some developed countries, such as Australia, the United Kingdom and the United States, and based on their numbers, the results indicate that BRICS are a long way from offering good healthcare to their population. If BRICS, in the economic area, are committed to becoming a solid bloc, in the healthcare area this commitment appears to be an issue that is still waiting to be addressed.

The next section will provide an overview of healthcare systems in BRICS countries.

2.2.1. BRICS healthcare system

In every country healthcare systems may combine to differing degrees; public administration and private market economies for insurance and the provision of care (Daemmrich, 2013). In BRICS countries, there is no predominance of only one model of administration either public or private; indeed a mix of healthcare can be found, part public and part private (Blumenthal and Hsiao, 2005; Bulletin of the World Health Organization (WHO), 2010; Perlman *et al*., 2009; Yip and Mahal, 2008). To provide an overview of each BRICS country, this study presents an individual analysis of the healthcare system in these countries.

Brazil is a country with continental dimensions and it contributes to a coverage problem in rural areas, the north and northeast of the country. These areas are supported by the public system, however, there is a lack of almost everything, such as physicians, nurses, medication and hospitals (Ministry of Health, 2014). The private healthcare system is

considered satisfactory, with quality and wide coverage. However, it is expensive and not accessible for poorer people who cannot afford private treatment. Indeed, only approximately a quarter of the population has access to a private system (National Regulatory Agency for Private Health Insurance and Plans (ANS), 2013).

Russia has changed its healthcare system since the breakup of the former Soviet Union. Russia now has a compulsory healthcare insurance, and all citizens are obliged to contract into it (Perlman *et al.*, 2009; Rese *et al.*, 2005). However, Russians have little confidence in their healthcare system, and as a result some are opting for private insurance which is considered better than the public system. For Rese *et al.* (2005), the Russian healthcare system is moving from a model based on cheap, poor quality labour to one with fewer, skilled people supported by modern technology.

Even with different levels of life expectancy, India and China have similar situations in their healthcare system. Urban and rural residents do not receive equal and sufficient outpatient care. The high cost of private healthcare is a challenge when the majority of the population cannot afford to pay for private care and tend to use the public system (Balarajan *et al.*, 2011; Yip and Mahal, 2008; Blumenthal and Hsiao, 2005).

According to Yip and Mahal (2008), these countries have recently committed to invest financial resources in their health care system; certainly this is one new way to face and solve this challenge. However, the authors suggest that money alone, channeled through insurance and infrastructure strengthening, is inadequate to address the current problems of unaffordable health care and has heavy financial risk.

The public system in South Africa delivers services for around 80 per cent of the population. The challenges that this country has to face are poor management, critical infrastructure and low investment (Bulletin of the World Health Organization, 2010).

South Africa has a particular situation in its healthcare system: the traditional healers are very respected in their communities, and also there is a kind of competition against modern medicine. There are around 200,000 traditional healers in South Africa, compared with 25,000 physicians of modern medicine, (Kale, 1995).

Each country provides different models of healthcare to assist the population; the most common models are public and private. The government provides the public system, but this does not necessarily mean that the system is totally without cost, as it depends of government regulations. Some countries provide free access to public healthcare and others share the cost with the population. On the contrary, private systems can be defined as a group

of companies that expect to raise profits; in this case, the patients should pay monthly for a coverage plan or directly in case of need.

Healthcare, whether privately or publicly managed, is a system that involves a range of processes; an example of these processes is hospital operations. Hospitals are the core of the healthcare system and their operations are very specific when compared to other service companies. Indeed, a hospital is one organisation that is composed of different areas, such as a pharmacy, a restaurant, management areas (finance, billing, human resources), laundry services, wards, emergency rooms, surgery rooms, reception and security (Bhattacharjee and Ray, 2014; Mans *et al.,* 2009).

Such large organisations require an immense effort to provide assistance to patients with quality and high performance; it includes managing resources, processes and people. Hence a considerable number of constraints and challenges are faced by managers in hospital operations. Improving that situation can be a challenge among several processes, however, many initiatives to improve hospital services were carried out for research and practitioners. Lean philosophy is one of these initiatives that can be performed in public and private healthcare systems, reducing waste and adding value. Examples of lean applications and results are presented in section 4.

2.3. Lean philosophy in healthcare

The lean philosophy was developed by the Japanese in the mid-1950s, and is nowadays used worldwide by different companies. The term 'lean thinking' encompasses a set of lean practices and was first proposed by Womack *et al*. (1990) and Womack and Jones (1996). From the advent of the lean concept to the present day, the popularity of lean thinking has spread widely. The main concepts of the lean philosophy are waste elimination and creation of value for the customer.

Dennis (2008) defines waste with the Japanese word "*muda*", the opposite of value, which is simply what a customer is willing to pay. It is also common to see the definition of seven types of waste that the lean philosophy seeks to eliminate: a) overproduction; b) waiting times; c) unnecessary transportation; d) unnecessary processing; e) inventories; f) motion; g) defects. A new (eighth) type of waste has been introduced: the misuse of intellectual capital (Womack and Jones, 1996). This waste means 'not using the intellectual capacity of employees to identify opportunities for improvement, regardless of their function within the organization'.

Reducing waste and creating value is not only for manufacturing applications, indeed, after a long period of lean applications exclusively in manufacturing companies, the techniques were adapted to the services area with the same focus, to reduce waste and create value for 'end-users' (Radnor and Osborne, 2012, p. 10). A considerable number of researchers addressed this subject, developing a variety of approaches in different organizations, such as banks, hospitals, offices, logistics, airline companies, hotels and public services (Allway and Corbett, 2002; Bicheno, 2008; Bowen and Youngdahl, 1998; Levitt, 1972; Radnor *et al.*, 2006; Song *et al*., 2009; Swank, 2003).

There are several service areas applying lean, however healthcare operations have received particular attention from academics and practitioners of lean in this area (Eller, 2009; Mazzocato *et al.,* 2012; Naik *et al.*, 2011; Ryan *et al.,* 2013). Several recent literature reviews about lean healthcare have been carried out; the results show relevant indications, for example, but not limited to, the growing of lean healthcare studies, positive results after implementation, tools, approaches as well as trends for this area (Brandao de Souza, 2012; Mazzocato *et al.*, 2010; Radnor, 2010b).

Within the lean literature, different types of research were carried out in the area of healthcare, for instance, Brandao de Souza (2012) reports over 90 works reviewed, and Mazzocato *et al.* (2010) analyzed 33 articles. Radnor (2010b) cites a large review of over 165 sources about business process improvement methodologies and found that 51 per cent of the publications were about lean, and 35 per cent of these were about health services.

These results about the growing relevance of lean in healthcare operations are not only theoretical, but have a considerable number of practical results. Several researchers have published positive results (Kim *et al.,* 2007; Womack *et al.*, 2005), which can be separated into operational results (process) and human resources results (patient and staff).

Operational results were reported in different ways, such as in cost reduction, process improvements, time savings, queue reduction, investment savings, reduction in wasted medication, improvements in time of patient admission, reduction in the average time to first appointment, among others. Human resources benefits were cited in a variety of types, such as reduction of patient and staff walking, increase in patient satisfaction, improved patient safety, increased teamwork, less overtime and reduced mortality, including others (Cima *et al.,* 2011; L'Hommedieu and Kappeler, 2010; Mazzocato *et al.,* 2010; Radnor *et al.*, 2006; Van Lent *et al.,* 2009; Weinstock, 2008; Yousri *et al.*, 2011).

Table 2 – Lean Healthcare and Organisations Selected from Literature

Company	Country	Source
Flinders Medical Centre	Bedford Park, Australia	Ben-Tovim *et al.* (2008)
Glostrup Hospital	Copenhagen, Denmark	Engelund *et al.* (2008)
Good Hope Hospital	Birmingham, UK	Yousri *et al.* (2010)
Intermountain Healthcare	Salt Lake City, USA	Jimmerson *et al.* (2005)
Nationalwide Children's Hospital	Ohio, USA	L'Hommedieu and Kappeler (2010)
Netherlands Cancer Institute – Antony Van Leeuwenhoek hospital	Amsterdam, Netherlands	Van Lent *et al.* (2009)
Medical Center Groningen	Groningen, Netherlands	Niemeijer *et al.* (2010)
Metropolitan Hospital	New York, USA	Mullaney (2010)
Royal Bolton NHS Foundation Trust	England, UK	Radnor (2010b)
ThedaCare, Inc	Wisconsin, USA	Womack *et al.* (2005)
The Johns Hopkins Hospital	Baltimore, USA	Heitmiller *et al*. (2010)
The Mayo Clinic	Rochester, USA	Cima *et al.* (2011)
University of Michigan Medical School	Michigan, USA	Kim *et al.* (2007)
Virginia Mason Medical Center	Seattle, USA	Womack *et al.* (2005)

A considerable number of healthcare companies have applied lean concepts in their operations with positive results, although only a specific group of those organizations actually published their names within the literature. It is regarded important to mention that some hospitals did not sustain the changes, for instance Bolton and Virginia Mason. Table 2 displays a sample of these companies with country and source of publication.

2.3.1. Lean healthcare implementation in BRICS and developed countries

Since the very outset of this work, the United States, the United Kingdom and Australia have been mentioned as economically developed countries. However, the list could become more extensive than necessary for this research; the intention was to select a specific sample to represent this group in the lean healthcare area.

This group of developed countries was selected using as reference the previous research carried out by Brandao de Souza (2011), who reported that in terms of lean healthcare, they are the main countries with the highest levels of research published in this area. This author studied the existing literature about lean healthcare applications in developed countries. The results show the percentage of publications per year in 2008 in this order of relevance: United States (57 per cent), United Kingdom (29 per cent) and Australia (4 per cent).

The presence of lean healthcare in developed countries is well established, principally when compared to developing countries. Some BRICS countries have organizations leading lean studies across the countries, even with a limited focus on healthcare compared to manufacturing applications.

In Brazil, an event promoted by Lean Institute Brazil in November 2013 was entirely focused on lean healthcare. According to Lean Institute Brazil (2013), four hospitals had the opportunity to share knowledge and experience in lean healthcare. Three of these hospitals were Brazilian and the other was American.

The Lean Management Institute of India (2013) organized a lean summit in 2011. The president of Lean Enterprise Australia, Peter Walsh, made a presentation entitled 'Using Lean Thinking to Redesign Hospital Patient Care'.

There are cases where healthcare was not reported to be using lean, which is the case in China. Despite the existence of Lean Enterprise in China, no information was found about lean healthcare.

In South Africa, three research projects in the healthcare area were reported by the Lean Institute Africa (2013). This institute is focused on promoting lean management in Africa. The University of Cape Town and the graduate school of business are the main partners of the institute in Africa. According to Faull *et al.* (2011), Lean Institute Africa tested the lean approach in 18 public hospitals of the country; according to the author the test was in the form of one-week rapid process improvement workshops (Bateman and David, 2002).

Contrasting with other BRICS countries, in which is possible to find a representative organization gathering lean information, Russia does not have a single institute or organization to gather information about lean transformation across the country. At the Lean Global Network website, it is possible to find a range of affiliate countries around the world, however there is no information about Russia (Lean Global Network, 2013).

Researching using websites, it is possible to find information about the application of lean concepts in Russian manufacturing companies, although in the healthcare system there is an absence of information. Graban (2008) in his Lean Blog carried out an interview with Professor Slava Boltrukevich, head of the Production Management Department at the Institute for Complex Strategic Studies; he is also publisher of lean books in Russia and a professor of Moscow State University. When asked about the status of lean applications in healthcare, he answered that lean is not yet applied in Russia healthcare because the hospitals are mostly public and there is no clear 'owner' that would be interested in implementing it, in his view.

To summarize the information about BRICS, a structured review was undertaken of the published literature about lean healthcare in these countries. Table 3 illustrates two different types of databases researched about lean healthcare in BRICS, one academic and another technical. Academic databases are related to knowledge based on empirical as well as theoretical data, which comes from academic journals and conferences that are peer-reviewed; on the contrary, technical databases are knowledge based on case studies from lean practitioners and consultants, commonly published in magazine articles, internet blogs, institutes or councils website.

Academic databases gathered a large number of well-known sources such as Scopus, Emerald, Ebsco, IEEE Xplore, Science Direct, Medline, PubMed and Springer. Additionally, Google Scholar, a worldwide renowned source of academic research, which can connect to library journal and book collections, was selected as a source to become part of the academic database. In order to assure the reliability of the technical databases, they were selected based on the technical knowledge that Lean Institutes around the world are sharing with the lean communities. Moreover, some important people in lean are managing these institutes such as Jim Womack, John Shook and Dan Jones, who have links to the Lean Enterprise Institute.

Table 3 – Lean Healthcare Publication in BRICS Countries

DATABASES	BRAZIL		RUSSIA		INDIA		CHINA		SOUTH AFRICA	
	Results (hits)	Suitable Information	Results (hits)	Suitable Information	Results (hits)	Suitable Information	Results (hits)	Suitable Information	Results (hits)	Suitable Information
Academic Databases	15,406	28	118,140	4*	23,249	23	26,031	8	35,076	2
Lean Institute Brazil	13	4								
Lean Management Institute of India					4	1				
Lean Enterprise China							2	0		
Lean Institute Africa									2	2

*2 papers in Russian language, only the abstract was in English

Saunders *et al.* (2016) encourage the use of predetermined explicit criteria of inclusion and exclusion can help to select relevant research studies during the literature review. Thus, the inclusion and exclusion criteria of this structured review was based on academic papers or publications that match the key words during the search; as the initial analysis will be focused on information in the abstract and BRICS countries speak different languages, it is important that at least the abstract of these papers are in English to be considered part of the research; in terms of period of consultation, all papers published up to 2017 will be considered in this search.

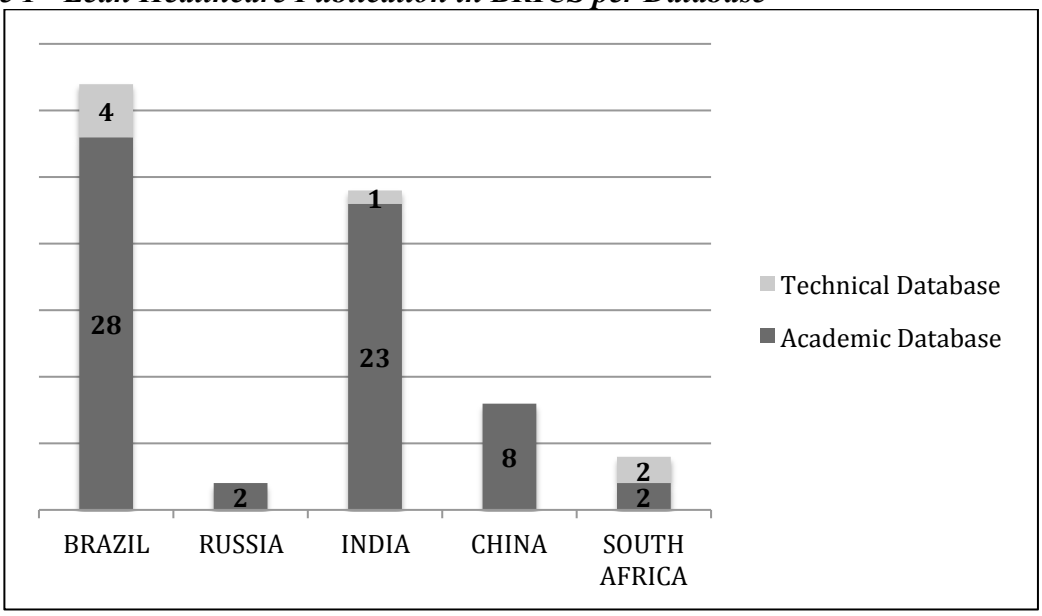
The predetermination of keywords to carry out search in databases during literature review is encouraged by Robson and McCartan (2016), thus in this structured literature review the search was conducted selecting the keywords ‘lean’ and ‘healthcare’ plus the name of the country, for example: ‘lean healthcare South Africa’ for research in South Africa. Understanding that some hospitals adopt the lean approach under other names, the search was expanded to other keywords related to lean in healthcare, such as quality improvement, improvement science and healthcare process improvements.

Table 3 shows the number of suitable publications about lean healthcare in each BRICS country by database, alongside the number of results or hits related to the area of research. Academic databases present the largest number of results and suitable information compared to other sources. India and Brazil have several papers published in the lean healthcare area, followed by China. However, Russia and South Africa have limited suitable information about lean healthcare.

In technical databases, the greatest prevalence of suitable papers was in Brazil followed by South Africa. India presented one paper related to lean healthcare and in China no information was found. Russia was not analysed because it has not established a lean institute (Table 3).

The distribution of lean healthcare publications in each developing country per type of database is shown in Figure 1. This distribution was developed according to the previous research shown in Table 3.

Figure 1 - Lean Healthcare Publication in BRICS per Database



The results show that there are more publications in academic than technical databases. Overall, considering both academic and technical databases, there is a prevalence of publications in Brazil with 32 papers, and India with 24 papers, followed by 8 papers in China, 4 in South Africa and 2 in Russia, even though these numbers of publications in BRICS compared to developed countries (Brandao de Souza, 2012) are lower.

These numbers of publications show that despite such economic evolution around the BRICS countries and their promising future, the level of these developing nations in the lean healthcare area is lower. Some countries such as China, South Africa and Russia are not relevant in terms of publications. Russia does not have any information about a single lean healthcare project developed in the country, even an organization to promote lean philosophy (Table 3). Among this bloc of countries, Brazil and India have the best levels, however there is no comparison with the substantial levels of research found in developed countries, such as Australia, Canada and the USA (Brandao de Souza, 2012; Mazzocato *et al.*, 2010; Radnor, 2010b).

This situation represents numerous opportunities to improve the healthcare process in those countries, as long as they do not have several lean projects, they have more opportunities to implement it and collect the benefits. However, for the lean journey, BRICS have an excellent scenario to start a transformation in healthcare. With few lean initiatives in

these countries, the number of opportunities in terms of improvements, waste reduction and savings are enormous. Actions focused on these countries could be implemented taking advantage of the previous knowledge acquired by developed countries.

In terms of lean knowledge and developments Brazil has a little more experience than other BRICS. This country is top in overall publications, has a Lean Institute as a source of training and organization of knowledge and the lean approach is already well known and spread in manufacturing companies (Valle *et al.,* 2011). In healthcare areas a lean summit was organized in 2013, with three cases from Brazilian hospitals on the agenda.

In terms of culture and politics, Brazil is considered a stable and friendly country, open to research and development areas (Giraldi and Carvalho, 2008). As an example of this, a first approach made at the beginning of this research with the government area responsible for research in healthcare system (level 1 and 2) resulted in a positive relationship for future developments about research in this area. Moreover, Brazil is investing a large amount of money to send students to develop different levels of study and research around the world (Science Without Borders, 2014).

Section 2.4 explores in depth the healthcare situation in Brazil, models of system, main constraints, as well as issues.

2.4. Brazil and its Healthcare System

2.4.1. Brazil Overview

Brazil is the largest economy in the South America and Caribbean region. It is also the 7th largest economy in the world (United Nations, 2012). With a population of around 198 million and life expectancy over 74.6 years, Brazil is the fifth most populous country of the world (Table 4). Moreover, it is South America's most influential country, an economic giant and one of the world's biggest democracies (United Nations, 2014; BBC, 2013).

According to the Brazilian Institute of Geography and Statistics (IBGE) (2014) the country is composed of five regions including Central-West, Northeast, North, Southeast and South. It has 26 states, one federal district and 5,561 municipalities. The Southeast is the most populated region, with over 80 million inhabitants, and urban areas representing around 84.35 per cent of the population's concentration.

Brazil is an immense country with continental dimensions, though there exists large social and regional gaps and issues in its healthcare system (Azevedo and Costa, 2010; Jain,

2006; Kedia *et al.*, 2006; Oliveira *et al.,* 2004; Paim *et al.*, 2011). In order to keep the continuous and sustainable growth, Brazil needs to face and manage some challenges, examples of which are, but are not limited to, high inflation, low human development, high proportion of population below of poverty line and high infant mortality rates. Table 4 shows an overview about the main characteristics of Brazil.

Table 4 - Main Brazilian Indicators

Indicator	Subject	Output
Economic	Gross Domestic Product - Trillion (2015)****	1.80
	Inflation 2016****	8.73%
Social	Population - 2015 (million)****	207,8
	Human Development Index (2015)***	0.754
	Population below national poverty line (2013)**	8.90%
	Life expectancy at birth (years) 2015****	74.67
	Infant mortality rate (0-1 year) per 1,000 live births (2013)**	12%
	Literacy rate among adults - 2007 - 2012*	90%
	Internet users per 100 inhabitants (2014)**	57.60%

Sources: *World Health Organization; **United Nations Statistics Division; ***United Nations Development Programme; ****The World Bank.

Among all these challenges, and a common issue in several developing economies, Brazil has a serious problem with public corruption. Stewart (2010) reported that the annual cost of corruption in Brazil is around USD 41 billion. Notwithstanding, according to Transparency International (2013), the organization that issues the Corruption Perception Index (CPI), Brazil was 79th in the global ranking in 2016. The CPI scores countries on a scale from 0 (highly corrupt) to 100 (very clean) – Brazil's score was 40. If this situation can be improved or even resolved, the government would have a large amount of resources to devote to priority areas such as urban and social development, as well as education enhancement, healthcare and transport infrastructure improvement, which are all weak in Brazil.

In terms of economic indicators, Brazil has to deal with the negative effect of inflation. According to the World Bank (2017), inflation in 2016 was 8.73 per cent (Table 4). The situation cannot be considered to be new. Brazil has a history of high inflation; in the last 5 years the average inflation was 5.53 per cent. Compared to China with 2.7 per cent or United States with 2.1 per cent, Brazil has more than triple the rate of inflation (Worldwide Data Inflation, 2014).

The social indicators provide an overview about the Brazilian situation in this important area. According to the United Nations Statistics Division (2013), the population below the poverty line is 8.9 per cent. The country has a type of rough neighbourhoods that summarizes that situation, which is called *favelas*.

The *Favelas* represent physically the situation of poverty in Brazil, with people living in poor conditions, in small houses built under mountains over several states such Rio de Janeiro and Sao Paulo, among others. Nevertheless, poverty is not limited to favelas, but also exists in the poorest regions of the country.

In the North and principally in the Northeast, poverty is the main issue. The region is less industrialized and less developed than the rest of the country. These regions suffer with long periods of drought; it is a difficult place to live due to the lack of rain, unreasonable sanitary conditions and lack of pure water. These situations contribute directly to the slow process of social development.

High rates of poverty reflect directly in other social indicators such as human development index, infant mortality rate, literacy rates among adults as well as the number of people with access to the Internet (Table 4).

Brazil has the fifth largest population in the world; to provide decent healthcare assistance for over 207 million people is a challenge for this country. This situation is highlighted by Jain (2006) and Kedia *et al.* (2006) who report that the Brazilian healthcare system is deteriorating, so that poor people do not receive healthcare assistance.

The next topic of this section explores the current situation of the Brazilian healthcare system.

2.4.2. Brazilian Healthcare System

The healthcare system in Brazil consists of public and private sectors. However, there is a predominance of resources in the private sector. The Brazilian healthcare model presented in Figure 2 shows that only 30 per cent of the hospitals in Brazil are public while 70 per cent are private (CNES, 2014).

The public healthcare system is 100 per cent funded by the government resources and widely known as the Unified Health System (UHS) (*Sistema Unico de Saude – SUS)*. However, the private healthcare system is divided into two subsystems: (1) private care, where the patient pays the healthcare provider directly; and (2) supplemental care, this model is based on a monthly payment made by employer and employee. This supplemental care is a

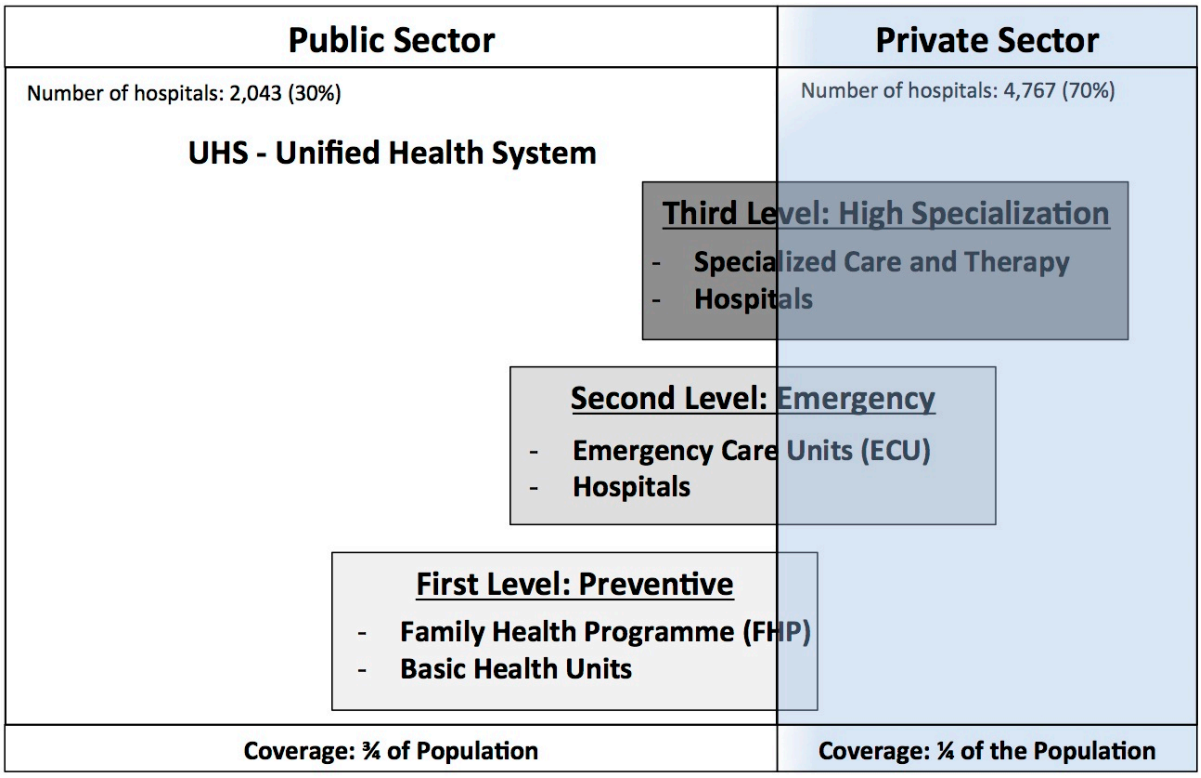
type of benefit offered by employers towards the employees, because the employers shoulder the large part of this cost. According to ANS (2013), over 49 million people (a quarter of the population) have private health insurance; 80 per cent of this population has supplemental health insurance, and 20 per cent has private care insurance.

Figure 2 portrays the interaction within the public and private healthcare system in Brazil. The public healthcare system has two different models of assistance: a shared and an independent model.

The shared model is defined by the high dependency that the public system has on the private system. Due to the weak infrastructure and insufficient specialized professionals and treatments capacity in the UHS, the private system supports the public under some specific conditions and prices (Paim *et al.*, 2011; Portaria (this is a Brazilian law) 3,277, article 4, 2006; Solla and Chioro, 2008). According to IBGE (2010), 65 per cent of the hospital's beds in the private system are contracted by the public system.

In contrast, the independent model of assistance can be described as a model in which the government is able to provide the entire treatment from its own resources, without private influence.

Figure 2 - Brazilian Healthcare System Model



Author (2014), Source: data adapted from Ministry of Health (2014), CNES (2014) and ANS (2013)

This shared model within the UHS is a particular method that the Brazilian government created to attend to the gap between high demand and the low supply of the system. Nevertheless, this model of subcontracting is no longer adequate, and part of this problem is related to the low fees that the government pays to private companies (Gerschman, 2003). This issue and others will be addressed in the analysis of the public system in the next topic.

2.4.2.1. Public Healthcare System

Due the publication of the Eighth Constitution in 1988, the Brazilian healthcare system has become a constitutional right. According to Article 196 of Brazil's Constitution (1988), 'health is a right of every citizen and a duty of the State'. Hence, a system called the Unified Health System (UHS) was established (Brazilian's Constitution, 198th Article, 1988).

The UHS is responsible for financing social security, municipalities, states and federal government health systems, including others. The resources to fund this system come from different Brazilian taxes. The UHS management is hierarchically shared by the federal government (Ministry of Health), state government (Health Secretary of State) and municipal government (Municipal Secretary of Health). Each level has different responsibilities in the public system.

One of the challenges of the UHS is to provide healthcare assistance across the country according to the constitutional right. As a strategy to fulfill this relevant social commitment, the system is underpinned by three different levels of care: primary, secondary and tertiary. Figure 2 illustrates in depth the structure of Brazil's healthcare system, aims in each level of care, as well as the level of relationship and interaction between the public and private system.

The primary level of care is responsible for the first and basic contact with a physician and preventive medicine. It is carried out for the most part by the Family Health Programme (FHP) (*Programa Saude da Familia – PSF)*. The Basic Health Units (BHU) also support this level and the FHP. At this level the influence of the private sector is low.

The FHP commenced in 1994, and it works as a standard model with a large number of medical teams spread across the country; each team includes one physician, one nurse, one nurse assistant and four municipal agents. The FHP is distributed geographically in regions of up to 1,000 families (Menucci, 2009). The main activity of this team is to present and perform preventive medicine. Nevertheless, in some cases when they cannot deal with the problem, they work as an intermediary between another UHS specialized level of care (Basic

Care Department, 2014; Ministry of Health, 2014). 'The Family Health Programme, which covers over 97 million Brazilians, is the key part of the national UHS. It employs more than 30,000 teams of healthcare workers who make concerted efforts to reach the country's poor and isolated communities' (Bulletin of the World Health Organization, 2010, p.646).

Working from Monday to Friday in diurnal shifts, the BHUs are responsible for looking after people in their local communities. Their main duties are health education, preventive programmes (tobacco, sexually transmitted diseases, diet), vaccination, insulin distribution, dentistry and pre-birth assistance (Municipal Secretary of Health, 2014).

The next level of the public healthcare system is the second level of the UHS and is considered the core of the whole system. It is responsible for urgency and emergencies and some specialized care. The activities are performed 24 hours a day in clinics called Emergency Care Units (ECU) (*Unidade de Pronto Atendimento – UPA)*, and some specialized hospitals with Emergency Departments (ED). Figure 2 shows that there is moderate influence of the private system at this level, specially sharing hospitals, providing specialized care and tests, including other services.

This secondary level is the first emergency, urgent and specialized care that patient receives from the UHS. The ECUs were implemented in 2003 as an effort to improve healthcare assistance and reduce the bottlenecks in hospitals' emergency rooms. Those units work as intermediaries between basic units, medium and high specialization and hospitals emergencies. The main ECUs duties are treating situations that involve risk of death such as: blood pressure, high fever, vomiting, diarrhoea, infarct, stroke, minor fracture and laceration, among others.

Some specific hospitals are also part of the secondary care. Once the ECUs cannot provide specific care, the patient is referred to hospital to see a specialist or have treatment and tests. In this case, when the public system is unable to provide specialized care, or even in cases when the demand is higher than supply (hospital beds), the private system provides care under agreement with the government (Piola *et al.* 2009; Kligerman, 2000; Solla and Chioro, 2008). Additionally, one of the key points of the secondary level is the integrated work with mobile emergency care and its ambulances (Menucci, 2009; Ministry of Health, 2014; Paim *et al.*, 2011).

To illustrate how an ECU works, Gomide *et al.* (2012) present the concept of the emergency unit. It is a place organized to work 24 hours per day to provide treatment for anyone who needs care at the urgent or emergency level, without prior appointment. The

authors also present the definition for urgency and emergency. Urgency is a need for care without risk of death, whereas emergency is a need of care with risk of death.

The ECU model is defined as an open door system, where one does not need an appointment to see a physician (Gomide *et al.,* 2012; Ludwig and Bonilha, 2003). This may be considered advantageous from the patient's point of view, whereas it also creates a weakness in the system, because the demand cannot be well estimated. The historical data in these places are not reliable and most of the time cannot be used which makes the situation related to demand difficult to manage.

The third and last level of the public healthcare system is the highest specialized among the UHS levels. In contrast, it is the lowest in government's capacity to attend and support the demands with its own system; consequently there is high dependency on the private system (Solla and Chioro, 2008). Figure 2 portrays the substantial influence of the private system at this level.

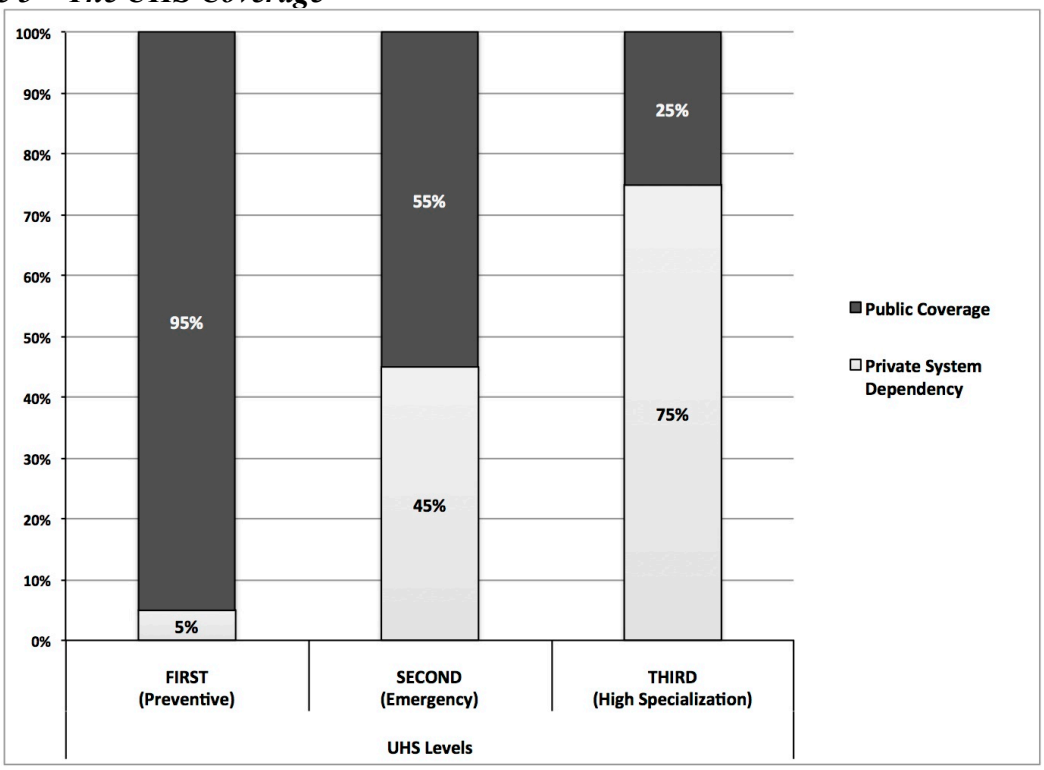
This tertiary level of the UHS performs a variety of highly specialized care, for example, but not limited to, chemotherapy, several cancer treatments, renal dialysis, heart surgery, transplant and complex tests, including other therapies. Nevertheless, this level represents a high cost for the government due the enormous dependency of the private resources (Feitosa, 2012; Kligerman, 2000).

Due this mix of private participation in public healthcare system, Kligerman (2000) carried out research about the healthcare system 'market share' and estimates the public and private participation in the UHS. Kligerman's research shows that the percentages are around 95 per cent versus 5 per cent at the primary level, 55 per cent versus 45 per cent at the secondary level, and 25 per cent versus 75 per cent at the tertiary level (see Figure 3).

The interaction between the public and private healthcare system may be defined as a system that increases its dependency according to levels' needs. Figure 3 depicts the coverage of the UHS and its interaction with the private system. There is a low dependency of the private system at level 1, it represents a high capacity of the public system at this level. However, it will steadily increase the dependency by the private system in the next levels. The third UHS level achieves the highest private dependency (75 per cent), representing the inability of the public system to provide complete specialized treatment with its own resources.

This dependency and interaction in public healthcare coverage can be summarized as: the higher the level of the UHS, the more it depends on the private system.

Figure 3 – The UHS Coverage



Author (2014), Source: Data adapted from Kligerman (2000)

Considering that one part of the population (around 49 million) has supplemental health insurance, the public system responsibility is to look after the other part (over 150 million). It represents a high need for a strong and wide coverage system (Menucci, 2009). According to various studies, the UHS is a well-designed model for the Brazilian healthcare system. The scheme and flow of the system in theory is able to cover the needs of the population and fulfill the constitutional right. Nevertheless, analyzing some points of the system such as the different levels of care and relationship between private and public systems, it is possible to assume that there are some constraints and challenges to make the theory carry out the population's needs and the constitutional right. Those issues of the public system will be addressed in depth in the next topic of this section.

2.4.2.2. The UHS Issues and Constraints

Brazil holds several programmes to prevent and support the population's health, such as mortality rate reduction, people's pharmacy, health gym, organ donation, humanization of the UHS and national health care (the term 'humanization' it is an unusual term even in the Portuguese language; a close meaning of this term would be an attempt of the UHS to make the system more accessible to the population), among others (Ministry of Health, 2014).

However, those programmes appear not to be enough to improve the system and satisfy the population's needs. According to Bravo (2001), the UHS has several challenges to face and overcome before becoming a truly public and widely covered system, as planned in the Brazilian Constitution. Paim *et al*. (2011) reports that the system has been improved in terms of emergency care, vaccination coverage and pre-birth assistance, mainly when compared to the previous public system. However, this is not enough for the current UHS situation and the existent high demand. The system has various problems and constraints to deal with, and some were tackled by different authors as follows:

a) *Private system dependency*: the UHS has a high dependency of contracts with the private system specifically in specialized diagnosis and therapy. As an example of this situation, in the public system only 24.1 per cent of the computed tomography and 13.4 per cent of the magnetic resonance images are performed in the UHS; also access is not equal (Almeida *et al.,* 2010; Menucci, 2009; Paim *et al.,* 2011). This issue in the public system contributes to a high level of dependency from the private system and a low level of treatment for patients.

b) *The UHS Privatization:* Heimann *et al*. (2006) and Kligerman (2000) identified a slight privatization process of the public system, and this has two sides. One is the public system increasing the need of services in the private system; the other side is the increase of the population contracting supplemental healthcare.

c) *Subcontracting and low prices*: The public system is unable to support some specific treatments for the population, then these are contracted by the private system, however the prices that the government offers to private companies are lower than average prices in the private market (Almeida *et al.*, 2010). Due to the different prices paid from UHS to the private system, a type of bid was identified by Menucci (2009): some private companies prefer only to perform diagnosis or therapies with advantageous prices and refuse those with low prices.

d) *Capacity size defined by private companies*: from the private system's point of view, the public system is considered a customer which has a high demand for several services. However, the private system prioritises supplemental and private patients. In this case, the supply offer in the public system is defined by private companies (Paim *et al.* 2011; Piola *et al*., 2009; Solla and Chioro, 2008).

e) *Long waiting times to perform tests*: Azevedo and Costa (2010) carried out a survey with patients in the public system. The outcomes indicate a long time (more than five

business days) to return results from basic tests, such as blood tests or urinalysis. Almeida *et al.* (2010) report three months or more for a basic X-ray in the UHS.

f) *Use of incorrect level of care*: Marques and Lima (2007) reported in their case study a group of issues in an emergency unit as well as patient problems in defining the correct level of care. Instead of accessing the primary level, a considerable number of patients just come into the emergency units, and as a result, this service becomes overcrowded (Bulletin of the World Health Organization, 2010). Non-urgent patients know that, even with long waiting times at the secondary level, the treatment will probably occur the same day, avoiding the waiting list for some specific treatments at other UHS levels. This type of issue contributes to long queues and high waiting times to see a physician in emergency units.

g) *Patients' point of view*: Ludwig and Bonilha (2003) reported on the patients' point of view in emergency units (ECU and ED). According to their research, patients define emergency areas as places where everyone and everything can be treated (urgent and non-urgent patients); another perception is that it is always overcrowded.

h) *Long waiting time to receive treatment*: Based on the patients' point of view Solla and Chioro (2008) identified two main problems in the UHS: 1) long waiting time to see a general physician; 2) queue size to make an appointment with a specialist. Additionally Azevedo and Costa (2010) report in their research that it takes a long time to see a specialist, sometimes more than two months. To summarise, problems in receiving treatment in emergency units are daily problems faced by UHS patients (Piola *et al*., 2009).

i) *Failure in levels of care:* Treatment considered basic and simple (non-urgent) should be made in BHUs, and avoids the emergency units, however a considerable number of these types of treatments are carried out in ECUs (Azevedo and Costa, 2010). If the primary and tertiary levels fail in providing treatment, then the patient goes straight to ECU. These situations in levels of care require more effort in addressing the problem of solving capacity, and finding an equilibrium between supply and demand at all UHS levels (Oliveira *et al.,* 2004; Travassos and Martins, 2004).

j) *Low levels of expenditure in healthcare:* Investment and expenditure in healthcare is another UHS issue. Based on current numbers and compared to other countries, there is a need to increase the expenditure in healthcare, or at least perform the budget estimated in the Constitution (Bulletin of the World Health Organization, 2010; Menucci, 2009). In 2011, Brazil spent only over $1,121 per capita on healthcare,

compared to the United Kingdom (the lowest in developed countries analysed in this study) expenditure per capita, which represents only 31 per cent (The World Bank, 2014).

k) *Lack of improvements:* According to Almeida *et al.* (2010), in the Latin America region, even with different levels of development among countries, there are common needs in healthcare strategy and development, for example, but not limited to, the use of electronic medical records in clinics, call centres for appointments as well as better specialization in primary healthcare. The UHS faces similar problems reported in other countries of the region.

Even though there are a large number of problems in Brazilian public healthcare, finding a reasonable number of academic papers addressing these issues is a challenge for researchers and practitioners. The majority of the papers focus on process and behaviour, and literature is scarce about issues and constraints in the UHS. Therefore, as an attempt to present more details about the situation in the UHS, the next list of problems is based on a review of non-academic sources, such as magazines, local newspapers and websites. These types of sources, even without academic and technical data treatment, provide a powerful amount of information collected directly from patients.

To extend that validity of non-academic sources and provide a suitable analysis and understanding of the problems identified, three different categories of data relevance and population impact were defined. Category I: is considered a source with low impact and coverage among the population; data in this category is collected locally, and in terms of electronic data collection it is given by the users, readers and population in general (e.g. local newspaper, blog, general websites); this source has a high level of bias. Category II: is considered a source with large impact and coverage among the population, however the data collected varies in terms of procedures and treatment type, (e.g. national newspapers, magazines, television website, councils and unions reports), this source has a medium level of bias. Category III: is considered a relevant and more professional source, with some methodology to collect and analyse data (e.g. national councils, reports from government and national institutes).

The main findings in the three categories of non-academic sources are addressed below:

<u>Sources Category I:</u>

a) The newspaper *Jornal do Comercio* (2012) reported serious problems in a new ECU in *Porto Alegre* city. According to the newspaper the emergency unit started to work

without the correct number of health workers, and as a result, the service was overcrowded and the priority for treatment was defined by risk of death.

b) The website CGN (2013) reported a large number of people waiting to receive treatment in an overcrowded ECU in *Maringa* city. Additional to the problem, there were 32 patients waiting to be transferred to a hospital bed. A similar problem was reported by the *Rede Petropolis* website (2012) in *Rio de Janeiro*.

c) The ECUs in *Brazilia* (Federal District) cannot supply the basic demands of the population. The numbers of patients who attempt to find treatment and are denied are high. The main complaints concern a lack of physicians and other healthcare professionals (website *Cidade Democratica,* 2012).

d) The website *Diario da Saude* (2011) advocates that the problem in the UHS is mainly in the management of the resources available.

Sources Category II:

e) A report by *Sindmed* – Physicians Union (2014) showed several problems in ECUs from *Aracaju* city, such as lack of medication, equipment, human resources, basic resources as well as the availability of beds.

f) According to *Cremers* – Physicians Council (2014), there is difficulty in finding hospital beds available to transfer patients from ECUs to hospitals. In cities located in the countryside is more difficult to transfer patients to the capital. There are no equipped ambulance or specialized crew to perform this activity, the waiting time for this service is high.

g) According to the website G1 (2012) for the population the most common problem in Brazilian healthcare is to receive treatment in hospitals and perform specialized tests.

Sources Category III:

h) The National Council of Healthcare Secretary (Connas) (2003) carried out a survey with 3.200 people across the Brazilian territory about the UHS situation. The method selected to collect the data was face to face interviews, and according to the results, the main problems in public healthcare system are: a) 41.3 per cent long waiting times to see a physician; b) 14.4 per cent queue size (waiting times) to perform general tests; c) 7.5 per cent time waiting to be transferred to a hospital bed.

i) The Federal Council of Physicians (FCP) (2014) visited eight public hospitals in different regions of the country and reported the main problems found as follows: the

emergency and urgency service have a double bottleneck in their operations, first is a considerable number of patients in a place with low capacity to provide assistance, secondly is the lack of capacity to solve the patients' problems when they need specialized care. Another point highlighted by this report is the low level of investment and expenditure in the UHS.

j) In 2006, another report by *Connas* (2006) about advances and challenges in the UHS pointed to three dimensions about what is called the UHS crisis: low level of funding, low capacity of management and inefficiency to manage the demand.

k) The Institute for Applied Economic Research *IPEA* (2011) carried out research with 2.773 people in all Brazilian states about the end users' situation in the UHS. The result demonstrated that 58.1 per cent of the population indicates the lack of physicians as the main problem in the UHS. The other problems identified were long waiting times to see a physician with 35.4 per cent and 33.8 per cent with difficulties to see a specialist. *IPEA* is a federal public foundation linked to the Strategic Affairs Secretariat of the Presidency.

l) In 2013, in an attempt to ease the situation of the healthcare system in Brazil, the government began a programme called More Physicians. The aim of the programme was to draw over 10,000 foreign physicians to cover the lack of physician in regions with shortage of this type of professional (Consulate General of Brazil in Miami, 2014).

m) In 2014, research requested by Federal Council of Physicians to the Datafolha Research Institute (2014) revealed that 57% of the population consider healthcare system the most important issue for government. Moreover, the research demonstrated that 70% of the population is not satisfied with the quality of services delivered in emergency areas such as ECUs.

These non-academic findings might reflect the real complaints and end users' points of view; and academic results show similar issues and constraints in the UHS levels. Thereby, these issues and constraints request an analysis to identify each type of problem found. This analysis will be carried out in the next topic of this section.

2.4.2.3. Exploring the UHS Problems

Considering academic and non-academic sources, a great many problems were found in the UHS, however they come from different areas.

To provide a suitable understanding, the problems above were separated in two types with three main problems found within the literature as follows: a) operational problems, which come from the daily routine of the healthcare system, and have a considerable impact on patients satisfaction and organization performance – these types of problems are visible in 'front line' operations (Dickson *et al.,* 2009); b) non-operational problems, which are all other problems related to back office operations. Table 5 depicts details from each operational and non-operational problem, the UHS level it comes from as well as the source within the literature.

Table 5 – The Main UHS Operational and Non-operational Problems

Main UHS Problems		
Operational - Front Line	**UHS Level**	**Sources**
- Long waiting times to perform basic and specialized tests	I, II and III	Almeida *et al.* (2010); Azevedo and Costa (2010); Connas (2003); Menucci (2009); Paim *et al.* (2011).
- The use of incorrect level of care	II	Bulletin of the World Health Organization (2010); Gomide *et al.* (2012); Ludwig and Bonilha (2003); Marques and Lima (2007).
- Long waiting times to receive basic and specialized treatment or to be transferred to a hospital bed	II and III	Azevedo and Costa (2010); Connas (2003); Cremers (2014); IPEA (2011); Piola *et al.* (2009); Sindmed (2014); Solla and Chioro (2008).
Non-operational - Back Office	**UHS Level**	**Sources**
- The UHS privatization, private dependency and weak contracts	II and III	Almeida *et al.* (2010); Heimann *et al.* (2006); Kligerman (2000); Menucci (2009); Paim *et al.* (2011); Piola *et al.* (2009); Solla and Chioro (2008).
- Low levels of expenditure and investment in healthcare	I, II and III	Bulletin of the World Health Organization (2010); Connas (2006); FCP (2014); Menucci (2009); The World bank (2014).
- Lack of physicians, equipment, basic resources and bed availability	I, II and III	Cremers – Physicians Council (2014); IPEA (2011); Menucci (2009); Sindmed (2014).

The information portrayed in Table 5 provides an overview about the main problems that can and cannot be addressed by process improvement initiatives. In the context of this research focus, non-operational problems are identified as highly dependent on the organisation's strategy and top managers' decision-making. In this scenario, with problems in back office operations where changes and improvements depend of politics, regulations, new policies and

rules, implementing lean concepts, or even other process improvement initiatives, it is considered difficult to request a project with substantial impact on the whole organization.

Moreover, in terms of implementation success, there is a high risk of failure in a first attempt, once this environment has a lack of process improvement initiatives. One example of a back office problem that summarizes this situation is the 'UHS privatization and private dependency'. Such a situation cannot be addressed with actions based on lean concepts; this problem depends directly on negotiation between government and contractor, and also decisions to allocate more or less financial resources in this area.

Indeed, improvements undertaken in non-operational problems such as increasing the investment and expenditure in healthcare, reducing the private dependency, providing more access to general practitioners and specialists, among others, are also relevant in public systems and affect front line operations. Nevertheless, the focus of this research is not to address such situations with high political and top managerial dependency.

In contrast, operational problems in front line operations are related to process performance and have a direct impact on patients' assistance and satisfaction. An example of the opportunity in front line operations is the problem related to 'long waiting times to perform a test or see a physician' (Almeida *et al.,* 2010; IPEA, 2011; Piola *et al.,* 2009). Such problems can likely be addressed by lean concepts and tools to reduce the waiting times.

Operational problems highlighted in this study are principally related to long waiting times and queue size; examples of these type of issues addressed by lean technique have some examples with positive results within the literature (Dickson *et al.*, 2009; Holden, 2011; LaGanga, 2011).

To sum up, operational and non-operation problems are situations that negatively affect process performance, increase costs and reduce the patients' satisfaction, among others (Boudreaux and O'Hea, 2004; Derlet and Richards, 2000). In public services such as the UHS, patients' satisfaction is one of the most relevant key indicators to measure the operational performance. The patient is the final user of this simultaneous production and consumption process, so if there is a high level of complaints coming from patients, this indicates that some part of the process is not performing perfectly and an analysis of the process is necessary.

Such problems related to patients' satisfaction are principally found in areas that work as an 'open door' model. This model of operation as well as an overview of the UHS situation will be tackled in the next topic of this section.

2.4.2.4. Summarizing the UHS situation

This section addressed the situation of Brazil and its healthcare system. The aim of this topic is to summarize the information surrounding this situation in order to provide a better understanding. The results demonstrated that the country has some challenges related to social and economic indicators, and these challenges also include the deficient situation in the healthcare system.

The Brazilian public healthcare system is underpinned by a constitutional right, the responsibility of the state is to look after the three-quarters of the population (over 150 million) who do not have a private or supplemental health insurance. The UHS is the public system responsible for providing health assistance free of charge to the population. This system is separated into three levels of care as follows: preventive, emergency and high specialization. The analysis of these levels revealed that the main operational and non-operational problems and constraints are spread throughout three levels of the UHS, for example, but not limited to, waiting times and lack of physicians.

The non-operational problems (lack of physicians, equipment, hospital bed, resources), as explained in the section 2.3.2.3, cannot be addressed with lean or other initiatives to improve the process, due to the high private dependency and political influences. In contrast, operational problems show opportunities for a lean transformation journey. The UHS' levels draw together a considerable number of opportunities to be addressed and improved.

The analysis of the three UHS' levels situation identifies that the first UHS level is well established and appears to have long-term planning in preventive care. An example of this is the family health scheme, with personal preventive medicine and basic health units looking after community care. These two initiatives are not enough in terms of demand support, however, the amount of coverage is steadily increasing (Geonella and Mendonça, 2008). It is important to highlight that this is a preventive level, and more government expenditure and investments at this level might represent demand reduction at the next emergency and specialized levels. Kligerman (2000) highlights that high investment in preventive medicine represents low cost of treatment in future. Indeed, actions that provide correct and satisfactory treatment at this level avoid patients' attempts to access the next level.

The second level is considered one of the most critical in this hierarchical system. This is the core of the system providing urgent and emergency care, 24 hours a day and 365 days a year. According to the Ministry of Health (2014) around 95 per cent of the problems

can be solved at this level, i.e. once the patient receives effective treatment, it will avoid accessing the third level. Notwithstanding, the structure and process at this level is a challenge, Gomide *et al.* (2012) and Ludwig and Bonilha (2003) argue that this current model of care in the UHS, including ECUs, work as an open-door system. Thus, this operational model represents that patients can request treatment at any time without a previous appointment; this unexpected demand results in a long time waiting to receive treatment.

The third level is also important. However, the focus on this level is related to demand for high-specialized care such as specialized physicians, complex treatments and surgeries, tests as well as bed availability in hospital. Efforts to improve primary and secondary levels may impact directly in demand reduction for this type of care at the tertiary level. This level is also highly dependent on the private system; only 25 per cent of the assistance is performed by the public system (Kligerman, 2000). Some bottlenecks were identified at this level about the waiting time to see a specialist and to receive specialized treatment in hospital.

Due the low capacity of the public system to provide assistance with its own resources (hospitals and staff) and the high dependency of the private system, actions to improve the situation at this tertiary level of care become more difficult to implement. It depends on negotiation between the private and public system, more investment and expenditure to provide resources, and needs several actions by top management at this level.

To summarize the findings related to the UHS situation, it is important to highlight two relevant and similar research projects carried out by *Connas* (2003) and Ipea (2011). The Conass survey indicates that 63.2 per cent of patients' complaints are related to waiting time and queues to receive treatment; this includes seeing a physician and performing some tests. Similar to these outcomes, the Ipea research demonstrated that 69.2 per cent of the problems are about the waiting times to see a general physician or a specialist. Those results demonstrated similar problems found from two different sources in a period of eight years, and indicate that the central problem remains the same, which is waiting time to receive some treatment. These issues are more common at the second level of the UHS, specifically in open door areas. However, the other two levels of UHS also have problems related to waiting times (Figure 4).

These two research outcomes underpin the argument that actions in open door areas such as emergency areas have a great impact to ease this situation. The next section will focus on narrowing the research to emergency areas.

2.5. Narrowing the Focus to Emergency Areas

Hospitals are large organizations in terms of process and structure; such organizations are the core of the healthcare system and their processes are very specific when compared to other service companies. Indeed, a hospital is one organization that draws together different areas, such as pharmacy, restaurant, management areas (finance, billing, human resources, payroll), laundry services, wards, emergency rooms, surgery rooms, reception and security, among others (Leite and Vieira, 2014).

Such a large service organization requires an immense effort to provide assistance to patients with high quality and performance; it includes the correct management of resources, process and people. Hence, managers in hospital operations face a considerable number of constraints and challenges in their routine to keep the operations' stability.

Different issues and constraints were highlighted in the Brazilian public healthcare system; some are related to top administrative responsibilities, but others come from operational areas in front line operations. Those problems are concentrated in complaints about waiting times for example, but not limited to, long waiting times to see a general physician, specialist, perform tests as well as to be transferred to a hospital bed (Connas, 2003; Ipea, 2011).

Such problems are common in some areas among the three UHS levels, principally in areas that work as an 'open door' model. The open door model is defined as an area within the healthcare system that provides the first patient contact with a physician, regardless of the urgency or even the previous appointment. The UHS areas that provide assistance as an open door model are: emergency departments in hospitals (ED), detached emergency care unit (ECU) and the basic health units (BHU), their duties and descriptions will be addressed in-depth as follows.

The literature has different names to identify areas related to urgent and emergency treatment – the most common are: emergency department (ED), accident and emergency department (A&ED), emergency room (ER) as well as emergency care (EC) (Coughlan and Corry, 2007; Wellstood *et al.*, 2005; Tsai *et al.*, 2010). Regardless of the different nomenclatures, the pattern term in this area and also recognized internationally by the Specialty of Emergency in Medicine is emergency department with the acronym ED (Department of Health, 2013).

The main duties of the EDs are initial patient presentation, registration, triage, bed placement as well as medical evaluation (Wiler *et al.*, 2010). Considered one of the most important areas in a hospital, the ED performs activities in front line operations, treating

people in critical situations and high risk of death. The patients' access to emergency services is made by themselves or referred by the mobile service ambulances.

The ED's service in Brazil is performed 24 hours a day and 365 days a year. In cases when the patients have major traumas, for example, but not limited to, head injuries, severe gunshot wounds or road traffic accidents, they will be transferred to a major trauma centre also considered an ED, but with appropriate equipment and specialist physician to treat it effectively. Calleja and Forrest (2011) describe the ED as a place with focus on providing urgent and emergency care for a short term, high equipped and proper layout to provide visibility of the patients.

In several countries such as the USA and Australia, EDs are the only area responsible to perform urgent and emergency activities (Calleja and Forrest, 2011;Wiler *et al.,* 2010). However, in Brazil the government established some centres for emergency and urgent care called ECU, with the purpose to split and support the demand in EDs in hospitals. Patients in Brazil can either use ED or ECU, however the treatment received in EDs will depend on the patients' situation (risk of death). One who wants to receive treatment for minor injuries in EDs rather than ECUs has to wait a long time.

Brazilian ECUs work as an extension of the hospital; however, different from an ED, the ECU is an isolated unit and there is no physical connection with a hospital. It may be considered a small hospital, a place where patients can stay under treatment for a short period until become healthy or to be referred to a specialized hospital. The model of short stay area is similar to in-patient wards, providing temporary care and assistance to patients for a short time (Eitel *et al.*, 2010). To summarize the ECU model, it is a place that provides care for urgency and emergency, and also is an intermediate (short time stay) between the unit and the specialized hospital (Ministry of Health, 2014).

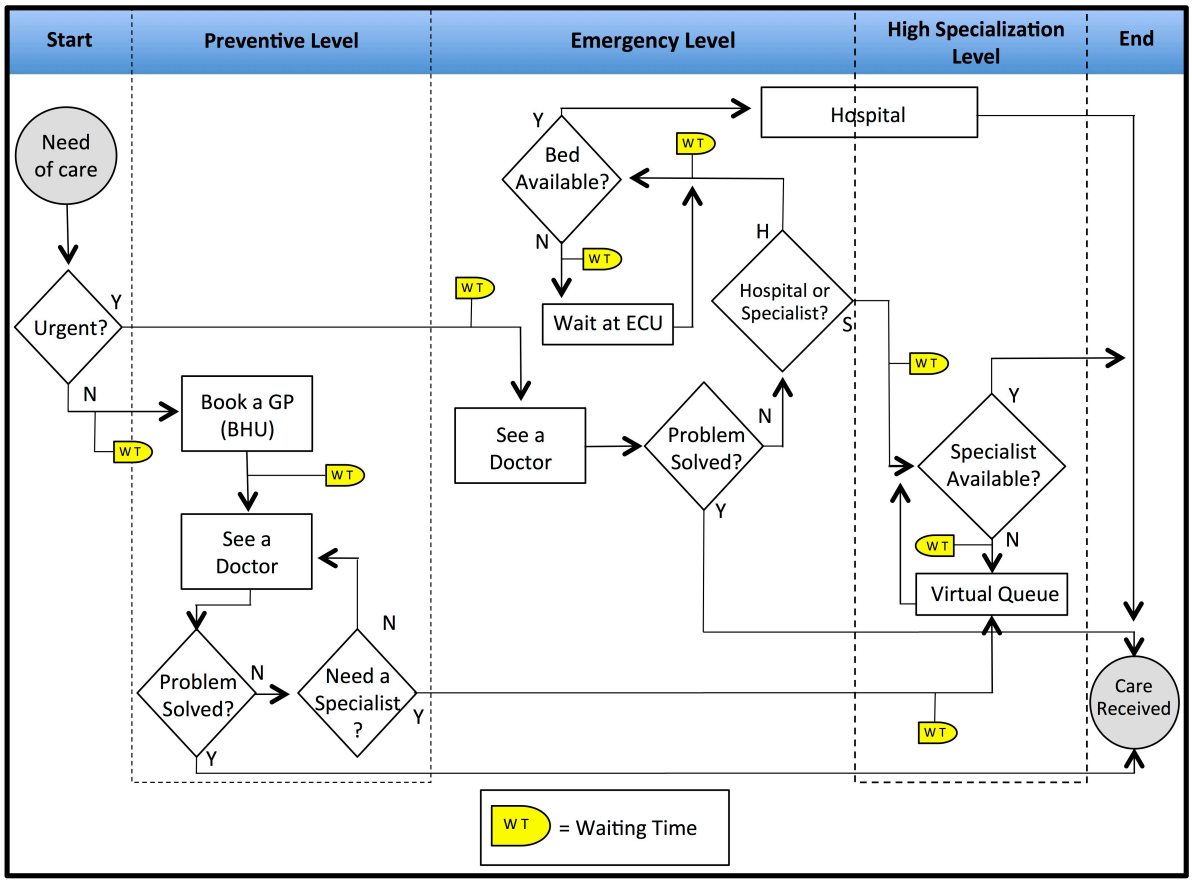
The next open door model presented is the BHU; it works at the preventive UHS level, providing support to the family physician scheme and performing several activities as opening first contact with a physician. Moreover this is also the primary contact of patients who need to be referred to a specialist. Due to this specific and basic level of care, the shifts are only during the day from Monday to Friday (Municipal Secretary of Health, 2014). In BHUs, the majority of patients make appointments, however, in case of need with minor injuries or health situation with low risk of death the patient does not need to be scheduled.

These open door or emergency areas receive several and distinct influences in their routine, for example, but not limited to, non-urgent patients, unscheduled patients, unbalanced demand and different priorities of care and urgency, among others (Lega and

Mengoni, 2008; Tsai *et al*., 2010). These situations create issues and constraints, and have a direct impact in the patients' assistance, time of waiting and satisfaction (Derlet and Richards, 2000). As a consequence of all these problems a situation arises: overcrowded places (Ludwig and Bonilha, 2003).

Analyzing the problems found in UHS operations, the overcrowded situation cannot be considered a problem of the system, but a consequence of many bottlenecks along the UHS levels, that create waiting times and long queues to receive care. Figure 4 portrays the basic flow of treatment in UHS levels, and underscores the main visible areas that contribute for the bottleneck effect in the system. This effect can be summarized as a system with low capacity of processing but with a high demand for a service. This situation creates queues and long waiting times to perform an activity across the system. This basic flow of care in UHS was developed based on information from Ministry of Health (2014), CNES (2014) and ANS (2013), as well as the own experience of this researcher.

Figure 4 – The Basic Flow of Care in UHS's Levels



Source: Author (2014); Ministry of Health (2014), CNES (2014) and ANS (2013)

Figure 4 shows the waiting times symbols (see the acronym W. T.) along the process, and it represents the main problems in the UHS levels. They were allocated in parts of the process to which most of the literature depicted as bottlenecks points. Despite the main problem in UHS system being related to waiting times, it is not limited to queues to see a physician. Indeed this problem appears in different activities in all UHS's levels, for example, but not limited to, waiting times to perform basic and specialized tests (UHS levels 1, 2 and 3), seeing a specialist (UHS level 3) or to being referred to a hospital bed (UHS levels 1 and 2).

Improving the situation can be difficult among several processes, however many initiatives to improve hospital services including emergencies departments were carried out for research and practitioners (Dickson, 2009; Holden, 2011; Ryan *et al.,* 2013; Soremekun *et al.*, 2011). Lean philosophy is one of these initiatives that can perform in public and private healthcare systems, reducing waste and adding value; however, lean is not the only technique that can be carried out to improve process as there are a group of business process improvements techniques; some are more suited than others.

2.5.1. Business Process Improvements Techniques

Within the literature it is possible to find a variety of techniques to improve processes, the most common are lean thinking, Six Sigma, Lean Six Sigma and business process re-engineering, among others. Table 6 displays an overview of the main techniques, features and applicability in the healthcare processes sector.

2.5.2. Lean Philosophy

The lean philosophy comes from the Toyota Production System (TPS) and was developed by the Japanese in the mid 50s. The term 'lean thinking' encompasses a set of lean practices and was first proposed by Womack *et al*. (1990) and Womack and Jones (1996). From the advent of the lean concept to the present day, the popularity of lean thinking has spread rapidly. The main concepts of the lean philosophy are waste elimination and creation of value for the customer. Regardless of the lean roots in manufacturing companies, there are different areas where lean has already been implemented with positive results and benefits, such as banks, hospital, offices, logistic, airline companies, hotels and public services, including others (Allway and Corbett, 2002; Bicheno, 2008; Bowen and Youngdahl, 1998; Radnor *et al.*, 2006; Song *et al*., 2009; Swank, 2003).

The healthcare area has received great attention from lean researchers and practitioners, with different literature reviews carried out (Brandao de Souza, 2012; Mazzocato *et al.,* 2010; Radnor, 2010b), and the results are not considered only to be theoretical but also as practical contributions. The main results and benefits of lean implementation in healthcare are: cost reduction, process improvements, time savings, improvements in time of patient admission, patient and staff walking reduction, increase in patient satisfaction, improvement in patient safety, increased teamwork, less overtime and lower mortality, among others (Cima *et al.,* 2011; L'Hommedieu and Kappeler, 2010; Mazzocato *et al.* 2010; Radnor *et al.*, 2006; Van Lent *et al.,* 2009; Weinstock, 2008; Yousri *et al.*, 2011).

2.5.3. Six Sigma

Six Sigma as a technique was first introduced by Motorola in the early 80s as a response to the competitive Japanese companies; it is considered a quality management innovation adopted for many organization with focus on performance and customer service improvement (Braunscheidel *et al.*, 2011). This technique aims to reduce defects or service failure to achieve customer satisfaction and cost reduction. From a statistical point of view, Six Sigma projects aim to reduce the defect rate to a maximum of 3.44 defects per million opportunities (DPMO) (Radnor, 2010b; Raisinghani *et al.*, 2005).

At first, Six Sigma seems to be similar to many of the techniques already implemented, however Schroeder *et al.* (2008) identified four areas that make Six Sigma different from other techniques and specially from TQM: 1) focus on financial and business results; 2) the rigor of following structured methods and the level of training of improvement specialists (methodology such as DMAIC – Define, Measure, Analyze, Improve and Control; statistics controls); 3) use of specific metrics (defects per million opportunities); 4) the use of fulltime improvement specialists (belt system such as, green belts and black belts). These features of Six Sigma create the unique identity of the technique and also show the complexity of the process implementation in different areas.

In other words, Six Sigma is a technique that requires a high level of training in different and specialized knowledge, especially statistics skills. Moreover, the team is very specific with a hierarchical structure, with focus on large production volumes. This made the Six Sigma approach famous among industries with high large-scale production. However, the technique was adapted in different areas, such as, healthcare, education, energy generation

and finance (Apak *et al.,* 2012; Goel and Chen, 2008; Krehbiel *et al.* 2009; Mehrabi, 2012; Mason *et al.* 2014).

Despite different areas, Six Sigma applications out of the large-scale industries seem to be more common when combined with lean, which is called Lean Six Sigma. There are some examples within the literature that portray this trend. Rossi *et al.* (2014) present improvements in the discharge room cleaning process combining lean and Six Sigma approaches; Mason *et al.* (2014) carried out a literature review about Lean Six Sigma application in the surgery process and found six process improvements combining both techniques; Fairbanks (2007) reported significant improvements in patient flow and increase in teamwork by incorporating Lean Six Sigma in the patient pathway.

2.5.4. Business Process Re-engineering (BPR)

Considered one of the main process improvement techniques in the 90s, Business Process Reengineering (BPR) was first proposed by Hammer and Champy (1993) as a dramatic rethinking and radical redesign of the process. The BPR aim is to achieve high levels of improvements in cost reduction, quality, service and speed.

BPR, by definition, is a radical and rigid technique. Radnor (2010b) suggests that the term Business Process Improvement (BPI) is used interchangeably with BPR; however, according to Adesola and Baines (2005) the BPI approach is considered less radical than BPR. Adesola and Baines (2005), highlighted five principles across both BPR and BPI: a) understand the business needs and the processes; b) model and analyzing processes; c) benchmark business processes and their outcomes; d) use the information to redesign and implement new processes; e) review and assess new process performance to feed back into further redesigns.

Currently there is a noticeable lack of new research about BPR within the literature; the majority of the publications were in the 90s during the internet arising where BPR was strongly implemented (Bertolini *et al.,* 2011; Khodambashi, 2013; Terziovski *et al.,* 2003).

Due its nature of changing processes radically, BPR seems to be a complex technique to start the process improvement in organizations, especially those with lack of initiative. This scenario might justify why more recently a large number of companies have adopted ‘friendly’ techniques of process improvements, which does not require a first massive impact in the whole organization, but works with a continuous improvement thinking tackling individual areas.

2.5.5. Other Process Improvements Techniques

Process improvement (PI) techniques are a set of approaches, which are outside of the three main techniques addressed above. These include several different approaches, such as, total quality management (TQM), ISO9000, European Foundation Quality Model (EFQM), Kaizen and Benchmarking (Radnor, 2010b). Each definition and features of these techniques will be presented below:

A. Total Quality Management (TQM): is an organizational process of changing and improvement, which aims to increase organizational satisfaction. Focus on customers, teamwork, quality systems, training and management commitment are key elements for successful TQM implementation (McAdam, 2010). Radnor (2000) suggests that the main concept of TQM is related to the management of the quality in each operational stage, from the planning through self-inspection, monitoring and finding opportunities for improvements.

B. ISO 9000: is a certification that assures that one company matches international standardized requirements of quality in its quality of product, service and processes (Singels *et al.*, 2010). This process of certification requires some assistance from experts in this field to support company development in the certification process (Baczewski, 2005). The main requirements to achieve ISO 9000 were summarized by Radnor (2010b): a) a set of procedures that cover all key processes in the business; b) monitoring processes to ensure they are effective; c) keeping adequate records; d) checking output for defects, with appropriate corrective action where necessary; e) regularly reviewing individual processes and the quality system for effectiveness; f) facilitating continual improvement. The ISO certification is not limited to one area; indeed, there is a group of ISOs that is known as family ISO, which covers different areas, such as, environmental management standards, medical services, computer software and energy audit, among others (International Organization for Standardization, 2014).

C. Kaizen: is considered one of the key components of techniques such as lean and TQM (Anderson *et al.*, 1994). The meaning of this Japanese word is continuous improvement; Farris *et al.* (2009) argue that one of the most common ways to use the Kaizen is promoting the 'Kaizen event, Kaizen week or Blitz Kaizen', where cross-functional teams can tackle an issue within a specific area over several days.

According to Radnor *et al.* (2006), some companies have focused on implementing one of the PIs, for example, Kaizen rather than a main technique, such as lean for process improvements.

D. Benchmarking: is considered a tool for continuous improvement; it is the process of identifying the best practices of excellence for products, services, or processes and then implementing these practices when necessary (Elmuti and Kathawala, 1997). The benchmarking technique can also be considered a study of the best practices within the business; it is an important element to support process improvement activities, and it will support the organization to improve its process based on similar experiences and results in other companies (Radnor, 2010b).

E. The European Foundation Quality Model (EFQM): this excellence model is based on nine criteria (five enabler and four result criteria). The enablers are concerned with things that are used to make a health organization function (e.g. leadership, policy and strategy, people, partnerships and resources and market knowledge); the results cover what the organization achieves or outcomes (e.g. key performance results, customer results, people results and society results). These nine criteria are broken down in 32 sub-criteria (Moeller, 2010; Radnor, 2010b).

There is common practice in a healthcare system that sometimes is misunderstood as a process improvement technique; it is known as Accreditation. This practice is becoming popular among healthcare organizations, which aim to achieve high levels of quality, especially in the healthcare area (The Joint Commission, 2014). This technique by definition is a formal, third-party recognition of competence to perform specific tasks. It means assessing, in the public interest, the technical competence and integrity of the organizations (United Kingdom Accreditation System, 2014). Buetow and Wellingham (2003) summarize the aims of accreditation: quality control, regulation, quality improvement, information given and marketing. However, the authors suggest that to achieve these aims and match the accreditation requirements is necessary to receive support from quality improvement elements or techniques such as kaizen and benchmarking.

The process of accreditation can be summarized as a complex checklist with standards requirements for each level of accreditation, which hospitals must achieve in order to pass or fail during an evaluation process. The organization responsible for evaluating and issuing the certification is The Joint Commission, an independent, not-for-profit organization (The Joint Commission, 2014).

Thus, it is important to highlight that Accreditation cannot be considered itself as a

process improvement technique, however it a process which requires process improvement support to be implemented and sustained, otherwise the checklist itself will only be a standard process of pass or fail without contribution for improvements.

Table 6 – Characteristics and Comparison of Main Business Improvements Techniques

Technique	Where Used	Focus	Benefits	Implementation Approach	Application in Healthcare
Lean Philosophy: a way of working, which identifies and eliminates waste to deliver improved value and service.	- Fast results are needed; - Where shorter lead times and improved flexibility are critical; - Where large numbers of front line staff work together; - Where limited performance data is available; - Long-term strategy is desired;	- Process - Customer - Defect Reduction - Waste Reduction	- High potential cash savings; - Moderate potential for soft saving; - Improvement in service delivery;	- External support required; - Moderate time from initiation to results; - Moderate implementation costs; - Significant staff engagement;	It is a common approach in healthcare and also a trend, however its application is more common in developed countries. (Brandao de Souza, 2010).
Six Sigma: a structured approach to data driven problem solving.	- To reduce costs or increase volume; - Where mature data analysis is in place; - Where time exists to analyse the right data; - Where specific training can be set up and supported;	- Process - Customer - Defect Reduction	- Moderate potential cash savings; - High potential for soft savings; - Improvement in service delivery;	- External support required; - Long time from initiation to results; - Moderate implementation costs; - Some staff engagement;	The applications in healthcare are combined with lean technique. Examples of the lean six sigma in healthcare within the literature are low. (Rossi *et al.*; 2014).
BPR: an approach to transforming activity through process change	- Where IT is likely to be the main driver of change; - Change is often done out of line;	- Process	- High potential cash savings; - Moderate potential for soft savings; - Improvement in service delivery:	- Moderate time from initiation to results; - High implementation costs; - Significant staff engagement for short periods;	Applications in healthcare are rare and with few new researches in this area. This is a radical approach of process redesign, widely used during the 90's. (Terziovski *et al.*, 2003).
Process Improvement Techniques: it includes other approaches of business process improvements, such as, Total Quality Management (TQM), ISO9000, European Foundation Quality Model (EFQM), Kaizen and Benchmarking.	- Kaizen: where fast results are needed; - Benchmarking: where other improvements strategy are required. - TQM: where formal management systems are already in place. - EFQM: where self assessment and peer reviews are valued and repeated periodically;	- Process - Customer - Defect or waste reduction.	- Moderate to high potential cash savings; - Low to high potential for soft savings; - Improvement in service delivery;	- Short to long time from initiation to results; - Low to moderate implementation costs; - External support required for TQM; - Staff engagement is needed but more significant for Kaizen and EFQM;	Moderate to high application when combined with other main technique, for example Lean. (Bertolini, 2011).

Source: Adapted from HM Government, Baczewski (2005) and Radnor (2010b)

2.5.6. Summarizing the techniques towards a single approach

The definition and explanation of the main process improvement techniques demonstrated how important and relevant the techniques are in different areas. There are some techniques that often appear within the literature combined with one of the main techniques, for example, but not limited to BPR and TMQ (Al-Mashari and Zairi, 1999), Lean and Kaizen (Suarez-Barraza and Ramis-Pujol, 2010) or Six Sigma and benchmarking (Henderson and Evans, 2000). This shows that there is a relationship between process improvement techniques and a main approach.

This relationship between process improvements and other approaches is underscored by Radnor, *et al.* (2006) and Radnor and Walley (2008). The authors suggest that some applications of these techniques can be carried out in two ways: as an isolated event or as a tool mixed with a main technique. However, the impact of these two applications differs in some important ways: an isolated event, for example, can be an easy way to implement one technique, but the impact and long-term application across the whole organization might be lower; combining one or more of these tools with a main technique such as lean, Six Sigma or BPR, in this case the impact across the organization can be higher and bring more benefits for the long-term strategy.

In competitive times and especially with several pressures on budgets, many healthcare organizations are looking for an approach in process improvement that matches with its long-term strategy and goals. The most common technique that presented initiatives with tested positive results across the healthcare areas in different countries is the lean philosophy (Brandao de Souza, 2012; Engelund *et al.,* 2008; Kim *et al.,* 2007; Niemeijer *et al.,* 2010; Mazzocato *et al.,* 2010; Yousri *et al.,* 2010).

The relevance of lean philosophy in healthcare is reported by Kim *et al.* (2006) as one of the methods that can help to improve the hospital process. Approaches based on lean principles in healthcare settings, particularly in hospitals, are reported to have a significant impact in quality, cost and time and satisfaction of both staff and customers (Papadopoulos *et al.*, 2011).

The Brazilian public healthcare system has a lack of PI initiatives (Brandao de Souza, 2012), it is an uncharted field with a great number of problems that requires a long-term philosophy to improve its process, reduce waste and increase patient satisfaction. The lean philosophy as a technique widely implemented in developed countries seems to be a suitable technique for the Brazilian scenario, not only for an isolated project, but also as an initiative to be implemented across the whole system. Therefore, this rationality prompts discussion

about the hurdles that an attempt to implement lean will face in the UHS.

2.6. Justifying a lean research in Brazilian healthcare system

The Brazilian public healthcare system has a considerable number of problems, especially at the second level of care or emergency level (Table 5). According to *Connas* (2003) and Ipea (2011), the main problems at this level are: long waiting time to see a physician (general or specialist), long time to perform tests (basic of specialized) and the use of an incorrect level of care, among others (Table 5).

These problems are concentrated in the emergency level of care, which is responsible to look after a substantial flow of patients (Connas, 2003; Datafolha, 2014; Ipea, 2011). This place is the main entrance door for patients into the healthcare system, thereby initiatives to ease the problems at this level might also bring benefits for other levels.

Despite all these problems, initiatives to improve the process are rare; the Brazilian public healthcare system has a lack of process improvement initiatives. Brandao de Souza (2009), during an in-depth literature review carried out about lean healthcare implementation in different countries, found only one case (pilot) of lean in Brazilian healthcare.

This situation, with several problems and lack of process improvement initiatives, demands a reliable and stable technique to support a long-term strategy in this area. The experiences gathered by lean philosophy combined with its positive results seem to be the 'bedrock' for a long-term initiative in the Brazilian public healthcare system. If the outcomes of this research project indicate that lean is an appropriate approach for the Brazilian public healthcare system, then this technique might represent a philosophy to be implemented not just as one project and isolated initiative, but also as a project to become part of the company's strategy, and be implemented across different areas of the system.

To achieve different results, lean can be combined with different techniques such as kaizen and benchmarking (Radnor, 2010). In terms of training compared to other main techniques, especially Six Sigma, lean has a softer approach, mainly because lean does not require mathematical or engineering backgrounds and does not generate a large amount of statistical data, and this helps to introduce lean to the majority of the employees (Kaizen Factory, 2013). However, lean also depends on external or professional support to be implemented. This lean implementation process can help the organizational learning process and also bring more results for a long-term strategy.

Following examples in developed countries such as United States, the United

Kingdom and Australia, where lean was already implemented with positive results, an approach with lean in a developing country such as Brazil might be an opportunity to identify and understand a different scenario of lean application and contribute to a new body of knowledge in this unknown area.

Lean implementation in the UHS also raises the discussion about the barriers that an approach that aims to provide change and bring new standardized procedures might face during implementation and regarding sustainability. The literature shows that lean faces different hurdles during the implementation process; these barriers will be explored in depth later on in this chapter, but some examples are related to lack of lean experience and training, low availability of resources, poor communication, lack of leadership, team involvement and resistance to change, among others (Bateman and Rich, 2003; Bhasin, 2012c; Radnor *et al.,* 2006; Hilton and Sohal 2012; Marodin and Saurin, 2015). Therefore, attempts to implement lean in the UHS should initially consider the barriers that this approach might face during implementation.

To sum up, among all process improvement techniques within the literature, lean has a considerable number of projects in healthcare systems; the majority of these initiatives are in developed countries. However, it raises a new demand for research of lean approach in developing countries, considering the investigation of the barriers that this approach will face in this new setting. Therefore, this research will understand the hurdles that the applicability of lean philosophy in an uncharted field might face. The results might contribute to future lean implementations in these countries as well as bringing knowledge and understanding in an unknown field.

2.6.1. Lean Philosophy as a Strategy to Improve Emergency Areas

Healthcare areas represent an enormous opportunity for lean initiatives. Radnor (2011) carried out research about lean implementation and highlighted the seven wastes in industry defined by Taiichi Ohno, and the healthcare wastes adapted from the NHS Institute for Improvement and Innovation (2007). Such wastes in healthcare are: transportation, inventory, motion, waiting, overproduction, over processing and correction (Table 7). Those are just a few examples of waste and also problems in healthcare systems; through narrowing the focus to open door areas, it is possible to understand the main problems in these areas in depth.

Table 7 – Waste in Healthcare

Wastes	Application in Healthcare
1. Transportation	- Staff walking to the other end of a ward to pick up notes. - Central equipment stores for commonly used items instead of items located where they are used.
2. Inventory	- Excess stock in storerooms that is not being used. - Waiting lists.
3. Motion	- Unnecessary staff movement looking for paperwork. - Not having basic equipment in every examination room.
4. Waiting	- Physician to discharge patients. - Patients theatre staff results, prescriptions and medicines.
5. Overproduction	- Requesting unnecessary tests from pathology. - Keeping investigation slots 'just in case'.
6. Over- or inappropriate processing	- Repeated clerking of patients. - Duplication of information asking patients' details several times.
7. Correction	- Readmission because of failed discharge adverse drug reactions. - Repeating tests because correct information was not provided.

Source: Adapted from Radnor (2011) and NHS Institute (2007)

Due the lack of resources and also problems at other levels of the UHS, the emergency areas deal with several problems in its operational routine. The concept of 'simultaneous consumption' advocated by Osborne *et al.* (2012, p.139) is strongly observed in service operations with such characteristics of open door areas. In this environment of simultaneous consumption in the front line process, the main problems identified relate to waiting times, for example, but not limited to, seeing a physician, performing a test or seeing a specialist. Those problems create some bottlenecks along the process as illustrated in Figure 4 which describes the basic flow of care in the UHS.

The diversity of problems combined with a lack of process improvements initiatives creates a chaotic situation for patients and staff in emergency areas. This type of situation in the front line process urges for initiatives of improvements such as lean philosophy. One example of lean benefits in healthcare operations is argued by Mazzocato *et al.,* (2012). The

authors advocate that the adoption of lean philosophy improves integration between healthcare and delivery in many organizations.

The literature reveals several benefits that lean implementation can bring into the process. The main positive outcomes are related to decreases in waiting times to see a physician, to perform a test, average length of stay, number of patients who left without being seen and registration time, among others (Eller, 2009; Mazzocato *et al.,* 2012; Naik *et al.*, 2011; Ryan *et al.,* 2013).

Considering some variables involved in the Brazilian public healthcare system such as current problematic situations, the massive size of the system considering the three levels, the need for wide coverage of about three-quarters of the population and political influences at some levels, improvements in the process, especially in emergency areas, can be a challenge. However, this environment also represents an opportunity for process improvement initiatives such as lean, as it can bring several benefits for the elements involved in this process of simultaneous production and consumption. Thus, understanding the lean applicability in this environment can help to lead future lean transformations, not only in Brazil but also in other developing countries such as BRICS.

2.6.2. Process Improvements Applications in Emergency Areas of the Developed Countries

Several examples from developed countries provide some understanding about the applications of different techniques to improve emergency areas, some of these examples are lean based and others have different approaches of process improvements. Although, there is a substantial number of studies that report positive benefits of the lean journey, such as length of stay reduction, decrease in waiting time to be seen, increase in patients and staff satisfaction, improvements in patient admission, decreasing in number of patients re-presenting to ED after discharge, and others (Dickson *et al.,* 2009; Holden 2010; King *et al.,* 2006; Ieraci *et al.,* 2008; Ng *et al.,* 2010). When implementing lean principles in emergency departments, developed countries such as the USA, Canada and Australia have improved their processes considerably, some examples will be presented in this section.

Using lean techniques, such as kaizen events, patient flow analysis, process redesigning and new standard operating procedures for patients' admission, an ED in USA reported substantial improvements in its operations, especially related to patient length of stay decreasing. Dickson *et al.* (2009) reported that in this ED the lean implementation

improved the value of the care delivered to patients, based on ideas generated and implemented by front-line workers. Another example of the lean adoption is reported by Eller (2009), in a large metropolitan hospital in the USA, with an overflow of patients in emergency rooms, lean tools were implemented, and approaches, such as rapid assessment and disposition were implemented. The results were positive reducing significantly the length of stay, diversion time and number of patients left without being seen.

There are cases where some developed countries have adopted different initiatives that are not called lean. In the USA Sanchez et al. (2006) report the use of fast-track area to improve emergency department performance, showing positive results related to reduction of waiting times and length of stay. In the NHS England, emergency areas work with time target called '4-hour target'. Mason *et al.* (2012) carried out a study within the NHS and reported that the implementation of this 4-hour rule has shown positive results related to decrease of waiting times and length of stay. Weber *et al.* (2012) argue that the '4-hour target' in the NHS was controversial when implemented, especially in terms of quality and safety, however the results have shown that the '4-hour target' does not have a negative impact on quality and safety.

Similar to the NHS England, the emergency departments in Australia, have the four-hour target to discharge a patient. Crawford *et al.* (2014) carried out a research about the initiatives implemented in these places to reduce the overcrowding. The results showed that streamlining patients flow and introducing new processes to manage patients, have demonstrated to be effective to reduce the number of people re-presenting to the ED, improving the management of existing resources, increasing patient flow and tackling time delays.

Overall, emergency areas are crucial areas of the healthcare, considered 'open door areas' it reports similar problems related to waiting times or length of stay (Dickson *et al.,* 2009; Holden 2010; Mason *et al.,* 2012). Thus, transferring lean into a different setting, in this case the emergency areas of the UHS, also raises the importance of understanding the barriers that this approach might face during its journey in the UHS. Therefore, the next section will present a literature review about the current barriers that the lean philosophy faces during implementation and regarding sustainability.

2.7. Barriers to Implementing Lean

The lean philosophy is acknowledged by different authors as an organizational long-term plan (Bhasin and Burcher, 2006; Liker, 2004); it is widely known as an approach to improve the process, reducing waste and add value to the customer (Radnor and Osborne, 2012; Womack *et al*., 1990; Womack and Jones, 1996). However, some scholars within the literature have reported low rates of lean projects that succeed. Jadhav *et al.* (2014a) argue that even though lean is one of the most powerful quality improvement methodologies, nearly two-thirds of the implementations end in failure and less than one-fifth of those implemented have sustained results. There are cases where the success rates are even lower. Bhasin and Bucher (2006) report that less than ten per cent of companies succeed at implementing or keeping the lean philosophy well instituted. Implementing lean has become a challenge for several organizations, and one of the main reasons for this situation is the lack of ability to cope with barriers faced across the implementation and sustainability process (Bhasin, 2011; Slim and Rogers, 2009).

There is no one unique recipe to implementing lean and succeeding, or as argued by Dixon-Wood and Martin (2016, pag. 193) there is no *'magic bullet'*, indeed every organization is different in terms of sector, product and service, therefore, a replication of another organization's lean process is a mistake, since lean is context dependent, and the cultures, organisational pressures and supporting infrastructures vary between companies (Bhasin, 2012b; Dixon-Woods *et al.,* 2011; Radnor and Osborne, 2012).

The barriers to implement lean, which constrain the philosophy to become a strong process improvement technique across the organization, were identified in different areas, such as public services (Radnor *et al.*, 2006), healthcare systems (Brandao de Souza and Pidd, 2011), manufacturing (Bhasin, 2011) and the IT service sector (Kundu and Manohar, 2012), among others.

To provide a comprehensive understanding about the barriers that constrain lean implementation, a systematic literature review was carried out within the lean literature that addresses the constraints of the lean journey. To access this secondary data, the researcher explored academic and professional articles published in several databases, such as Science Direct, Emerald, Springer Link, Google Scholar and Taylor Francis Online, Ebsco, Medline, PubMed and IEEE Explore.

The publication's period considered for the search followed the availability of the papers from 1996 to 2015. The criteria defined to carry out the searches were based on the saturation of the following key words: lean barriers, enablers, challenges, obstacles and

constraints. The selection of the literature was carried out in two phases: firstly searching results considering title, abstract and key words showed about 180 papers; the second phase involved a rigorous screening process, following which the number of papers selected was reduced to 115. The screening process was based on abstract assessment where the researcher revised article by article and tried to find the key words mentioned in this paragraph.

Table 8 describes the barriers identified and a classification of these barriers into four main categories: behaviour and culture, organisation and management issues, training, and financial.

Table 8 – Main Barriers to Implementing Lean Philosophy

Categories	Barriers	Sources
Behaviour and Culture	- People and lack of attitude and commitment to change the process	Deloitte and Touche (2002); Kinder and Burgoyne (2013); Poksinska (2010) Radnor *et al.* (2006)
	- Lack of ownership; insufficient understanding of the potential benefits.	Andersen *et al.* (2014); Bhasin (2011); Kumar and Kumar (2012); Marodin and Saurin (2015a); Radnor *et al.* (2006); Roslin and Shahadat (2014); Worley and Doolen (2006)
	- Resistance to change to something new/scepticism, including leaders' resistance.	Albliwi *et al.* (2014); Bhasin (2011); Brandao de Souza and Pidd (2011); Deloitte and Touche (2002); Jadhav *et al.* (2014a); Lean Enterprise Institute (2007); Malmbrandt and Ahlstrom (2013); Roslin and Shahadat (2014); Sim and Rogers (2009)
	- Fear of job losses; lean becomes a threat	Antoni (1996); Carter *et al.* (2013); Conti *et al.* (2006); Fine *et al.* (2009); Jadhav *et al.* (2014a); Kinnie *et al.* (1998) Kim *et al.* (2006); Sim and Rogers (2009)
	- Personal and organizational cultural issues	Bhasin (2011); Deloitte and Touche (2002); Kundu and Manohar (2012); Radnor *et al.,* (2006)
Organisation and Management Issues	- Poor communication	Bollback (2012); Čiarnienė and Vienažindienė (2013); Grove *et al.* (2010; Kundu and Manohar (2012); Marhani (2013) Marodin and Saurin (2015a); Radnor *et al.* (2006); Scherrer-Rathje *et al.* (2009)
	- Leadership failure/misunderstanding and lack of commitment and support	Bateman and Rich (2003); Brandao de Souza and Pidd (2011); Bhasin (2011); Drotz and Poksinska (2014); Emiliani and Stec (2005); Massey and Williams (2005); Radnor *et al.* (2006)
	- Weak link between improvement programmes and the organisational strategic level.	Bhamu and Sangwan (2014); Canadian Manufactures and exporters (2006); Hilton and Sohal (2012); Hines *et al.* (2004); Pakdil and Leonard (2015); Radnor *et al.,* (2006)
	- Organizational momentum and pace	Brandao de Souza and Pidd (2011); Crute *et al.,* (2003); Marodin and Saurin (2015a); Radnor *et al.* (2006)
	- Measurement framework; performance management;	Bhasin (2012c); Brandao de Souza and Pidd (2011); Deloitte and Touche (2002); Hilton and Sohal (2012); Kundu and Manohar (2012); Mostafa *et al.* (2013)

Categories	Barriers	Sources
Organisation and Management Issues	- A need to convince shareholders/board	Bhasin (2011); Deloitte and Touche (2002); Poksinska (2010)
	- Lack of understanding of the potential benefits	Bhasin (2012a); Deloitte and Touche (2002); Marodin and Saurin (2015a); Roslin and Shahadat (2014); Worley and Doolen (2006)
	- Viewed as a fad	Fine *et al.* (2009); Lean Enterprise Institute (2007); McIntosh and Cookson (2012); Roslin and Shahadat (2014)
	- Lack of long-term strategy	D'Andreamatteo *et al.* (2015); Emiliani and Stec (2005); Kumar and Kumar (2015); Marodin and Saurin (2015a); Rymaszewska (2014); Scherrer-Rathje *et al.* (2009)
	- Failure of past lean projects	Canadian Manufactures and exporters (2006); Lean Enterprise Institute (2007); Kumar and Kumar (2012); Lucey *et al.* (2005); Roslin and Shahadat (2014)
Training	- Terminology; something new among the employees	Abdullah *et al.,* (2009); Albliwi *et al.* (2014); Brandao de Souza and Pidd (2011); Lean Enterprise Institute (2007); Proudlove *et al.* (2008)
	- Lack of understanding of the approach in different organization levels/lack of lean knowledge	Aij *et al.,* (2013); Bhasin (2011); Brandao de Souza and Pidd (2011); Bollback (2012); Deloitte and Touche (2002); Zimmermann and Bollbach (2015); Wendel and Abdulhalim (2014)
	- Personal/professional skills of healthcare professionals; lack of know-how.	Alinaitwe (2009); Bhasin (2012a); Brandao de Souza and Pidd (2011); Lean Enterprise Institute (2007)
	- Training and Skill Building	Bhasin (2013); Hilton and Sohal (2012); Kundu and Manohar (2012); Malmbrandt and Ahlstrom (2013)
Resources	- Lack of investment (intern and extern)	Bhasin (2013); Deloitte and Touche (2002); Jadhav et al. (2014b); Mostafa *et al.* (2013); Radnor (2010a); Roslin and Shahadat (2014)
	- Lack of resources and budget constraints	Albliwi *et al.* (2014); Bateman and Rich (2003); Kundu and Manohar (2012); Lean Enterprise Institute (2007); Marodin and Saurin (2015a); Radnor *et al.* (2006)
	- Financial value not recognized	Fullerton and Wempe (2008); Kumar and Kumar (2012); Lean Enterprise Institute (2007); Marodin and Saurin (2015a); Mehta *et al*. (2012)

The categories Behaviour and Culture, Organisation and Management Issues, Training and Resources (Table 8) were developed to facilitate and simplify the understanding of each area where the barrier was found. They were defined based on similarities of each barrier cited by the authors; even with different names or definitions some barriers have similarities in terms of meaning and are part of the same category. Therefore, all barriers were classified in clusters of similar barriers and one main category will emerge in this cluster. For instance, lack of investment, lack of resources or financial value not recognized, is all part of a main category named 'resources'. The categories and a description of the barriers found within the literature will be presented in the following paragraphs.

The category entitled behaviour and culture addresses people's behaviour and how the issues relating to human behaviour constrain the lean implementation. It is essential to have people's engagement, as this can help to anticipate problems as well as create enablers for success (Hines *et al.,* 2008). The strong part of this element relies on aspects related to culture which will influence people's behaviour. Some barriers found with this element are related to resistance to change to something new/scepticism, including leaders' resistance, or people and lack of attitude and commitment to change the process (Albliwi *et al.,* 2014; Bhasin, 2011; Brandao de Souza and Pidd, 2011; Malmbrandt and Ahlstrom, 2013; Poksinska, 2010; Radnor *et al.,* 2006).

The category 'Organisation and management issues' is a broader category in definition; it brings the barriers related to strategy and alignment and leadership within the organisation. After years of lean implementations in different areas, there is an understanding that lean is a journey that takes time and requires change in behaviour. People need time to engage with and embed ideas (Radnor, 2010b; Radnor and Walley, 2008). In the lean journey, the human aspects play an essential role and it is highly dependent on cultural aspects such as strategy, leadership and behaviour (Hilton and Sohal 2012; Radnor *et al.,* 2006; Wahab *et al.,* 2013). All elements are important, but strategy and alignment of the organization can be considered crucial for a successful lean implementation and sustainability. It is the foundation of the organization, and a well-defined vision and purpose are part of a strong strategy and alignment (Bhasin, 2013). Thus, failures in providing the correct strategy and alignment will rely on barriers that will hinder lean implementation, such as lack of understanding about lean as a direction (Karlsson and Åhlström, 1996).

The leadership is the organizational aspect that leads the lean transformation across the organization. *Hines et al.* (2008) argue that many organizations possess managers and

supervisors but do not have leaders who have a guiding vision, passion and integrity to lead changes and focus on people. In order to achieve successful lean implementation and avoid pitfalls, the leadership team, which includes executives, middle managers and shop floor leaders, has to be consistent with the lean values, keeping the long-term vision. The literature reveals that leadership can be the strength of lean journeys, but also the reason of their failure (Bhasin, 2012a; Brandao de Souza and Pidd, 2011; Massey and Williams, 2005; Radnor *et al.,* 2006).

The next category identified is training; it tackles the level of lean knowledge during the implementation and sustainability. During the process of the literature review, several papers indicated hindering factors related to lack of technical knowledge and skills to guide lean implementation (Lean Enterprise Institute, 2007; Marodin and Saurin, 2015; Mostafa *et al.,* 2013; Zimmermann and Bollbach, 2015). This situation has a relevant impact in the lean journey, mainly because organizations that do not know how to use the lean concept will face constraints to implement and sustain the lean system (Wendel and Abdulhalim, 2014).

The last category identified is related to resources. The lean journey is dependent on resources, basically related to human and financial resources. To promote the lean implementation and achieve the benefits that lean can bring, it is necessary to provide the right resources, such as financial investment, material, and human resources, such as people's time (Marodin and Saurin, 2015a; Roslin and Shahadat, 2014). To provide an example of the barriers related to resources, the Canadian Manufactures and Exporters (2006) carried out a survey with manufacturing companies which showed that lack of time for human resource and finance are obstacles to effective lean implementation. In other words, if these resources are available during the lean transformation, they will have an opposite effect acting as enablers.

An analysis of the literature review carried out to build Table 8 showed a common trend in generating lists of barriers about lean implementation and sustainability (Hilton and Sohal 2012; Mostafa *et al.*, 2013), which raises common and similar barriers; however analysis of the deeper causes of these barriers is still a challenge. Therefore, it is relevant to investigate and understand the routes and concentration of these barriers within the organisation.

Understanding the causes of these barriers to implement lean philosophy might contribute to an increase in the chances of successful implementation and sustainability of future lean initiatives. Moreover, for companies that are embarking on a lean journey, this

can work as a ‘lessons learned’ and will help to avoid or at least ease problems during the implementation phase.

In an uncharted environment for lean such as the Brazilian public healthcare system, understanding the barriers to implementing lean can be one of the most relevant activities to initiate and lead future implementations.

The next section provides a summary of the chapter, as well as the introduction of research aim and questions.

2.8. Summary of the chapter

This chapter provided an in-depth literature review about developing countries such as BRICS, challenges of the Brazilian public healthcare system with special focus on emergency areas, lean as a strategy to improve operations in emergency areas, as well as the barriers to implementing lean.

The literature about the BRICS bloc has shown that they have similarities, not just in terms of economic growth, but crucial basic challenges in the development of the country, such as education, infrastructure, healthcare and corruption. BRICS countries are one of the strengths that move the global economy, but these challenges are also a barrier for future development. Regardless of the economic recession in Brazil and Russia, recent research shows that the BRICS countries are still an important economic bloc in the world, perhaps because of the strong development of Chinese and Indian economies (Menon, 2017; Stephen, 2016; Word Bank, 2016). According to Huang and Osborne (2017), the BRICS countries became internationally recognized due the progress made in the last two decades; the challenges for these countries are related to corruption, political tensions and environmental damage.

Narrowing the focus onto Brazil, the literature has provided invaluable information about its healthcare and main problems. The problems in the UHS with special focus on emergency areas can be divided into operational problems (e.g. long waiting time to perform basic and specialized tests) and non-operational problems (e.g. low levels of expenditure and investment in healthcare).

The lean philosophy has emerged as one of the main approaches to ease operational problems in healthcare. However, an analysis of lean implementation in developed countries has shown a list of barriers that inhibit lean implementation and sustainability. These have emerged from the literature as common barriers, however the

identification of the causes that motivate these barriers is still a challenge. This leads to a discussion about the type of barriers that lean will face in an uncharted field such as the emergency level of the UHS. The next section will address the research aim and questions.

2.8.1. Research Aim and Questions

The literature review depicted three main points related to the subject of this research. First, the emergency level of the Brazilian public healthcare system, as an example of many developing countries, has a public system with a substantial number of problems (Almeida *et al.,* 2010; IPEA, 2011; Piola *et al.,* 2009; Bulletin of the World Health Organization, 2010; Connas, 2006; Menucci, 2009; The World bank, 2014; Paim *et al.,* 2011). Second, initiatives to improve the processes and ease the problems are difficult to find in the Brazilian public healthcare system. Some techniques, such as lean philosophy, were found in private systems, but with lack of initiatives in public systems, according to the literature reviewed (Bertani, 2012; Brandao de Souza, 2012; Lean Institute, 2014; Silberstein, 2006). Finally, the barriers to implement lean were addressed, providing a list of common barriers found within the literature (Table 8).

This situation with problems, lack of process improvement initiatives and barriers to implement lean, draws together a scenario for an in-depth study to identify and understand the types of barriers that a future lean implementation in an uncharted setting (the emergency level of UHS) might face. Therefore, this leads to the aim of this research, which is to understand the barriers to implement lean in the emergency level of the Brazilian public healthcare system (UHS).

As previously addressed, the literature portrays different studies about lean applications in healthcare systems in developed countries such as Australia, the United States and the United Kingdom (Ben-Tovim *et al.,* 2008; Brandao de Souza, 2009; Womack *et al.,* 2005), however research about this subject in developing countries is scarce. This lack of research in these countries might be justified by the differences between developed and developing countries in terms of priorities, resources, culture, knowledge and living standards, among others. According to the literature reviewed, the impact, effect or even the applicability of lean philosophy in an uncharted field such as Brazilian public healthcare system is unknown. This leads to the research questions that will be addressed during this research.

- How to understand the barriers to implement lean in the emergency level of Brazilian public healthcare system (UHS)?

a) What are the main barriers to implement lean in the emergency level of the UHS?
b) How can the Brazilian public administration model impact the lean implementation in the emergency level of the UHS?

Those questions together aim to provide a relevant and original research within the emergency level in the Brazilian public healthcare system.

This research will represent a new understanding and contribution to the knowledge for future research in terms of identifying the main barriers to transfer lean philosophy into the public healthcare system in a developing country. Moreover, the results of this research might be adapted for other developed countries in future research.

The research aim and questions were introduced in this section, however, they will be discussed in-depth in the following chapter (Section 3.6), when the research design will be addressed which includes research problem, purpose, question and framework.

The chapter 3 is an in-depth discussion about the research methodology.

Chapter 3 - Methodology

3. Chapter 3 – Methodology

3.1. Introduction

The aim of this chapter is to provide an in-depth analysis of the qualitative methodological procedures which will be undertaken to access data to answer the research questions. This phase can be considered the core of the research, the procedures to collect the data and analysis will be defined in this chapter, thus mistakes or misunderstanding about the procedures can jeopardize the entire research, creating a pitfall that will bring incorrect or unsuitable outcomes. Such relevance relies on the need to define a comprehensive and accurate research methodology, which will cover all elements involved in this process, from the research philosophy to data analysis.

This chapter will work as a research guide. It will show the researcher understanding about the world as well as his involvement in the research context; also it explains the research problem and purpose. To sum up, the research framework (Figure 7) will bring an in-depth explanation about the research plans in terms of methodology, data collection and outcomes.

The next sections of this methodological chapter will tackle the main topics: the identification of the paradigm, research design, research justification, research methodology, sampling strategy, methods, pilot, data analysis, research questions and methods summary, ethical considerations as well as research schedule.

3.2. Identification of the Paradigm

Identifying the paradigm is one of the main steps of the research methodology. This philosophical assumption will guide the researcher during the process of research data collection as well as analyse the data.

The philosophy adopted by researchers represents the communication about the way that they view and understand the world. The research philosophy underpins a way to answer the research questions and allows understanding and identification of the logic of enquiry (Maylor and Blackmon, 2005). In other words, research philosophy directly affects the research strategy, methods as well as the analysis and understanding about the subject under investigation and outcomes (Saunders *et al.,* 2012).

Collis and Hussey (2014, p. 43) argue that 'a research paradigm is a philosophical framework that guides how research should be conducted, based on people's philosophy and their assumptions about the world and the nature of knowledge'. The Oxford Dictionary (2014) defines a paradigm as 'a typical example or pattern of something; a pattern or model: society's paradigm of the 'ideal woman'. A world view underlying the theories and methodology of a particular scientific subject. The discovery of universal gravitation became the paradigm of successful science'.

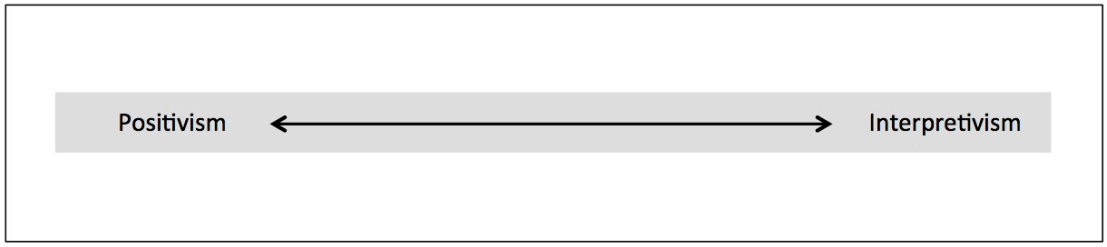
Regardless of the different definitions of the paradigm, there is a common understanding about how the decision for one paradigm or another can affect the research's performance as well as the outcomes. The decision process will be influenced by researcher's belief and the way that view and understand the world.

This world view is associated with how the researcher will address the subject under investigation; at this point the researcher can be involved within the research context or can choose to analyze with an outer point of view, this represents to accept a philosophical paradigm, either positivism or interpretivism.

There are different paradigms within the literature, however the two traditional 'schools' through research process are positivism and interpretivism. Nevertheless, over time new research paradigms have emerged, for example, hermeneutics, phenomenology, existentialism, critical rationalism, linguistics, pragmatism, realism and conventionalism, among others. These new research paradigms have emerged in response to criticism, inadequacies and evolution of the reality and knowledge nature of earlier paradigms (Collis and Hussey, 2014; Lee and Lings, 2008).

The positivism paradigm is considered as external, objective and independent of social actors and there is a strong focus on data and facts analysis. Whereas interpretivism is socially constructed and subjective with multiple realities, it focuses on details and understanding of the situation.

Figure 5 – A continuum of the main paradigms



Source: Adapted from Collis and Hussey (2014); Morgan and Smircich (1980)

Attempting to establish rationality about the evolution of paradigms, Morgan and Smircich (1980) drew a scheme placing positivism and interpretivism at the extremities of a continuum (Figure 5). Assuming this point of view, the philosophies and assumptions of one paradigm are gradually replaced by those of the next according to the movements along the continuum (Collis and Hussey, 2014).

3.2.1. Positivism

One of the most traditional philosophies, positivism is underpinned by the belief that reality is independent and external to the researcher, hence there is only one reality and the aim is to discovery theories based on observation and experiment; this will provide knowledge that can be scientifically verified (Collis and Hussey, 2014).

The positivist philosophy comprises of the application of the natural sciences to the study of social reality. However, to achieve a positivist view the researcher must understand that purpose of theory is to generate hypotheses which can be tested, and knowledge is achieved through the gathering of facts and information (Bryman and Bell, 2011; Smith, 1983).

The researcher who adopts a positivist philosophy is considered a natural scientist, who prefers to collect data about observable reality and investigates causal relationships within the data collected to create laws and test hypotheses, it permits the anticipation of phenomena and its control (Collis and Hussey, 2014; Saunders *et al.*, 2012). The common positivist research strategy is quantitative methodology, based on large samples and statistical data analysis.

Table 9 portrays several characteristics of positivist researchers. One of these is related to the distance between the researcher and the subject under research. This is the concept of value-free, and is based on the rigid separation of the relationship between researcher and subject; at this point the research is undertaken as far as possible and it creates the assumption that ‘the researcher is value neutral’ (Saunders *et al.*, 2012).

Due this point of view where the researcher is separated from their context and other assumptions such as only one reality, positivist philosophy received considerable criticism, thus a new and alternative philosophy emerged, called interpretivism (Collis and Hussey, 2014).

3.2.2. Interpretivism

Interpretivism emerged as an alternative to positivism. The aim of interpretivism relies on understanding human behaviour rather than explaining it (Bryman and Bell, 2011; Maylor and Blackmon, 2005). The interpretative approach is made in time and context; according to Lee and Lings (2008), one is unable to separate knowledge of a phenomenon from its context.

Interpretivist researchers advocate that social reality is subjective and socially constructed, and that there are multiples realities. Hence it is impossible to separate people and the social context, and the researchers are not objective but part of the context that they are researching (Collis and Hussey, 2014).

The relationship between researcher and subject can be considered interactive, cooperative and participative, at this point, the aim of the interpretivist researcher in the context is to understand the social phenomena rather than measure and explain them with a positivism approach (Collis and Hussey, 2014; Lee and Lings, 2008; Maylor and Blackmon, 2005).

The interpretivism paradigm works with qualitative data providing meaning of analysis and understanding rather than rules and statistical generalizability (Smith, 1983; Yin, 2003).

Table 9 provides assumptions about interpretivism and positivist philosophy and also highlights the epistemological and ontological considerations about these two main philosophies.

3.3. Epistemological and Ontological Considerations

Ontology and epistemology are the two major ways of thinking about research philosophy (Saunders *et al.*, 2012). The positivist and interpretivist paradigms have some different assumptions in terms of ontology and epistemology (Table 9).

Ontology is concerned with the nature and belief of reality itself (Lee and Lings, 2008; Saunders *et al.;* 2012). The ontological view of the positivists is that social reality is objective and external to the researcher, hence there is only one reality (Collis and Hussey, 2014). Whereas the ontological view of the interpretivists is about multiple realities, which are subjective and socially constructed. The citation made by Collis and Hussey (2014) about Mercier's book '*Night Train to Lisbon*', is clearly ontological thinking; the citation is 'Life is not what we live; it is what we imagine we are living' (Mercier, 2009, p. 214).

Epistemology is concerned about what constitutes acceptable and valid knowledge (Collis and Hussey, 2014; Saunders *et al.,* 2012). Moreover, it expresses the relationship between the researcher and what is researched.

The epistemological beliefs of the positivists are based on understanding that knowledge comes from objective evidence about observable and measurable phenomena, and the researcher is distant from the phenomena under investigation. In contrast, the epistemological view of the interpretivists is that knowledge comes from subjective evidence from participants and the researcher interacts with phenomena under study (Table 9).

The ontological and epistemological assumptions will influence and underpin the paradigm decision either positivism or interpretivism.

Table 9 - Positivism and Interpretivism Paradigm

Assumptions	Positivism	Interpretivism
Ontological assumption (the nature of reality)	Social reality is objective and external to researcher. There is only one reality.	Social reality is subjective and socially constructed. There are multiple realities.
Epistemological assumption (what constitutes valid knowledge)	Knowledge comes from objective evidence about observable and measurable phenomena.	Knowledge comes from subjective evidence from participants.
Research aim	Explanation and prediction	Understanding
Relationship between researcher and subject	Rigid separation. The researcher is distant from phenomena under study.	Interactive, cooperative and participative. The researcher interacts with phenomena under study.
Desired Information	How many people think and do a specific thing.	What some people think and do, what kind of problems they are confronted with and how they face and react with them.
Methodology	Survey, quasi experimental, outsider looking in, extensive and general.	Ethnography: insider seeking. Case Study.
Type of Data	Quantitative, systematic and precise; directly observable and measurable; large samples.	Qualitative, Intangible, subjective conceptions and interpretations of actors; intensive and contextual, detailed, penetrating 'processual' written texts; small samples; in-depth investigation.
Techniques of Data Collection	Self-completion questionnaire, structured interviews, simulation, use of secondary data.	Participant observation, unstructured interviews, textual analysis.

Source: Adapted from Collis and Hussey (2014); Creswell (1994); Pizam and Mansfeld (2012); Wass and Wells (1994); Saunders *et al.* (2012).

The process of choosing one philosophy rather than other can be a pitfall in terms of trying to find the best one. Indeed, no research philosophy is better than another, however there is research philosophy that best suits the answer to the research question (Saunders *et al.,* 2012).

According to Smith (1983), each approach brings different procedures and has different ontological and epistemological implications. One is concerned with laws and hypothesis generation, whereas the other seeks understanding that can be socially constructed.

The relevance of choosing a suitable philosophical paradigm is advocated by Saunders *et al.* (2012). The authors explain that the research philosophy adopted by the researchers can be assumed as the way that they view the world. This will generate assumptions that will underpin the research strategy and methods choice.

3.4. Justification of the Research Philosophy

Considering the ontological and epistemological assumptions in each philosophical approach, it is possible to state that the orientation of this research is interpretivism. It is justified by the nature of the research question and the aim of the research. In an uncharted environment, interpretivism seems to be more suitable to achieve the aim of the research.

It is also justified due to the research aim to understand the barriers to implement lean in the emergency level of the Brazilian public healthcare system (UHS). However, to access this information interviews and observation will be carried out to access people's knowledge. Thus, this research process will be conducted with an inductive, interactive and cooperative relationship between participants and researcher, who will interact with the subject under investigation.

Moreover, the knowledge in this research will be socially constructed accessing subjective evidence from people's (ECU and ED staff, physicians, patients, lean management consultants, staff from lean private hospitals) point of view in time and context (the emergency level of the Brazilian public healthcare system).

Furthermore, this research aims to access people's minds, their actions in context and how they face and react with the problems in their routine. This includes accessing intangible qualitative data using an in-depth investigation.

Thereby, the interpretivism approach in this research is justified for providing more suitable understanding of the research issues as well as bringing a more interactive and

participative approach during the data collection as required to answer this research problem. Table 9 illustrates the interpretivist assumptions that correlate with the research aims.

3.5. Qualitative Research

Once the philosophical assumption is defined, the next step is to define the methodological choice, which includes the definition of the qualitative approach and methods to access the data.

The qualitative research can be distinguished from quantitative in terms of accessing and analysing data. According to Saunders *et al.* (2012), qualitative research is associated with methods of data collection such as interviews or observation, also with data analysis and the use of non-numerical data.

The qualitative research is suitable to be conducted when a problem needs to be explored and also to identify variables that cannot be measured or hearing what is called 'silenced voices'. Indeed qualitative research aims to understand the context, empowering individuals to share their stories (Creswell, 2013).

Bryman and Bell (2011) advocate that qualitative research emphasizes an inductive approach and relationship between theory and research, and the view of social reality is constantly shifting.

There are several characteristics of qualitative research, Creswell (2013) underscored nine: 1) is conducted in a natural setting, a source of data for close interaction; 2) relies on the researcher as key instrument in data collection; 3) multiple methods to access data; 4) involves complex reasoning going between inductive and deductive; 5) focuses on participants' perspectives, meanings and multiple subjective views; 6) is situated within the context; 7) involves an emergent evolving design rather than tightly prefigured design; 8) is reflective and interpretive; 9) presents a holistic, complex picture.

Considering the characteristics of qualitative research as well as the focus on understanding the context, the methodological approach of this research can be considered qualitative. Thus, with this important phase defined, the next phase of this research will explain the research design and its elements.

3.6. Research Design

The research design is the process of organising, planning and writing the ideas about the research in focus (Creswell, 2009). This includes providing details about the elements of the research such as goals of the study, research framework, concrete questions and

methodological procedures (Flick, 2014; Robson, 2011). The next topic of this section aims to explain the details about each element of this research design.

3.6.1. Research Problem

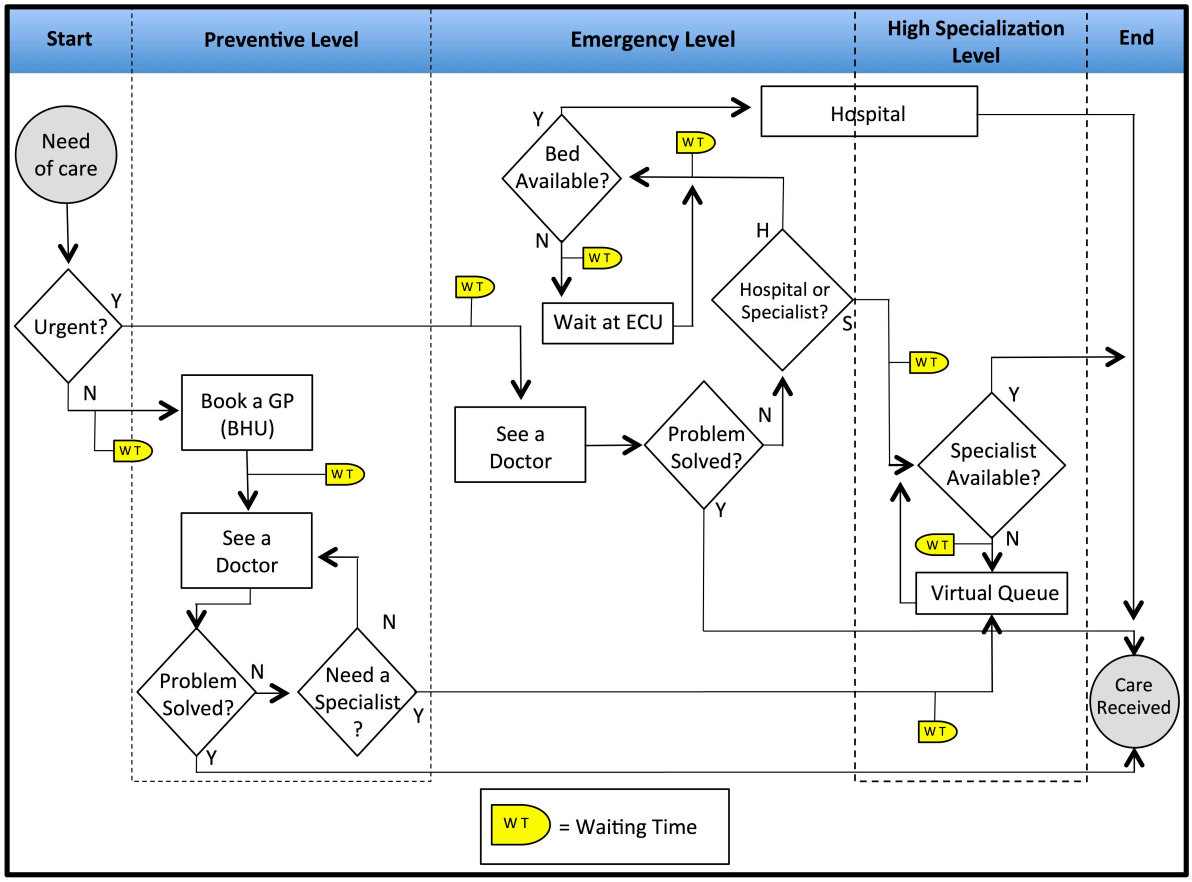
Identifying the suitable research problem is one of the most relevant phases of the research design; this process includes reviewing relevant literature, discussion with researchers and also analysis of the previous research in this area, among other important activities related to the research area (Gilbert, 2008; Green, 2008; Robson, 2011).

The research problem process was defined considering the information collected during the literature review, which revealed the main problems in the emergency level of the Brazilian public healthcare system as well as the absence of initiatives to improve these processes.

The Brazilian public healthcare system (UHS) has several problems in providing assistance for the population (Table 5). The main problems are related to waiting times such as to see a physician (general physician or specialist), perform tests (basics and specialized) and also to be transferred for a hospital bed (Almeida *et al.,* 2010; Azevedo and Costa, 2010; IPEA, 2011; Paim *et al.,* 2011; Piola *et al.,* 2009).

Those problems create several bottlenecks within the system, Figure 6 is explained during the literature review, however, it is important to revisit this figure in order to explore the context of this research. Figure 6 illustrates the main points of bottlenecks (represented by the waiting time sign) and shows that this problem is spread throughout different levels of the healthcare system. However, the emergency level is more sensitive in terms of pressure to deal with supply and demand, once this level is the main entrance door of the system and receives the majority of the patients flow within the healthcare system. Activities at this level can be performed either by an Emergency Care Unit (ECU) detached unit or an Emergency Department (ED) within the hospital.

Figure 6 – The Basic Flow of Care in the UHS Levels



Source: Author (2014); Ministry of Health (2014), CNES (2014) and ANS (2013)

The ECU and ED are considered the core of the public healthcare system. Due the concentration of problems related to waiting times, these places are acknowledged by patients as overcrowded places (IPEA, 2011). Thereby, initiatives to improve the process in these places, such as lean philosophy, might ease this problematic situation and increase the patients' coverage as well as satisfaction.

There are many examples in developed countries within the literature that demonstrate how the use of lean philosophy in healthcare can ease these types of problems as well as improve the process with positive benefits (Mazzocato *et al.,* 2012; Naik *et al.*, 2011; Radnor *et al.,* 2006; Ryan *et al.,* 2013). Such an approach for process improvements, if addressed at the emergency level, might help the Brazilian healthcare system to understand its issues and provide improvements across the UHS processes.

Despite the number of problems in the emergency level in the UHS, finding initiatives undertaken to ease this situation and improve the processes is still a challenge in Brazil. Moreover, there is a lack of literature published in English about lean initiatives in Brazil; scarce information about these initiatives was found in Portuguese. Some of these papers are

restricted to improvements in private hospitals as well as pilots in specifics areas, and some initiatives are not published in academic databases (Bertani, 2012; Lean Institute, 2014; Silberstein, 2006). This statement is sustained by Brandao de Souza (2009): during an in-depth literature review carried out about lean healthcare only one case (pilot) of lean in Brazilian healthcare was found.

Despite the few cases found within the literature, none of these were about an approach to generate new ideas or theories to support future implementations in Brazilian public healthcare, but rather implementation carried out within the private healthcare system, or academic analysis performing literature reviews about overseas cases.

To sum up, this review shows several situations which contribute to a research need in the emergency level of the UHS, as follows:

a) Lean healthcare studies carried out in Brazil are scarce and more about the replication of lean techniques in the private healthcare system;

b) Not enough evidence within the literature was found about in-depth studies tackling lean implementation considering patients' and staff point of view at the emergency level;

c) There is an absence of information about the barriers to implement lean in the Brazilian public healthcare system;

d) No theoretical contribution was found about a framework to lead and support future lean implementations in the UHS;

e) There is a lack of understanding about how the Brazilian public administration, which is responsible for the UHS, can impact future lean implementations in this area;

f) There is a high concentration of operational problems that affect patients in front line operations, especially in the emergency level in the UHS.

To address these issues and pave the way for future lean implementations, an in-depth analysis at the emergency level of the healthcare system is needed. This analysis must consider the elements involved in UHS such as patients and staff members, but also an external point of view from lean healthcare specialists such management consultants as well as people with experience in lean private hospitals.

Thus, those data and the literature review made in this research draw together the research problem that represents the study's importance and need. Collis and Hussey (2014) argue that a research problem is a specific issue, which is the focus that represents the research, and also is the first step to design a research study. According to Creswell (2013),

the aim of the research problem in qualitative research is to provide a rationale or need for studying a particular issue or problem.

Thereby the problem of this research lies in the 'lack of understanding from both practice and theory of the problems faced to implement lean in the emergency level of the Brazilian public healthcare system (UHS)'.

The purpose statement that underpins the investigation of this problem is presented in the next topic of this section.

3.6.2. Research Purpose

The purpose of the research explains the general aim of the study and is also a preliminary definition of the researcher's intentions (Collis and Hussey, 2014; Creswell, 2013). A number of key words related to the research area will help to explain what the research project aims to achieve or the type of knowledge that will be produced (Gilbert, 2008; Green, 2008). This information can be summarized with the purpose statement, as follows:

- **To understand the barriers to implement lean in the emergency level of the Brazilian public healthcare system (UHS).**

This process includes an exploratory study to access the main barriers in this process of transferring lean philosophy into the emergency level of the Brazilian public healthcare system.

The research purpose was built considering Robson's (2011) thoughts about this phase of the research design; the author advocates that the purpose of the research must convey what the study is trying to achieve, understand, describe, assess or explain.

3.6.3. Research Question

The research question definition is a process that involves several steps, starting from a general area of interest and moving on to a specific question and sub-questions. To generate the question for this research, the process was based on the model developed by Bryman and Bell (2011). This model suggests 4 basic steps: 1) to select a research area; 2) to select a specific aspect of the research area; 3) to define several research questions; 4) to select suitable research questions.

Considering this information and narrowing the focus to the emergency level within the UHS, the research question has arisen. Thereby, the research question is based on the literature review data, which provide evidence that the emergency level has a considerable

number of operational problems, especially those related to waiting times and also the absence of lean initiatives to improve the processes.

This scenario within the UHS, which combines problems related to waiting times and the lack of process improvements initiatives, draws together an opportunity to carry out original research about the barriers for lean implementation in the emergency level of the UHS.

Among all these situations, the central question that arises is:

- How to understand the barriers to implement lean in the emergency level of Brazilian public healthcare system (UHS)?

The sub-questions, which underpin the main question, are:

a) What are the main barriers to implement lean in the emergency level of the UHS?

b) How can the Brazilian public administration model impact the lean implementation in the emergency level of the UHS?

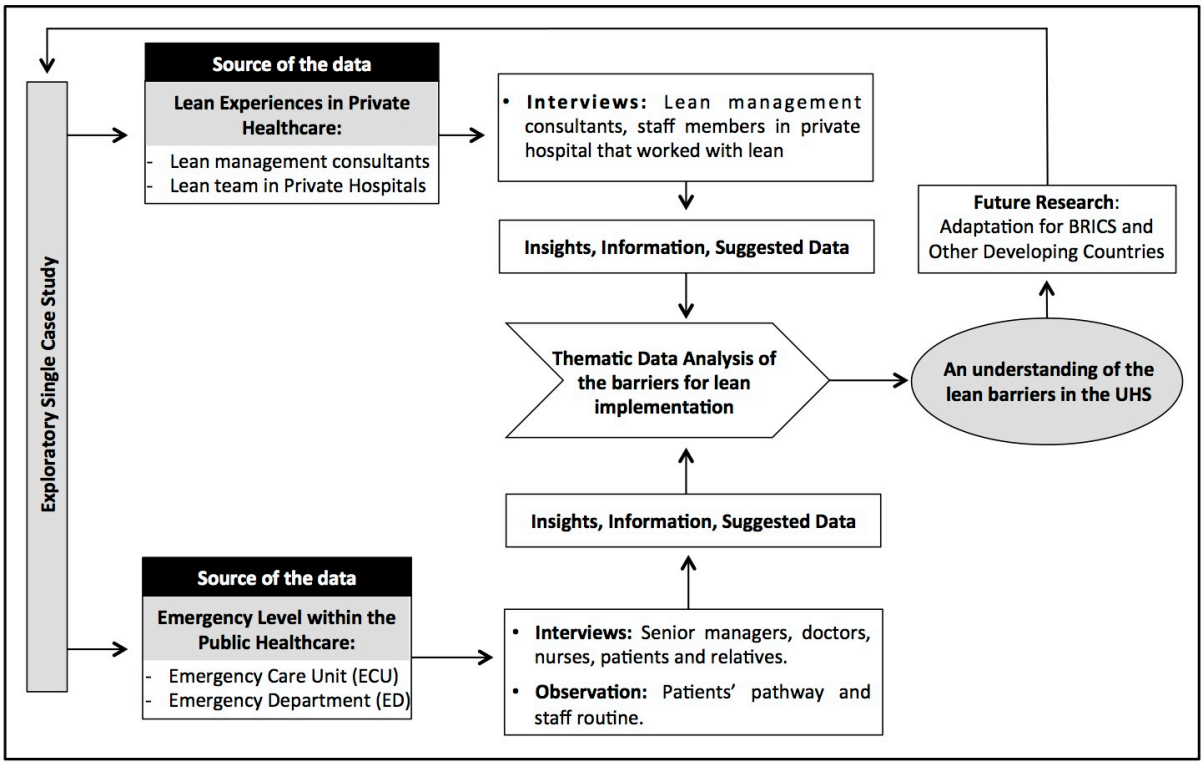
Those questions together aim to provide a relevant and original research within the emergency level of the Brazilian public healthcare system.

3.6.4. Research Framework

To provide a visual description about the research intentions, a research framework was built (Figure 7). According to Robson (2011), a framework forces the researcher to make explicit the ideas and planning about future research. It also provides knowledge and help to explain the details about which features are important, the meaning of the elements involved and the type of data that will be accessed.

Figure 7 portrays the research framework, which provides summarized information about elements involved in this research, for example, methodology, population, methods, expected type of data and outcomes.

Figure 7 – Research Framework



Source: Author (2014)

The methodology and methods will be explained in depth subsequently in this section. However, at this point the methodology for this research is a single exploratory case study, and the methods to access the data will be interviews and observation from four different sources.

3.6.5. Data Collection Sources

The research framework (Figure 7) depicts about four sources to collect data; two of these sources in lean private healthcare: lean management consultants and lean team or staff in a private hospital that had lean implemented; and two of these sources in the UHS: one emergency care unit and one emergency department. To understand the equivalence of these sources, it is necessary to connect with the aim of this research, which is 'how to understand the barriers to implement lean in the emergency level of Brazilian public healthcare system (UHS). Nevertheless, Brazil has a lack of lean projects in public healthcare. In contrast, the private healthcare system has already implemented different lean projects.

Thus, to understand the barriers to implement lean in the UHS, first it is necessary to understand these sources in private and public settings:

a) Lean experiences in private healthcare: this can be divided in two main sources: lean management consultants and staff members as part of a lean team in a private hospital which has already implemented lean. Lean management consultants are considered people with high-level of knowledge and domain of the lean philosophy, principally with experience in the healthcare sector. Some examples of these practitioners are management consultants in the lean area (local Lean Enterprise Academy or Institute, consultancy offices). The data expected from this source is related to their experiences implementing lean across the private healthcare system, possible barriers faced during this process, parallels between the private and the public system, their point of view about lean within the UHS as well as any general lessons learnt that can be applied in the public healthcare system as well.

   Staff in a lean private hospital might contribute with their own experience in this field and highlight the main barriers for lean implementation and make a parallel with the public healthcare system.

   In order to collect the data, both lean management consultants and staff in the private hospital will be interviewed to access information from their previous experience in work with lean projects in healthcare. Saunders *et al.* (2012) argue that interviews with practitioners and experts in the subject are a great method to access the data needed.

b) Emergency level within public healthcare: the EDs in public hospitals and ECUs are places to collect data about the current and real situation in the public healthcare system. Observation and interviews in these places shall consider people involved in this process of co-production such as staff members and patients. Their point of view associated with patients' pathway observation and analysis might reflect the barriers for a lean implementation (culture, regulations, resources, process).

   Their lack of knowledge about the lean philosophy in a primary approach can be a challenge to access suitable data, however to tackle this issue and ease it, an induction kit about the main lean principles as well as visual examples of the implementations within the healthcare area will be provided in order to acknowledge these people. With this information provided beforehand they will be able to make comparisons about lean being implemented in their context. This lean induction kit will be comprised of:

i. A popular local newspaper article about lean implementation in Brazilian hospitals and its benefits, which will be provided beforehand and they will be asked to read it.

ii. On the day of the interview a short presentation will be carried out for the interviewer with the following content: before and after pictures with lean implementation scenarios considering visual management, standardization, lean tools and staff involvement; lean principles, such as seven means of waste reduction, value and flow; to summarize the presentation a list of lean benefits will be shown.

iii. After the presentation, three questions for validation of the knowledge will be made: 'A) in your point of view, how do you define lean? B) How can lean be implemented or related to your work? Please provide examples; C) After everything that you read and was presented to you, what attracted your attention about lean applications within the healthcare area?' If the answers match the lean philosophy criteria, then the interviewee is ready to be interviewed, however if the answers are wrong or seem to be confused, then the interviewee will be refused and another candidate will be selected.

Performing this lean induction kit, following carefully all phases described above, is expected to gather superficial but necessary knowledge from the interviewees' answers, based on their experience and relate it to a possible lean implementation. A test of the reliability of the lean induction kit will be performed and details about it will be provided in the 'pilot' section of this chapter (Section 3.12).

The description of private and public in this section explains how they are equivalent and relevant for this study. Moreover, it shows that collecting data in multiples sources and undertaking different methods such as interviews and observations, enables the triangulation of the data and ensure that the evidence reflects the consistency of the findings (Denzin, 1978; Patton, 1999).

3.6.6. Expected Data from Barriers

The research purpose aims to understand the barriers to implement lean in the emergency level of the Brazilian public healthcare system. It means the need to consider analysis of the current process and mapping these barriers. To clarify the research purpose it is important to understand what data from barriers in this research context mean:

- Barriers: might represent everything along the current process, which in a certain way constrains the healthcare system or is a point of limitation for some process improvements initiatives, for example, but not limited to, staff behaviour, patients' treatment, local culture, training background, laws and regulations, politics, resources (Bhasin, 2011; Brandao de Souza and Pidd, 2011; Radnor *et al.,* 2006). The Table 8 within the literature review chapter depicts the main barriers identified within the literature.

The data analysis process will provide the barriers that emerged from four sources during the data collection.

3.6.7. Research Outcomes

The information from lean barriers analysed from a holistic point of view and considering lean as a source of improvement will underpin the process of building a new understanding of lean implementation in the Brazilian public healthcare system. The research outcomes are not limited to the theoretical field, but will extend beyond the theoretical thoughts, which means an opportunity to be tested on future lean implementation in developing countries, or more specifically in this case the UHS.

a) Theoretical contribution: a new body of knowledge and understanding about the constraints that lean philosophy might face in the public healthcare system specifically in developing countries such as Brazil.

b) Practical contribution: the contribution to the practice of this research aims to support lean practitioners and management consultants to understand the impact of Brazilian public administration in lean implementation as well as the barriers that impact the lean journey.

Indeed, there is a third contribution in this research, about the contribution for future research in BRICS countries, which is the replication of these findings in developing countries, with local and cultural adaptations.

3.7. Research Justification

The literature review depicted two main points related to the subject of this research. First, the Brazilian healthcare system as an example of many developing countries has a public system with a great number of problems. Second, initiatives to improve the processes and

ease the problems are rare in the Brazilian public healthcare system. Some techniques such as lean philosophy were found in the private system, but with lack of initiatives in public system, according to the literature reviewed (Bertani, 2012; Brandao de Souza, 2012; Lean Institute, 2014; Silberstein, 2006).

This situation with problems and lack of process improvement initiatives draws together a scenario that demands in-depth research to understand this unknown field as well as to identify the applicability of lean in the emergency level of the Brazilian healthcare system.

The literature portrays different research about lean application in healthcare systems in developed countries such as Australia, the United States and the United Kingdom (Ben-Tovim *et al.,* 2008; Brandao de Souza, 2009; Womack *et al.,* 2005), however research about this subject in developing countries is scarce. This lack of research in these countries might be justified by the differences between developed and developing countries in terms of priorities, resources, culture, knowledge and living standards, among others. According to the literature reviewed the impact, the effect or even the applicability of lean philosophy in an uncharted field such as the Brazilian public healthcare system is unknown.

This research will represent a new understanding and contribution to the knowledge for future research in terms of transferring lean philosophy into the public healthcare system in a developing country. Moreover, the results of this research might be adapted for other developed countries in future research.

In terms of the access to data collection sources, there is a well-established relationship between the researcher and the UHS director (specific areas), and they have shown a great intention to contribute to this research (as a source of data collection) as well as to take advantage of the future outcomes.

3.8. Research Methodology

Defining the correct methodology and methods is one of the first and important activities to choose after the research problem development. This phase of the research is crucial to provide reliable data. However, it is important to highlight the difference between methodology and methods. Collis and Hussey (2014, p.59) argue that ‘methodology is an approach to the process of the research, encompassing a body of methods. A method is a technique for collecting and analysing data’.

The research can be classified in terms of purpose, process, logic and outcome. The research purpose is the reason why the research will be carried out; the research process is the

way in which data will be collected and analysed; research logic shows whether the research is inductive or deductive; the research outcome is the solution to a particular problem or a general contribution to the knowledge (Collis and Hussey, 2014).

In terms of research purpose Sunders *et al.* (2012) define it as exploratory, descriptive and explanatory, Table 10 portrays details about these research typologies.

Table 10 – Research Typology

Research typology	Description
Exploratory	- It is carried out where there are few or lack of studies to which it is possible to refer to for information about the nature of the issue or problem. - It is a valuable, flexible and adaptable means to conduct interviews with 'experts' or more in-depth individual interviews to discover what is happening in this environment. - It looks for patterns and ideas rather than testing hypothesis.
Descriptive	- It aims to gain an accurate profile of events, persons or situations. - It goes further in examination of a problem. - It is conducted to describe phenomena as they exist. - It needs a clear picture of the phenomenon before to collect the data.
Explanatory	- It establishes a causal relationship between variables. - It analyses and explains why or how the phenomenon is happening. - It aims to understand.

Source: Collis and Hussey (2014) and Saunders *et al.* (2012)

Regardless of differences in research typologies, they work as complementary to or an extension of each other (Collis and Hussey, 2014; Saunders *et al.,* 2012). Nevertheless, due the nature of the exploratory research and also its adaptability to discover what is happening in the environment under investigation, it seems more suited for this research to be classified as exploratory research.

In terms of research logic, it lies in inductive or deductive (Collis and Hussey, 2014). Robson (2011) argue that an inductive approach is related to explore a topic and develop a theoretical explanation; the deductive approach will be related to a theoretical position which will be tested.

Considering the aim of this research, which is ‘to understand the lean barriers in an uncharted field’ as well as the exploratory nature of this study, the research logic can be classified as inductive.

3.9. Sampling Strategy

Defining a sampling strategy is a relevant and complex activity during the research process; a misconception in this phase can produce either incorrect or lack of data, and this will threaten the data collection outcomes. Robson (2011) argues that the sampling size or strategy is a common question among novice researchers, however the answer is not straightforward and it will depend on the situation.

Thus, the outset of a sample strategy lies in the understanding of population and sample concepts. Collis and Hussey (2014) define population as a group of people in a context under investigation. In this case if the population is relatively small the researcher can select the entire population and carry out the research. Saunders *et al.* (2012) define this possibility to collect data with the entire population as a census, however when the population size is larger than the resources and possibilities available, the researcher needs to define a subset of this population, which is called a sample.

There are two types of sample, random and non-random, also known as probability and non-probability sampling (Saunders *et al.*, 2012). However, using qualitative research the non-random sample is more common. There are several methods for non-random sample, however Collis and Hussey (2014) underline the three main methods of non-random sample as: snowball or networking, purposive or judgemental and convenience or natural (Table 11).

Table 11 – Typology of Sampling

Sampling Technique	Description
Snowball or Networking	- It is used in studies where is essential to include people with experience of the phenomenon being studied in the sample. (Collis and Hussey, 2014). - It identifies cases of interest from people who know people who know what cases are information-rich (Miles and Huberman, 1994).
Purposive or Judgemental	- The researcher needs to use its own judgement and interest to select cases that will best enable to answer the research question and meet the research aims (Robson, 2011; Saunders *et al.,* 2012). - Participants are selected by the researcher judgement on the strength of their experience of the phenomenon under study (Collis and Hussey, 2014).
Convenience or Natural	- The researcher has a little influence on the composition of the sample, which involves selecting cases haphazardly only because they are convenient available (Collis and Hussey, 2014; Saunders *et al.,* 2012). - It is convenient because saves time, money, effort, but at the expense of information and credibility (Miles and Huberman, 1994).

The unit of analysis of this research is the emergency level of the UHS, Collis and Hussey (2014) advocates that the unit of analysis represents the phenomenon under investigation, about which the data are collected and analysed.

The researcher will carry out a single case study in the emergency level of the UHS, collecting data from four sources, the population of these case study can be divided in two:

1) Lean management consultants and staff in lean private hospitals;
2) Clinical staff, physicians and patients from ECU and ED in the UHS.

Clinical staff, physicians and patients across the EDs and ECUs, represent an enormous population, which creates several constraints to collect data from every patient and all staff of the UHS, especially considering the continental dimensions of Brazil.

Thereby, due the population heterogeneity and size, as well as the time and resources available to perform this data collection, it is not possible for this researcher to carry out data collection with the entire population, or achieve the census (Saunders *et al.*, 2012). In this case there is a need to select a sample to represent a part of this population.

The nature of this research is a qualitative study, which means that non-random sampling can be used, applying one of the techniques available (Table 11). Considering the

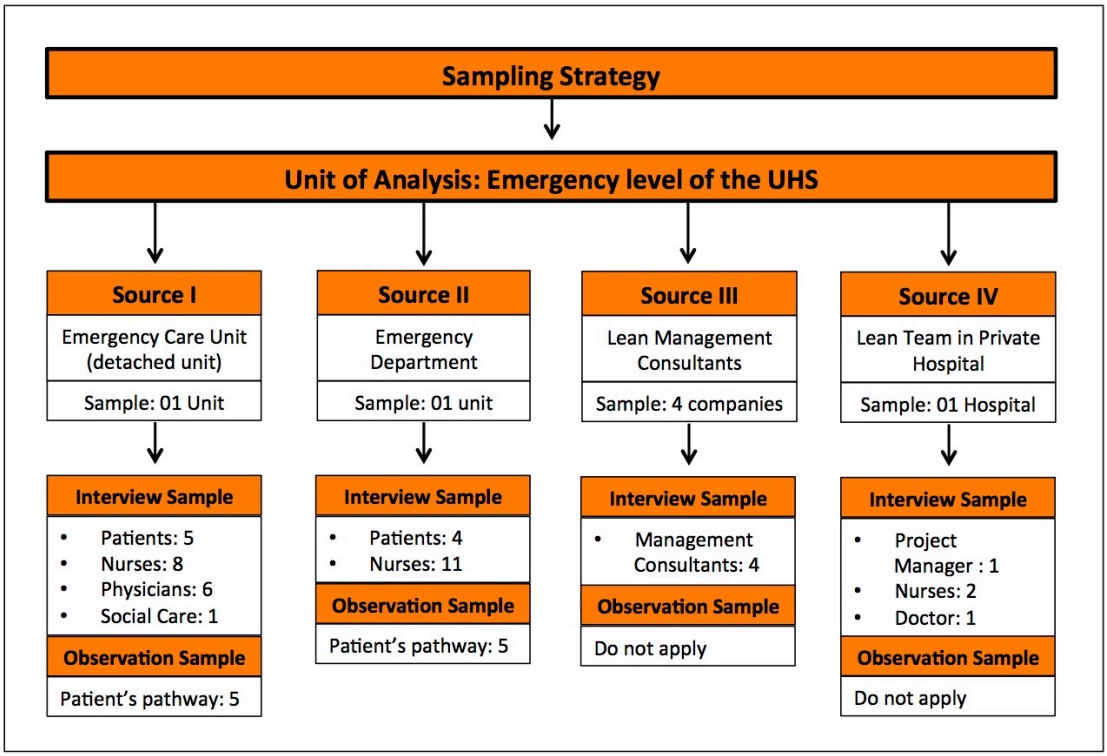
aim of this research, which is to understand the barriers to implement lean in an uncharted environment, the purposive sampling technique seems to be more suited to achieve the research aim with both populations. Robson (2011) advocates that purposive sampling enables the researcher to satisfy their specific needs within the research process.

Following Robson's (2011) thoughts about the purposive sampling technique, the needs of this research lies in the need to access primary data from a selected group of people with specific information and experience, which is people from the Brazilian healthcare system, lean management consultants and lean teams from private hospitals. These groups have very specific knowledge and experience in this context, especially in the case of the group in private healthcare with experience in healthcare implementation.

Finding lean management consultants with experience of lean in public healthcare might be a challenge, mainly because only a few lean healthcare projects (small initiatives) were carried out in this country (in the public setting), according to Brandao de Souza (2009). Thus, performing purposive sampling technique will enable access to suitable information through their experience of the phenomenon under investigation, which will satisfy the research needs (Collis and Hussey, 2014; Robson, 2011). In private healthcare, more lean projects were found, therefore interviews with staff members from lean private hospitals will also follow the purposive sampling technique.

Clinical staff and patients from ECU and ED will form a sample with experience at this emergency level of the Brazilian healthcare system. Performing purposive sampling technique will provide information from people's experience in terms of patient experience and the operational routines of staff.

Figure 8 – Sample Strategy and Size



Source: Author (2015)

Figure 8 displays the research sample size, considering the four main populations selected for this single case study as follows: emergency care unit; emergency department; lean management consultants, lean teams in private hospitals.

The sampling technique will be purposive and people will be selected according their availability and opportunities to collect data in each environment; in this case different sizes will be selected. For example, source I has the largest sample, in that this is justified due the nature of this place, where staff and patients are more available for interviews and observation; also the researcher has more access in different areas and different times in this place.

Source II has a smaller sample, justified by the nature of their activity which is considered intense work as a trauma centre, and in this place there is always someone's life in danger. The researcher has limited access and time to carry out the data collection in this environment. In terms of lean teams in private hospitals the data collection will be performed with staff members that have experience implementing lean within the hospital. The number of management consultants was defined based on their availability, but also limited to those who were involved in the main lean healthcare events in Brazil.

There are several reasons, which justify the size of this sample, but the most important lies in the time and resources constraints to carry out and analyse an extensive data

collection from interviews and observation. A tentative attempt to exemplify these limitations for data analysis is presented by Saunders *et al.* (2012). In an illustration about the time needed to transcribe audio-recordings, the authors indicate that it can take 6 to 10 hours to transcribe every hour of audio-recording. Nevertheless, it is important to highlight that the interviews and consequentially the audio of this data collection will be in Portuguese, which represents additional time spent translating it into English.

In terms of venues of the emergency areas, the ECUs' and EDs' operations and medical procedures performed are standard in all units across the country. The only variation that might occur is about the demand according to the population size around this ED or ECU.

Notwithstanding, it is possible to state that there are advantages of choosing a sample with only one ECU and ED, which is the possibility to carry out more focused and in-depth research in these environments. However, there are disadvantages of performing single case studies, such as the lack of comparison with a large sample.

3.9.1. Management Consultant Selection

Following the purposive sampling strategy the lean management consultants were selected based on their knowledge and experience with lean projects in the healthcare area; to find these professionals the researcher carried out research with the local Lean Institute. The Lean Institutes are well known organisations established in different countries around the world such as the USA (Lean Enterprise Institute, 2015), the United Kingdom (Lean Enterprise Academy, 2015), Australia (Lean Enterprise Australia, 2015) and Brazil (Lean Institute Brasil, 2015), among others. According to the Lean Global Network (2015) the organisation which gathers together all lean institutes around the globe, these institutes 'promote lean thinking and provide leadership to help organisations with their lean transformation.'

In November 2013 the Lean Institute promoted an event in Brazil focused on lean healthcare. According to the Lean Institute Brazil (2013), four hospitals had the opportunity to share their knowledge and experience in lean healthcare. Three of these hospitals were Brazilian and the other was a case about an American hospital.

Thereby, considering the lean transformations carried out in these local hospitals, the lean consultants responsible for such projects were selected to become part of this interview sample. Moreover, the Lean Institute consultant responsible for the healthcare projects was selected to become part of this sample'.

3.9.2. Staff Members from Private Hospital Selection

Following the purposive sampling strategy, the staff members from the private hospital will be selected based on their experience as part of the lean team in the hospital. The leader of the project or the project manager will be asked to indicate a group of possible participants with solid experience.

Considering that access to a private hospital might be a challenge, the sampling strategy to select the hospital will be both purposive and snowball. The hospital was first selected based on its reputation amongst the other lean hospitals; the main criteria considered were about lean results published in local media. In order to establish contact and access within this hospital, the lean management consultants networking was crucial.

3.9.3. Single Case Study Selection

Considered as a study within the real life context or setting (Yin, 2009), the case study is defined for many authors as a methodology. This is also a qualitative approach in which the researcher explores the real life context over time, carrying out in-depth data collection such as observations, interviews, documents and reports (Collis and Hussey, 2014; Creswell, 2013).

There are different areas of knowledge that apply case study to understand problems in real life, such as psychology, sociology, social work, business, education and nursing. The focus of this type of approach is to contribute to the knowledge of individual, group, organisational, social, political and related phenomena (Yin, 2014).

Robson's (2011, p. 136) statement summarizes the definition for case study: it is 'a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple sources of evidence'.

In terms of typology, the case studies can be distinguished by the size of the bounded case, such as if the investigation involves one or several individuals, a group or an entire programme, or an activity (Creswell, 2013). Thereby, the variations of case study can be either single or multiple.

Yin (2014) underlines five reasons for single case study choice, as follows: when it represents the critical case in testing a well-formulated theory; where the case represents an extreme case or a unique case; where it is representative of a typical case; where it is a revelatory case; and a longitudinal case. Saunders *et al.* (2012) summarize the single case study conduction. The authors argue that this type of case study is often used where it

represents a critical or a unique case, in other words, it can provide an opportunity to observe and analyse a phenomenon that few have considered before.

In contrast, in several studies it is appropriate to study more than a single case. It will provide more information, such as findings, patterns and more specific data; in this case the researcher should consider to undertake a collective case study (Robson, (2011). In a multiple or collective case study, an issue or concern is selected, however the enquirer selects multiple case studies to illustrate or investigate the issue (Creswell, 2013).

The case study typology in this research will be chosen based on the research objectives and question as suggested by Saunders *et al.* (2012). The aim of this research is 'to understand the barriers to implement lean in the emergency level of UHS', which means accessing data from different sources such as ECU, ED, lean management consultants, lean teams in private hospitals. The data collected from these sources are expected to answer the research question (section 3.6.3) and aim (section 3.6.2).

Considering all this information about research objectives and questions, the single case study typology is more suitable for this research, using multiple sources of evidence, or in this research four different sources. Bryman and Bell (2015) advocate that using different sources of data can provide a cross-checking or triangulation of the qualitative data and allows access to different levels of reality. Furthermore, single case studies have been used by different scholars in the operations management field (Karlsson and Ahlstrom, 1995; Narasimhan and Jayaram, 1998; Schonberger, 1982).

As show in Figure 8, the single case study will be carried out in the emergency level of the UHS, which is comprised of emergency care units and emergency departments across the country:

a) **<u>One Emergency Care Unit – ECU (detached unit).</u>**

   As previously explained in this research (Section 2.4.2.1), the ECUs work as an extension of the hospital performing similar activities to an emergency department; nevertheless it is a detached unit, without any physical connection to a hospital (Eitel *et al.*, 2010; Ministry of Health, 2014). The ECU's management is the responsibility of the City Hall, however a great part of the financial resources comes from the UHS.

b) **<u>One Emergency department – ED (within the hospital).</u>**

   Similarly to ECUs, EDs perform activities of urgency and emergency, however the main difference is the physical connection within the hospital, and the ability to cope with major traumas (Calleja and Forrest, 2011).

The selection of the ECU and the ED to collect the data was based on purposive sampling strategy, as advocate by Robson (2011) the researcher uses his own judgement and interest to select cases that will best enable answering the research question. Understanding that the access to these units would provide invaluable information related to barriers to implement lean in emergency areas of the healthcare, these two units were selected.

The methods which will be carried out to access in-depth data will be explained in the next topic.

3.10. Methods

The research methods represent the way to collect the data; this can be considered the tools that will support the research methodology to access the data needed. Saunders *et al.* (2012) define methods as techniques and procedures.

To support the case study approach, it is necessary to define some methods to support the data collection procedures. Creswell (2013) advocates that there are multiple sources to collect data in case study, for example, interviews, observations, documents and artifacts. However, interviews and observation are more suitable to support the research question answer process.

The use of different methods is also known as the triangulation technique, which supports the consistency of findings generated by different data collection methods to study social phenomena (Denzin, 1978; Patton, 1999).

3.10.1. Interviews

Interviews are one of the common methods to access data in case study research (Yin, 2014); they can be conducted with individual or groups, using a variety of methods such as face-to-face, telephone and online. However, the first step of the interview is to clarify what information is needed, and how to access the right people who can supply this information. But the most important aspect will be approaching and encourage interviewees to provide the information needed (Collis and Hussey, 2014).

There are different types and styles of interviews. Robson (2011) highlights the three main types: 1) fully structured interview: has predetermined questions with fixed wording; 2) semi-structured interview: the interviewer has a checklist of predetermined questions or topics, but the wording and order can be modified or more unplanned questions can be added

based on the flow of the interview; 3) unstructured interview: the interviewer only has an area or topic of interest, but lets the conversation develop within this area.

Considering the purpose of this research, which is to understand the barriers for lean implementation within the emergency level of the Brazilian public healthcare system, semi-structured interviews are the suited method to access data with staff and patients in the UHS, lean management consultants and staff in hospitals.

The interviews with patients in emergency level aim to understand according to their point of view the main problems to receive treatment at the emergency level. The interviews with staff in the emergency level aim to understand the barriers and opportunities to implement lean in this environment. They will be briefly introduced to the lean philosophy and will be asked about lean in their environment.

According to the research summary (Table 5), each interview question is connected to one research sub-question and must be answered by different interviewees. The duration of each interview is estimated at 45 to 60 minutes for staff and practitioners; for patients this time tends to be shorter, between 20 and 30 minutes each. However, this time is only an estimate – due to the nature of the semi-structured interviews, this time can be either sufficient or insufficient.

3.10.2. Observation

The observation is considered one of the key tools for collecting qualitative data in the real world; through this natural technique it is possible to watch and analyse people's actions and behaviours in a laboratory or natural setting, as well as interpreting what was observed (Collis and Hussey, 2014; Creswell, 2013; Robson, 2011).

The researcher, or in this case the observer, in different degrees is involved with the situation under observation. The literature underscores the three main types of participant observation: complete participant, observer as participant and participant as observer (Robson, 2011; Saunders *et al.*, 2012).

The complete participant has the full engagement of the researcher as a member of the group that is under observation; an advantage of this model is the strong relationship established with the group and participations in their decisions. In the participant as observer model, the researcher tries to establish close relationships with members of the group and they know the research purpose. Observing the activities, the observer can ask members to explain various aspects of what is going on. The observer as participant takes no part in the activity but his status and purpose as a researcher is known among the participants;

sometimes it is necessary to take a participant observer technique to access some data and have interaction with informants (Robson, 2011; Saunders *et al.*, 2012).

Considering one of the purposes of this research is collecting data from staff and patient interaction (patients' pathway) within the public hospitals and lean private hospitals, the participant as observer model is more suitable. It is important to mention that observation in the private hospital was the initial idea, however, the hospital selected did not allow the researcher to carry out such observation. The justification for this according to the hospital was related to confidentiality, as they did not feel prepared to open their internal process to an observer.

There are two sources of observations in this research: the environments in emergency care unit (ECU) and emergency department (ED). Thereby, the observation aim in ECU and ED is to understand the main issues across the patients' pathway within the UHS emergency level. Thus, the first aim of the observation is to understand the main problems faced by patients during their journey in the UHS.

3.10.3. Description of the Observation Process

During the observation process the main objective will be look at the patients' journey in the emergency areas of the UHS, this process will be recorded in the researcher's notes from the field (type of diary of the observation). The aim is to understand the main problems faced by patients and staff members; results will be related to the issues across the patients' pathway. To achieve these results three elements will be considered: patients' pathway analysis and lean seven wastes, as follows:

I. Patient's Pathway Analysis: observation about the main problems in the ECUs and EDs considering the patient's pathway analysis from the arrival to the discharge.

   In order to support and guide the researcher during the observation data collection, some questions are relevant, such as:

   a) In terms of patient flow, what kind of problems were observed across the public process?
   b) How do they deal with problems?
   c) What is the average time waiting to see a physician in public and private emergencies? What are the main problems in the process?

d) What kind of process do the patients need to complete to see a physician? How many phases are necessary to be completed from the start point (arrival) to the end of the process (discharge).
e) How do they cope with demand variation (peaks and troughs)?

II. Seven Wastes: observation based on seven wastes analysis and how they are tackled in both the private and public context, examples adapted from Radnor (2011) and NHS Institute (2007):

a) Transportation: staff walking to the other end of a ward to pick up notes; central equipment stores for commonly used items instead of items located where they are used.
b) Inventory: excess stock in storerooms that is not being used; waiting lists.
c) Motion: unnecessary staff movement looking for paperwork; not having basic equipment in every examination room.
d) Waiting: physician to discharge patients; patients' theatre staff results, prescriptions and medicines.
e) Overproduction: requesting unnecessary tests from pathology; keeping investigation slots 'just in case'.
f) Over- or inappropriate processing: repeated clerking of patients; duplication of information; asking patients' details several times.
g) Correction: readmission because of failed discharge; adverse drug reactions; repeating tests because correct information was not provided.

To sum up this observation description process, Erikson and Kovalainen (2008) suggest some key elements to be observed, asked and answered, which are:

a) Space: what is the physical space like?
b) Actors: who is involved?
c) Activities: what are they doing?
d) Objects: what objects are present?
e) Acts: what are individuals doing?
f) Events: what kind of event is it?
g) Feelings: what is the mood of the group and of individuals?

These questions linked with the three elements of the observation (patients' pathway comparison, seven wastes and lean tools and practices) will aim to gather suitable data during the observation data collection.

The use of interviews and observations to collect the data in multiple sources will offer the triangulation of the data, and cross-checking the consistency of the data collected and analyzed.

3.10.4. The Role of the Interviewer and Bias

It is important to clarify the role of the interviewer in this data collection to limit any possibility of bias during the interview and observations. The researcher is distant from the context of this research; the only similarity is the fact that he is Brazilian and lived in Brazil, and the relationship with the ex-partner who works as a nurse in a state hospital. Apart from these two situations that do not affect the research context, there is no close relationship to the process and researcher rarely uses the services provided by the UHS. The proximity of the researcher from lean which can result in a optimistic approach, can be controlled based on the aims of this research, which is to understand barriers to implement lean, the idea is not to show that lean is a good or bad approach, but to investigate barriers related to its implementation.

The 3.10.5 section will address the research trustworthiness.

3.10.5. Research Trustworthiness

Qualitative research is evaluated in a different way from quantitative research, there is substantial discussion about research trustworthiness in qualitative specially from positivists (Bryman and Bell, 2015; Shenton, 2004). However, some scholars, such as Lincoln and Guba (1985) and Guba and Lincoln (1994) specified some terms to assess the quality of qualitative research that have been accepted by many. They addressed similar issues faced by positivists and proposed equivalent criterion:

a) Credibility (equivalent to internal validity)
b) Transferability (equivalent to external validity)
c) Dependability (equivalent to reliability)
d) Confirmability (equivalent objectivity)

In order to establish trustworthiness, credibility is one of the most important factors according to Lincoln and Gruba (1985). Bryman and Bell (2015) argue that the establishment of credibility of findings entails that the research was carried out based on good practices and that the researcher understood the social world.

The credibility can be reached using different techniques or provisions, such as the adoption of well established research methods; familiarization with the culture of

participating organizations; tactics to help ensure honestly in informants; negative case analysis; frequent debriefings sessions; peer scrutiny of research project and others (Creswell, 2013; Erlandson *et al.,* 1993; Lincoln and Gruba, 1985; Miles and Huberman, 1994; Silverman, 2000). The most common and recent techniques is triangulation, it involves using more than one method (interview, observation and focus group) or source in the study of the social phenomena (Bryman and Bell, 2015; Creswell, 2013).

Qualitative research typically addresses small groups or individuals sharing certain characteristics, thus the transferability covers the possibilities that the research findings can be applied to other contexts (Bryman and Bell, 2015). In order to provide a certain extend of transferability, Firestone (1993) argues that it is the responsibility of the investigator to provide sufficient contextual information about the fieldwork to enable the reader to make such a transfer. This information is usually provided in the methodology and data analysis, the use of 'thick description' is encouraged by Geertz (1973) to ensure the rich account of the details of a setting.

The research dependability is a parallel to reliability in quantitative research, in order to state the research dependability in qualitative research the process within the study should be reported in detail and records of all phases should be kept (Bryman and Bell, 2015; Shenton, 2004). Moreover, peers can act as auditors during the course and the end of the research to establish how far proper procedures are being followed.

Finally, the confirmability is parallel to objectivity in quantitative studies, which addresses the researcher bias. According to Patton (2005), it is difficult to ensure real distance of the investigator in the research process, as even tests, questionnaires and interviews are designed by humans. Thus, provide elements that will assure that researcher has act in good faith is crucial to active confirmability, for instance the use of triangulation to reduce the bias, also the explanation for favouring one approach when others could be taken, and weaknesses in the techniques deployed have to be admitted (Bryman and Bell, 2015; Shenton, 2004). All these elements lead to detailed information about the methodology.

Overall, the trustworthiness of this research can be assessed based on suggestions from the literature discussed above. Thus, credibility, transferability, dependability and confirmability can be justified by the use of well established data analysis methods (thematic analysis, Section 3.13) and peer scrutiny from conferences participation (Section about Publications, page 14), supervisor auditing during the period of the research, extensive description of the data in the data analysis and findings chapter (Chapters 4 and 5), definition of the role and bias of the research (Section 3.10.4). Finally, the triangulation (Sections 3.6.5,

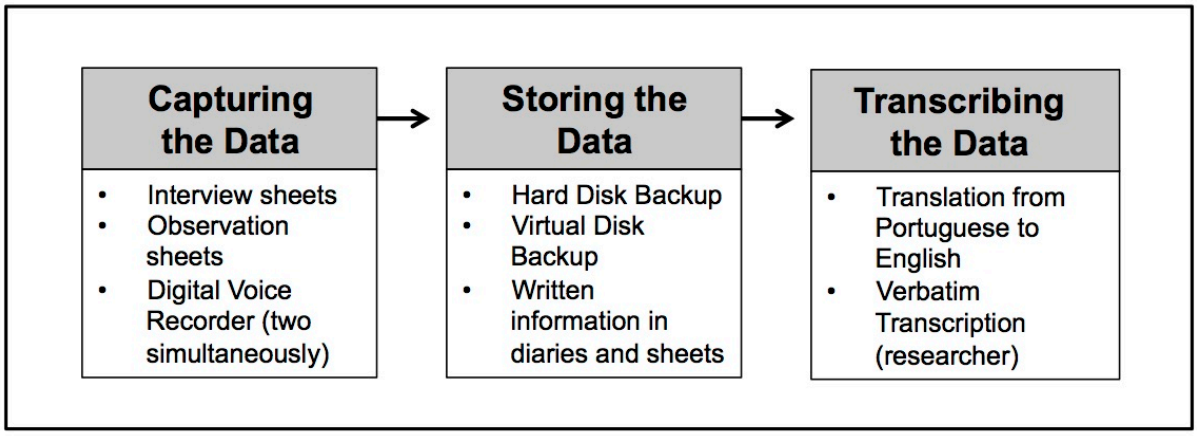
3.9.3 and 3.10.3) of different methods (interviews and observations) as well as different sources (ECU, ED, lean management consultants and staff members from lean private hospital) together with elements mentioned above assures the credibility of this study'.

The following section will address the procedures to capture the data during the interviews and observations.

3.11. Strategy to Capture Data

Capturing the data requires a considerable number of the elements in order to make this data available after the data collection.

Figure 9 – Data Capture Strategy



Source: Author (2015)

The strategy to capture data and make it available for the analysis is divided into three phases of capturing the data, storing the data and transcribing the data (Figure 9). The description of each phase follows:

I. **Capturing the data:** In this phase the researcher's concerns are related to capturing the reality about what is going on in the environment under investigation. There are different ways to capture primary data in interviews and observations, such as taped or digital recording, writing information in suitable sheets, filming the event, internet streaming, among other technologies (Saunders *et al.,* 2012).

   Thus, considering the data collection nature which is semi-structured interview and the participant as observer, the most suitable techniques are:

   A. <u>During the Interviews</u>: The data will be captured mainly by digital voice recorder and secondly by the researcher's written notes and comments in interview sheets (Appendix I). The use of this technology will support the

researcher's interview process in terms of total focus on interview and interviewee, avoiding distraction and misunderstanding of the content. This equipment records the interviews in MP3 files.

It is important to highlight that the researcher will use two simultaneous voice recorders to record the interviews, one as the main source, and the second as a spare, just in case of some unexpected technological issues.

B. During the Observations: As the observation method in this research is participant as observer (Robson, 2011), the observation data capture technique can be based on Radnor's (2002) model, which has three phases: watch, listen and record.

The watch and listen phases are similar in terms of researcher interaction with the environment; the only difference is that during the listening phase the researcher will focus on understanding the communication between the elements under observation (patients and staff). Thus, it is in the listening phase that the researcher starts to ask questions about what he/she wants to understand, this is what Radnor (2002, p.48) calls 'asking people to take us into the realm of meanings'.

The record phase is a complementary part of the watch and listen phases; when the researcher is watching and notices a relevant interaction, fact or issue between the patients and staff interaction, it needs to be recorded, physically and electronically.

The physical recording of this observation will be carried out with notes and comments in the observation sheet (Appendix II), where the focus will be on observing the process, asking questions about what is going on in the patient's pathway, and making written notes on this sheet.

The electronic recording is a support to register the information watched or listened, thereby an audio recorder will be used to register information.

II. **Storing the data**: as the information will be generated either electronically or physically, there is a need for a specific procedure to keep the data preserved and available for future analysis. The procedures these two types of data are described as follows:

A. Electronic information: this information is any intangible information generated during the interview and observation process, such as MP3 files or electronic notes. These files will be stored as follows:
    i. After the interview sessions, the files will be stored on a hard disk.
    ii. The files will also be stored on virtual disks, such as Dropbox or Google Drive.
    iii. The voice recorder equipment has 8 gigabyte of capacity which represents 650 hours record. With this capacity available the spare equipment will keep all information, and it will not be deleted.
B. Physical information: this is the tangible information, such as notes, interview and observation sheets, informed consent forms, and any additional provided during the data collection. These hardcopy files will be stored by the researcher in a private box, with other records related to the research.

III. **Transcribing the Data:** the data transcription phase has two main activities, i.e. translation and transcription. The description of each activity is provided below:
A. Translation: the research will be carried out in Brazil and the interviewees will be interviewed in Portuguese which is the researcher's first language. Then the interviews will be translated from Portuguese to English by the researcher.
B. Transcription: the interview audio will be transcribed verbatim by the researcher. According to Saunders *et al.* (2012) and Bryman (2012), this process can take a considerable time; for each hour of interview the researcher must be prepared for 6 to 10 hours of transcription. There is an option to pay for a professional transcription, however there are two limitation in this case. Firstly, the cost of this was not forecast in this research project, and there is no funding available to cover this extra cost. Secondly and most important is to aid the researcher to have the closest contact with the data since the outset of this process. Therefore, this might develop an intimacy between researcher and data collected, easing the data analysis process.

Both translation and transcription will be performed manually by the researcher, using the Microsoft Office package to organise, save and store the data.

The next topic of this section addresses the research pilot, considering the main points to be tested before the data collection phase starts.

3.12. Pilot

The pilot can be considered as real research on a small scale, also a test where the researcher has the opportunity to check the feasibility of data collection; due the practical nature of this activity, it is considered an opportunity to 'learn on the job' (Robson, 2011). Yin (2014) refers to this research phase as a 'laboratory' for the investigators, which allows them to observe the phenomena from different angles and try different approaches on a trial basis.

This research pilot will be carried out in the field during the first week of the data collection according to the research schedule (Figure 16). The aim of this pilot is to work as a test of the interviews as well as the observation. A sample of five patients within the emergency area of UHS will be selected and interviewed, and an observation in this environment will be carried out. This will also be an opportunity to simultaneously test the 'lean induction kit' mentioned in the previous section about the data collection source.

This activity will give the researcher an opportunity to fix any misunderstanding that was not previously identified, such as unknown words, academic vocabulary, and lack of clarity as well as the interviewee approach. Moreover, this opportunity to 'learn on the job' will provide additional information to cover relevant practical and theoretical elements of the interview questions and observations.

Two native Portuguese speakers from a local university will check and review the written Portuguese and the understanding of it. If necessary some questions will be adapted for suitable understanding.

3.13. Data Analysis

Collecting data is one important part of this research, however it is also an activity directly connected with the next research phase which is the data analysis. This activity is described by Collis and Hussey (2014) as a management challenge, due to the large amount of data and its variety, especially when the data is qualitative, mainly because it tends to generate a large non-standardized and cumbersome data base (Bryman, 2012). Thereby, the researcher will be confronted with a considerable amount of data, either a mass of hardcopy or electronic files

that ought to be explored, analysed, summarized and transformed to tackle the research objectives and answer the research questions (Saunders *et al.,* 2012)

The method chosen to analyse the data will vary according to different elements such as research philosophy, qualitative or quantitative data collected, whether the data is primary or secondary as well as methods to access these data (Collis and Hussey, 2014; Saunders *et al.,* 2012). In this research, the paradigm is interpretivism, therefore the data that will be collected comes from interviews and observations, which is considered qualitative and primary data.

The approach to analyse the data is also a relevant point to consider; it can be either deductive or inductive (Collis and Hussey, 2014; Robson, 2011; Yin, 2009). As previously explained at the outset of this chapter, this research lies in an inductive approach, where a topic will be explored and a theoretical explanation will be developed from the data collected and analysed.

Moving towards the method to analyse the interview and observation transcripts, it is possible to state that there is a considerable discussion about the best or at least the most suitable approach to undertake data analysis in qualitative research (Bryman, 2012; Collis and Hussey, 2014; Robson, 2011). Compared to the rules and analytic procedures in quantitative research, the qualitative approach seems not to have an agreed universal and standardised model (Robson, 2011; Yin, 2014), however for Bryman and Burgess (1994), due the nature of the qualitative approaches, this standardized technique is not necessary desirable. However, what can be provided are broad guidelines from successful experiences in undertaking qualitative data analysis; moreover, is important that it matches what the researcher wants to know (Braun and Clarke, 2008; Bryman, 2012).

Thus, analysing the qualitative data analysis methods available within the literature, it is possible to find different methods for different purposes. Nevertheless, there are only few common methods underlined among the relevant authors in the research methodology field. Those methods are Data Reduction and Display, Thematic Analysis and Grounded Theory. Table 12 displays the description for each method.

Table 12 – Data Analysis Methods

Data Analysis Methods	Description	Sources
Data Reduction and Display	This method is part of the general analytical procedure. It involves the selecting, discarding, summarizing and reorganise the data during the reduction phase. However, during the display data is the process of showing the data in a diagrammatic form, which will support the conclusions.	Collis and Hussey (2014); Miles and Huberman (1994); Saunders *et al.* (2012)
Thematic Analysis	A generic approach not necessarily linked to a particular theoretical perspective. It can be used in descriptive or exploratory research. Moreover, it can be either a realist or constructionist method, which reports the reality of the participants and their experiences.	Braun and Clarke (2008); Bryman (2012); Robson (2011)
Grounded Theory	It undertakes an inductive approach to develop theory grounded from the data collected; codes are based on the researcher's interpretation of the meanings or patterns in the texts.	Bryman (2012); Robson (2011); Saunders *et al.* (2012)

Each method described above has advantages as well as disadvantages, but more than this, the researcher aims to find a main characteristic in these methods, which is how each method is able to support and enable answering of the research questions.

Thus, after an in-depth analysis of each method depicted in Table 12 and also considering the primary data from interview and observation transcripts in this research, the thematic analysis method seems to match the criteria to support the investigation of the research aim, which is the lean barriers for future lean implementations in the UHS. This can be justified considering Robson's (2011) and Braun and Clarke's (2006) thoughts about the different elements of this approach, such as:

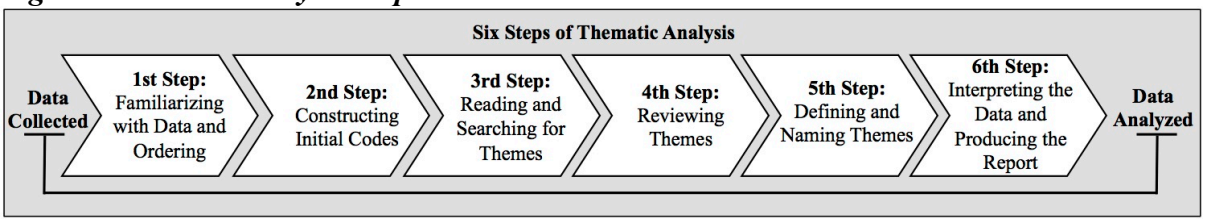
a) the exploratory and flexible nature of this method;
b) it is a relatively easy and quick method to learn and use in comparison with other approaches;
c) it is accessible to researchers with little experience of qualitative research;

d) it is a suitable method to employ in participatory research;
e) the data size can be summarized using a principled approach acceptable to fellow researchers and journal editors.

Thematic analysis is one of the most common techniques to analyse qualitative data (Bryman, 2012), although finding a structured model to undertake this method is still a challenge for researchers. Braun and Clarke (2006) consider this a disadvantage and argue that there is a lack of information about the details of the procedures to perform thematic analysis.

Thus, to cover the weakness of this method and provide a well-structured technique to carry out the thematic analysis, the researcher will perform a combination of the best practices from two standardized techniques suggested by Braun and Clarke (2006) and Radnor (2002). This approach is encouraged by different authors in this field (Braun and Clarke, 2006; Bryman and Burgess, 1994; Patton, 1990); they acknowledge that qualitative analysis cannot be carried out with a rigid method and take it for granted as a rule, but it needs to be flexible to fit the research question (Bryman, 2012). This combined best practices model is based on the six steps of thematic data analysis (Figure 6).

Figure 10 – Data Analysis Steps



Source: Adapted from Braun and Clarke (2006) and Radnor (2002)

The model from the experiences of Braun and Clarke (2006) and Radnor (2002) provides a step-by-step data analysis, illustrating the methods with several practical examples about the technique, which provides support and a 'friendly' technique for researchers to analyse their own data collected. This method can be summarized as a structured analysis based on coding generation and data interpretation, which has similarities with techniques based on computer aided qualitative data analysis software (CAQDAS), such as Nvivo and HyperResearch (Saunders *et al.,* 2012).

In this combined method, each step has a relevant whole that will contribute to data analysis outcomes, these steps and their descriptions are provided below:

1) First Step: Familiarizing with Data and Ordering: the aim of this step is to transcribe the data, performing some readings with focus on identifying and ordering some topics which should appear during this reading (Braun and Clarke, 2006; Radnor, 2002);

2) Second Step: Constructing Initial Codes: the aim is to produce initial codes, which means generating initial features from the data in a systematic fashion across the entire data set, collating data relevant to each code (Braun and Clarke, 2006);

3) Third Step: Reading and Searching for Themes: in this phase the researcher must seek to collate data into potential themes or sub-themes, gathering all data relevant to each potential theme; a visual representation may be helpful to sort different codes into themes. Moreover, it is helpful to start highlighting the main codes related to each theme, which will provide support for each theme chosen (Braun and Clarke, 2006; Radnor, 2002);

4) Fourth Step: Reviewing Themes: at this stage, the reviewing and refinement of the themes are the aims. This means that some themes are not really themes, as such, because there are not enough data or relevance to support them, or in some cases two or three themes can collapse in one main theme, or others will be broken down into two separate themes and generate a sub-theme. The development of a thematic map of analysis is strongly encouraged by Braun and Clarke (2006);

5) Fifth Step: Defining and Naming Themes: with a satisfactory thematic map, this phase moves towards the on going analysis to refine the specifics of each theme, identifying the 'essence' of what each theme is about, providing definitions and names as well as determining the aspects captured by each theme (Braun and Clarke, 2006);

6) Sixth Step: Interpreting the Data and Producing the Report: this is the final stage of the data analysis and also a refining process. Thus, with the coded transcripts and themes well defined, the researcher writes a statement summarizing findings and connecting with the research questions, which forms the basis for an understanding of what is going on (Braun and Clarke, 2006; Radnor, 2002).

An example of this process is available in the following section of this chapter as well as in chapters four and five. These six steps of thematic data analysis are strongly related to two main elements across the analysis, i.e. codes and themes (and sub-themes). Thereby, it is relevant to clarify the meaning of these elements.

Codes identify a feature of the data that appears interesting to the analyst; it is considered a tool to get at the themes in the data (Braun and Clarke, 2006; Ryan and Bernard, 2003). 'It is a process of reviewing the transcripts and give labels to component parts that seem to be of potential theoretical significance and appear to be particularly salient within the social worlds of those being studied' (Bryman, 2012, p. 568). A considerable number of elements can be coded, but this coding process will depend on the research questions, some examples of which are provided by Robson (2011), such as specific acts, behaviours, activities, events, consequences, strategies and meanings, among others.

Themes and sub-themes are the next level after the coding process; it will capture something important about the data in relation to the research question, which represents some level of patterned response or meaning within the data coded (Braun and Clarke, 2006). Ryan and Bernard (2003) suggest some techniques to identify themes, such as to seek repetitions, indigenous categories, metaphors and analogies, transitions, similarities and differences, linguistics connectors, missing data and theory-related material. This is an iterative process where the researcher goes from data to analysis, analysis to data, and in the end will feel satisfied with at least an intuitive group of themes (Robson, 2011).

Another process to analyse data as well as a support to identify codes and themes is the use of the software; this has become common practice among researchers (Bryman, 2012; Saunders *et al.,* 2012). Robson (2011) highlights several advantages and disadvantages to perform analysis with CAQDAS, which just put this technique in the same level of a 'manual' process, with one difference, the software will not make any analysis, it is just systematic way to organise it. Therefore, the researcher can use different software to analyse its data, however the need to define relevant codes and interpret the data observed is still in the data analysis process, and this analytic cannot be replaced by software (Yin, 2014).

Thus, this researcher feels more comfortable and encouraged to manage the data 'manually' rather than electronically; moreover, there is a personal belief that it will create a stronger relationship between the data collected and the researcher.

3.13.1. Process of Data Analysis Coding

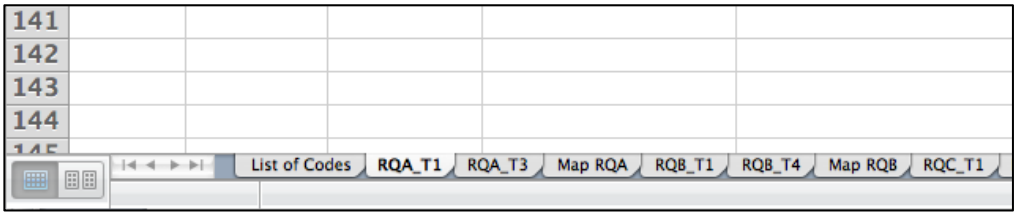
Thematic analysis was the method chosen to analyse the data in this research. The justification for this method was previously explained in the methodological chapter. Undertaking a standardized technique combined by Braun and Clarke (2006) and Radnor (2002), the analysis has been done following the six steps of thematic analysis (Figure 6).

During the first step the researcher spent 10 months familiarizing and ordering the data, which involved the process of transcription, translation, reading and identification of some relevant topics that repeatedly appeared during the reading. The interviews were carried out in local language, which is Portuguese, and afterwards the researcher translated it into English to perform the coding process. To ensure that the translation would keep the meaning in both languages, a sample of 25% of the interviews was submitted to an external lecturer specialized in Portuguese and English translation in the Federal Technological University of Parana in Brazil. The result of this review was satisfactory and after the end of this validation the coding process started.

The next step of the analysis was based on coding construction, however as the researcher decided not to use software to identify codes and themes, it was necessary to develop a module for data organisation and analysis. This module was built using Microsoft Excel and was a tangible description of the six steps of thematic analysis suggested by Braun and Clarke (2006) and Radnor (2002).

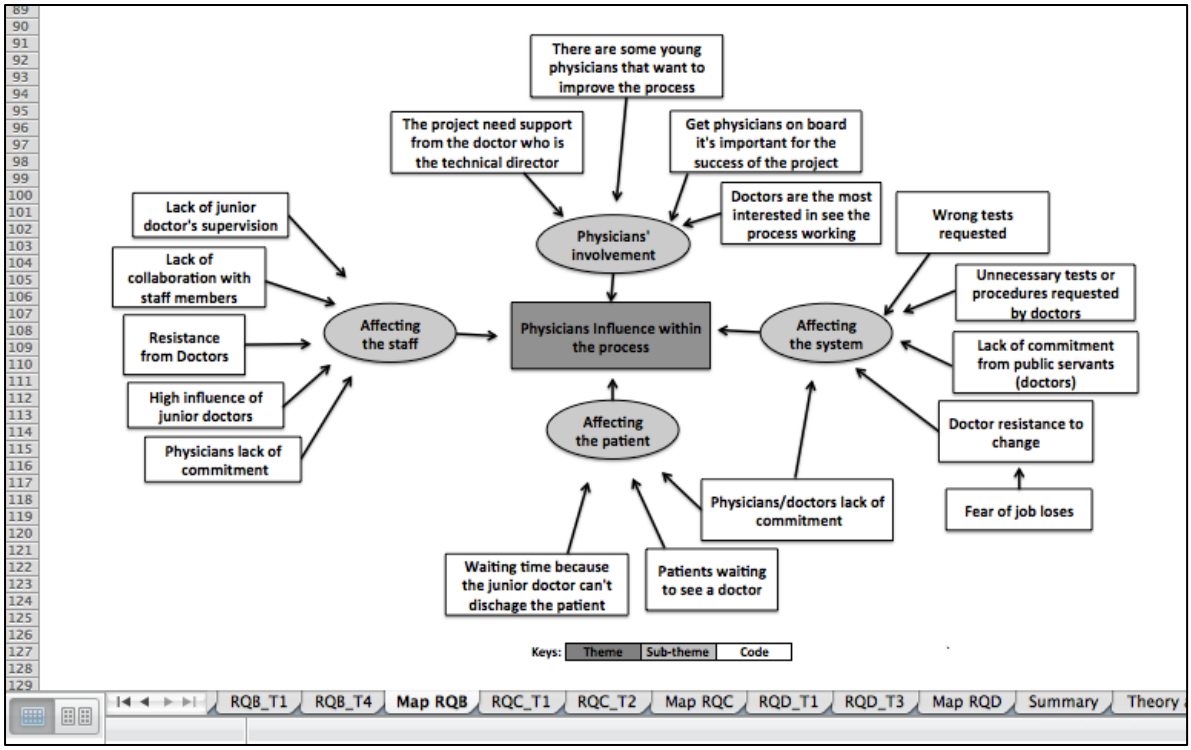
The Microsoft Excel spreadsheets were organised to provide a logical understanding of the data. Each spreadsheet is connected with one research theme from the interview, for instance each interview question was analysed in one spreadsheet combining all interviews carried out. Thus, to illustrate this logic, Figure 11 shows the interface of the module where each spreadsheet received the code RQ+RT, which is based on a combination of research question and interview theme. For instance, the code RQA_T1 has the content related to the research question A and the interview theme 1.

Figure 11 – Data Analysis Model – Research Question and Interview Themes



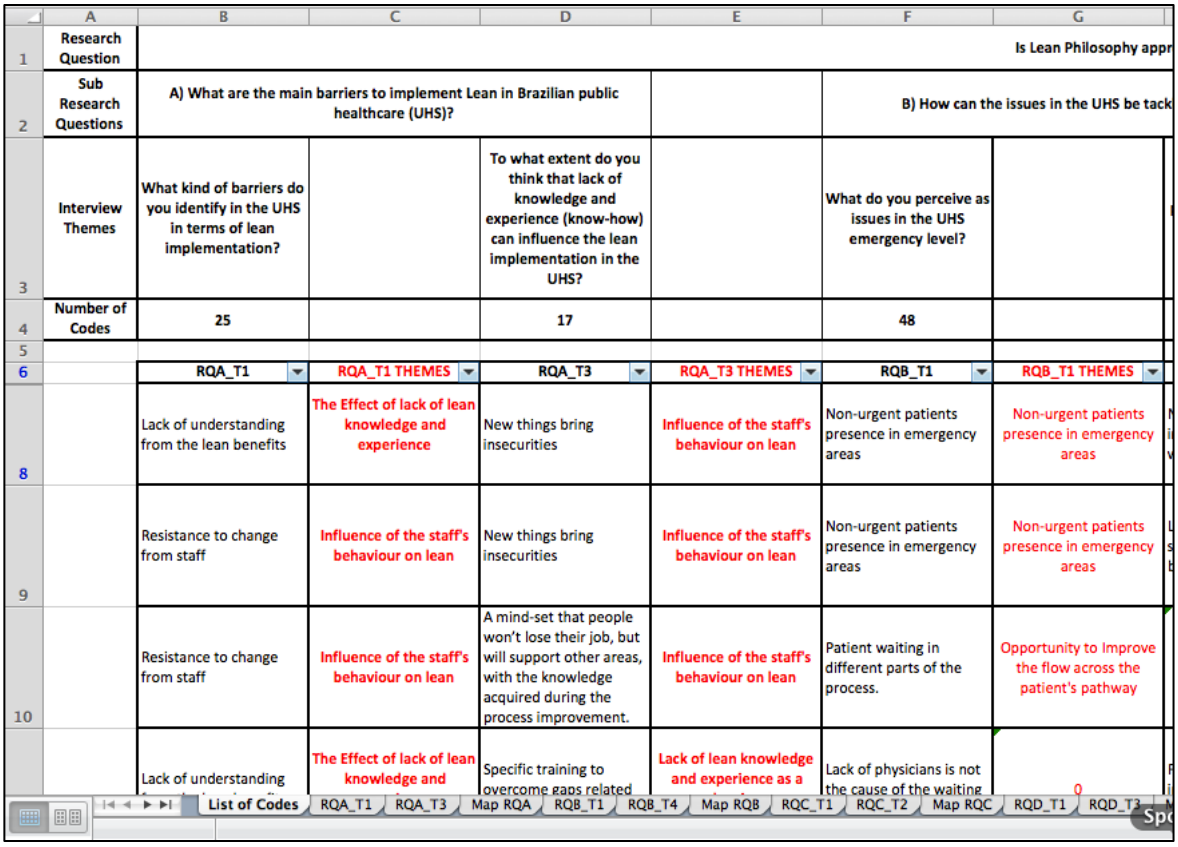
The model was also designed to present the thematic maps suggested by Braun and Wilkinson (2003). After each set of interview themes related to one research question, a spreadsheet with the related thematic map was named. For instance, Figure 12 shows the code ‘Map RQB’, which presents one of the thematic maps from the research question B.

Figure 12 – Data Analysis Model – Thematic Maps



The last feature of this model is called 'List of Codes' (Figure 13) and it was designed to concentrate all codes and themes that emerged from the interviews; besides it is also linked with the research questions and interview themes. Using this option, it is possible to filter and match the codes and themes, thus providing a better understanding of the analysis and easier access to the data analysed.

Figure 13 - Data Analysis Model - List of Codes and Themes



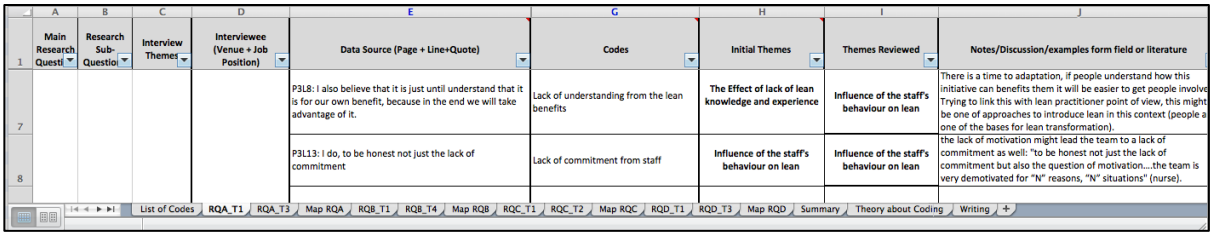
	A	B	C	D	E	F	G
1	Research Question						Is Lean Philosophy appr
2	Sub Research Questions	A) What are the main barriers to implement Lean in Brazilian public healthcare (UHS)?				B) How can the issues in the UHS be tack	
3	Interview Themes	What kind of barriers do you identify in the UHS in terms of lean implementation?		To what extent do you think that lack of knowledge and experience (know-how) can influence the lean implementation in the UHS?		What do you perceive as issues in the UHS emergency level?	
4	Number of Codes	25		17		48	
5							
6		RQA_T1	RQA_T1 THEMES	RQA_T3	RQA_T3 THEMES	RQB_T1	RQB_T1 THEMES
8		Lack of understanding from the lean benefits	The Effect of lack of lean knowledge and experience	New things bring insecurities	Influence of the staff's behaviour on lean	Non-urgent patients presence in emergency areas	Non-urgent patients presence in emergency areas
9		Resistance to change from staff	Influence of the staff's behaviour on lean	New things bring insecurities	Influence of the staff's behaviour on lean	Non-urgent patients presence in emergency areas	Non-urgent patients presence in emergency areas
10		Resistance to change from staff	Influence of the staff's behaviour on lean	A mind-set that people won't lose their job, but will support other areas, with the knowledge acquired during the process improvement.	Influence of the staff's behaviour on lean	Patient waiting in different parts of the process.	Opportunity to Improve the flow across the patient's pathway
		Lack of understanding	The Effect of lack of lean knowledge and	Specific training to overcome gaps related	Lack of lean knowledge and experience as a	Lack of physicians is not the cause of the waiting	0

List of Codes | RQA_T1 | RQA_T3 | Map RQA | RQB_T1 | RQB_T4 | Map RQB | RQC_T1 | RQC_T2 | Map RQC | RQD_T1 | RQD_T3

Inside of each research question and interview themes spreadsheet (RQA_T1) it is possible to find the step-by-step information about how the data was analysed (Figure 14). To support the logic of the analysis, these spreadsheets have the same information, which can separated into two parts. First is the information about the research structure which provides the main research question and research sub-questions. This information is important either to support inductive analysis when necessary, as the researcher can always refer back to the research questions, or to keep the analysis aligned and focused on the research aims.

The second part inside these spreadsheets is about the data analysis. Column C provides the interview theme or the question that started the interview process. Column D shows the information from the interviewee that is a combination of the venue where the interview was carried out and the job position of the interviewee. Column E displays the data source, which is a chunk of the interview script, with a reference of the location (page and line) of this 'quote' within the original script.

Figure 14 – Data Analysis Model – Inside the Research Question and Interview Themes

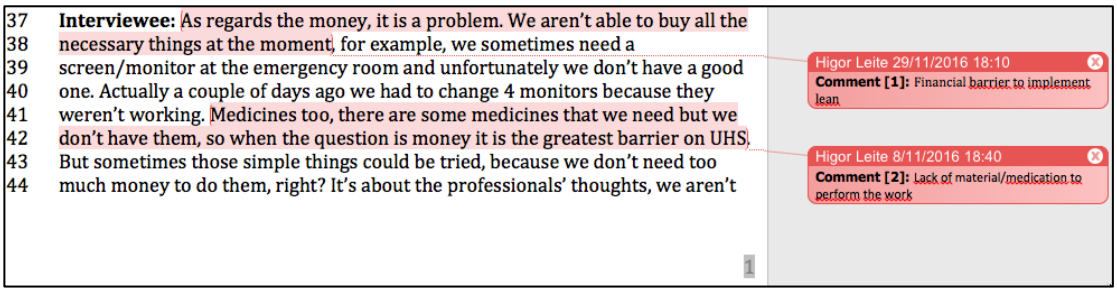


	A	B	C	D	E	G	H	I	J
1	Main Research Questi	Research Sub-Questio	Interview Themes	Interviewee (Venue + Job Position)	Data Source (Page + Line+Quote)	Codes	Initial Themes	Themes Reviewed	Notes/Discussion/examples form field or literature
7					P3L8: I also believe that it is just until understand that it is for our own benefit, because in the end we will take advantage of it.	Lack of understanding from the lean benefits	**The Effect of lack of lean knowledge and experience**	**Influence of the staff's behaviour on lean**	There is a time to adaptation, if people understand how this initiative can benefits them it will be easier to get people involve Trying to link this with lean practitioner point of view, this might be one of approaches to introduce lean in this context (people a one of the bases for lean transformation).
8					P3L13: I do, to be honest not just the lack of commitment	Lack of commitment from staff	**Influence of the staff's behaviour on lean**	**Influence of the staff's behaviour on lean**	the lack of motivation might lead the team to a lack of commitment as well: "to be honest not just the lack of commitment but also the question of motivation....the team is very demotivated for "N" reasons, "N" situations" (nurse).

List of Codes | RQA_T1 | RQA_T3 | Map RQA | RQB_T1 | RQB_T4 | Map RQB | RQC_T1 | RQC_T2 | Map RQC | RQD_T1 | RQD_T3 | Map RQD | Summary | Theory about Coding | Writing

The next information available will be about the codes found during the thematic analysis. Column G presents these initial codes, which is related to the second step of the Braun and Clarke (2006) and Radnor (2002) technique of thematic analysis. Following this technique, column H depicts the initial themes that emerged from the data analysed. As previously described in the methodological chapter, the process of theme identification is an iterative process where the researcher goes from data to analysis, analysis to data, and in the end will feel satisfied with at least an intuitive group of themes (Robson, 2011). Once the initial themes have been defined and the thematic maps reviewed, these themes can be refined and reviewed. Column I will present the final theme reviewed. The last column of this model is called 'Notes/Discussion' and display the researcher's written reflections during the data analysis process.

Figure 15 – Interview File Organisation



37 **Interviewee:** As regards the money, it is a problem. We aren't able to buy all the
38 necessary things at the moment, for example, we sometimes need a
39 screen/monitor at the emergency room and unfortunately we don't have a good
40 one. Actually a couple of days ago we had to change 4 monitors because they
41 weren't working. Medicines too, there are some medicines that we need but we
42 don't have them, so when the question is money it is the greatest barrier on UHS.
43 But sometimes those simple things could be tried, because we don't need too
44 much money to do them, right? It's about the professionals' thoughts, we aren't

Higor Leite 29/11/2016 18:10
Comment [1]: Financial barrier to implement lean

Higor Leite 8/11/2016 18:40
Comment [2]: Lack of material/medication to perform the work

1

The organisation of the data within the interview files is shown in Figure 15. To keep tracking the coding process, the codes were recorded, as the option new comment in the review process of the Microsoft Word was used. Moreover, every page received a number as well as every line, restarting the numbering on every new page.

With the operational process of coding explained, the next section will address the code and themes found after data analysis.

3.14. Research Questions and Methods Summary

This research summary gathers together and connect information about the main research question, relevant literature review, research sub-questions, interview themes as well as interviewees and observation sources. In a certain way, all this information is connected, and aims to answer the main research question (Table 13).

Table 13 – Summary of the Research Questions and Methods

Main Research Question	Literature Review Summary	Research Sub-Questions	Interview Themes	Interviewees				Observation Needed?	
				Lean Management Consultants	Lean Team private hospital	Staff in UHS	Patients in UHS	Yes/No	If Yes, what?
How to understand the barriers to implement lean in the emergency level of Brazilian public healthcare system (UHS)?	Albliwi *et al.* (2014); Bhasin (2011); Brandao de Souza and Pidd (2011); Lean Enterprise Institute (2007); Malmbrandt and Ahlstrom (2013); Radnor *et al.* (2006)	A) What are the main barriers to implement Lean in Brazilian public healthcare (UHS)?	RQA_T1: What kind of barriers do you identify in the UHS in terms of lean implementation?	X	X	X		No	
			RQA_T2: Is it possible to overcome these barriers in the UHS? If yes, How? If not, please justify.	X	X			No	
			RQA_T3: To what extent do you think that lack of knowledge and experience (know-how) can influence the lean implementation in the UHS?	X	X			No	
	Albliwi *et al.* (2014); Bateman and Rich (2003);Deloitte and Touche (2002); Kundu and Manohar (2012); Lean Enterprise Institute (2007); Marodin and Saurin (2015a); Radnor (2010a); Zimmermann and Bollbach (2015);		RQAB_T1: What do you perceive as issues in the UHS emergency level?	X		X	X	Yes	Patient pathway at UHS emergency level
			RQAB_T2: In your point of view is it possible to ease these issues with a lean implementation in UHS? If yes or not, please justify.	X	X			Yes	Patient pathway at Lean private Hospitals
			RQAB_T3: During a possible lean implementation in the UHS, which practices, tools and approaches must be considered as most important and which are less important? Why?	X	X			Yes	Patient pathway at Lean private Hospitals
			RQAB_T4: Have you ever heard about other initiatives to ease the main problems in the process of the UHS? Do you think that it is possible to implement this type of initiative?	X		X		No	

Main Research Question	Literature Review	Research Sub-Questions	Interview Themes	Interviewees				Observation	
				Lean Management Consultants	Lean Team private hospital	Staff in UHS	Patients in UHS	Yes/No	If Yes, what?
How to understand the barriers to implement lean in the emergency level of Brazilian public healthcare system (UHS)?	Brandao de Souza and Pidd (2011);Malmbrandt and Ahlstrom (2013); Radnor and Osborne (2013); Radnor (2010)	B) How can the Brazilian public administration model impact the lean implementation in the UHS?	RQB_T1: How the bureaucratic management style of the Brazilian public healthcare can influence the lean implementation process in UHS?	**X**	**X**	**X**		**No**	
			RQB_T2: The lean philosophy has a strong base on leadership engagement and staff empowerment, how can this be achieved in this public environment in the UHS?	**X**				**No**	
			RQB_T3: To what extent do you perceive lean philosophy as relevant for the UHS?	**X**	**X**	**X**		**No**	

The next topic of this section will address the ethical issues involved in this research.

3.15. Ethical Consideration

There are several ethical codes and guidelines that must be observed before starting data collection, especially when this process involves people. In this case, the researcher must submit the proposed research project to an ethics committee. Bryman (2014) advocates that universities can provide professional guidelines and indicate what are considered ethically unacceptable practices. It is important to highlight that when the research involves people there is always a potential harm, stress and anxiety, and a myriad of potential negative consequences involved (Robson, 2011). In this case, the risks and the research procedures will be evaluated by the ethics committee.

This research project was approved by three different ethics committees, as follows: Loughborough University's Ethics Approval (Human Participants) Sub-Committee under the number R14-P145 (United Kingdom); *Plataforma Brasil* and Workers' Hospital (Brazil). Each of these committees requested similar or in some cases different documents to approve the research procedures; some of the documents are informed consent, researcher's background, research proposal, adult participant information sheet and university's approval, among others.

Robson (2011) discusses the relevance of asking for people's consent to take part in the research, however sometimes this is not possible or practicable, otherwise it could alter the behaviour that the researcher is interested in. Nevertheless, several research studies can be carried out with the consent of the participants, which is the case with this study. In this case, the researcher must provide a document called Inform Consent, of which the model varies according to institutions and the aims of the research. The informed consent of this research has been approved by Loughborough University's Ethics Approval (Human Participants) Sub-Committee. The appendixes of this research present the Adult Participant Information Sheet (Appendix IV), Informed Consent Form (Appendix V), Observation Notice that will be displayed in the areas of the data collection (Appendix VI), and the formal approval from Loughborough University's Ethics Approval (Human Participants) Sub-Committee (Appendix VII). All these documents were translated into Portuguese in order to provide understanding to all participants.

Finally, it is important to clarify that in order to maintain consistency in the analysis, all participants will be called by the gender 'he', as no names or other type of identification will be used.

3.16. Research Schedule

Managing the time and resources is important to keep the research and researcher focused on the targets of the project; the timetable is a useful tool that specifies different stages of the research (Bryman and Bell, 2011).

Figure 16 depicts a timetable with estimated dates. This was previously discussed with supervisors, considering the main research points: project approval in the University's ethics committee, Brazilian ethics board approval and meetings, data collection pilot, data collection in Brazil, closing meetings and return to the UK.

Figure 16 – Schedule Data Gathering

Item	Subject	Year - 2014				Year - 2015									Year - 2016		Status
		sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug	sept	Jan	sept	
1	Case Study Protocol Development	24th								1st							Done
2	Research Project Approval, University's Ethics Board	1st	14th														Done
3	Research Project Approval, Brazilian's Ethics Board	24th						31st									Done
4	Lean Healthcare Presentation in Brazil				3rd												Done
5	Meeting with hospital's directors in Brazil (first formal approach)				8th												Done
6	Meeting for hospitals definition in Brazil					7th											Done
7	Pilot to collect data (pre-test)									12th							Done
8	Trip to Brazil - Data collection									8th							Done
9	Data Collection ECU - Brazil									18th							Done
10	Data Collection with Lean Practitioners										14th						Done
11	Data Collection in Lean Private Hospital										22nd						Done
12	Data Collection ED Hospital - Brazil											1st					Done
13	Data Collection Academics											27th					Done
14	Closing meeting in Brazil											29th					Done
15	Return to UK												3rd				Done

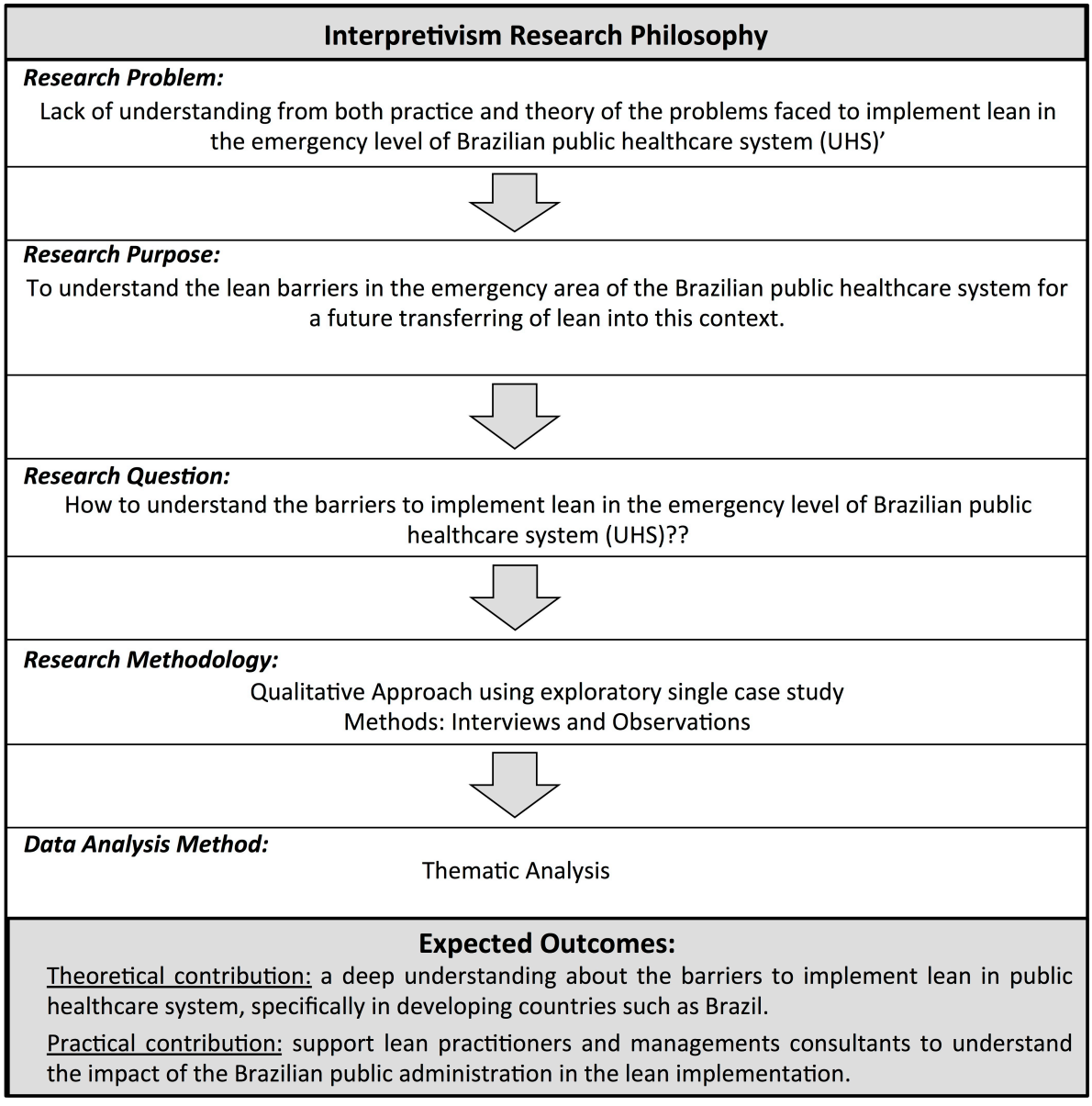
Source: Author (2014)

The data collection period between May and August 2015 is relevant because this period is considered normal in terms of demand in healthcare. This period is outside the main Brazilian holidays and also the winter season, which are considered high demand periods. Also, it considers the hospital's availability to collect the data.

3.17. Chapter Summary

This chapter addressed the main elements involved in the research methodology, such as the philosophical paradigm as well as the research problem, purpose, question, methodology, methodology, data analysis and outcomes. Figure 17 depicts the research design which provides details about these research elements.

Figure 17 – Research Design



Source: Author (2014)

The philosophical stance of interpretivism reflects the researcher's point of view and the understanding of this research which relies on involvement in the research context. Interpretivism is also socially constructed and focuses on details to understand the situation

rather than to generate a hypothesis or test it. These interpretivism characteristics draw together the possibility to understand the research's purpose which is to understand lean applicability in an uncharted context. To achieve this objective a qualitative exploratory research based on interviews and observation methods of data collection will be carried out.

The sources of these interviews and observations come from four different areas: EUC, ED, lean management consultants and lean teams in private hospitals. The expected sample from these populations is 43 interviews and 10 observations of the patients' pathway.

The data collected in these interviews and observations will be transcribed and translated in order to start the data analysis. There are a group of methods to analyse qualitative data, however within this field there is no agreement among the authors about which model is best. The agreement relies on which is more suitable for the research purpose (Bryman, 2012, Bryman and Burgess, 1994, Collis and Hussey, 2014, Robson, 2012).

After an in-depth analysis of the methods available and also considering the nature of the data collected, the thematic analysis seems to support the research aim. This method will be underpinned in seven steps (Figure 10) adapted from Braun and Clarke (2006) and Radnor (2002). This type of approach is encouraged for different authors within the qualitative field (Braun and Clarke, 2006; Bryman and Burgess, 1994; Patton, 1990). They acknowledge that qualitative analysis cannot be carried out with a rigid method and take it for granted as a rule, but it needs to be flexible to fit the research question (Bryman, 2012). Undertaking this thematic analysis will bring a clear understanding of the data collected as well as supporting the research outcomes.

The expected outcomes of this research can be summarized in theoretical and practical contributions. The theoretical contribution relies on a new body of knowledge about the barriers to implement lean in the public healthcare system in developing countries, specifically Brazil.

The next chapter will discuss the case study findings, presenting a description of samples, sources of data collection, and extracts from interviews to support the findings.

4. Chapter 4 – Case Study Findings

4.1. Introduction

This chapter aims to present and categorise findings from data collection in the emergency level of the Brazilian Healthcare (UHS). This process will be supported by sections from the interviews and observations carried out during data collection. The outcomes of this chapter will support the following chapter, which is the data analysis that will provide an interpretation of this case study's findings.

Table 14 presents an overview of the case study including the location, average number of patients seen per day (numbers were informed during the data collection by the sources), number of interviews and observations carried out and period of the year.

Table 14 - Overview of the case study sources

Seq.	Case Study Sources	Location	Number of patients per day (average)	Number of interviews	Number of Observations	Date
1	UHS Site 1 (ECU)	Curitiba - Brazil	over 400	20	5	May - June/16
2	UHS Site 2 (ED)	Curitiba - Brazil	over 200	15	5	June - July/16
3	Lean Management Consultants	Sao Paulo - Brazil Goiania - Brazil	N/A	4	N/A	Jun-16
4	Lean Private Hospital - Lean team	Sao Paulo - Brazil	N/A	4	N/A	Jun-16

This is a single case study, therefore the unit of analysis is the emergency level of care of the UHS which includes two emergency sites that were used as sources of data collection, Collis and Hussey (2014) argue that the units of analysis represent the phenomenon under investigation, about which the data are collected and analysed. The emergency level of the UHS is separated into two emergency areas. This structure was explained during the literature review chapter; however a brief summary of the UHS structure will be presented further in this section. Moreover, to gain knowledge about possible barriers to lean implementation in the emergency level of UHS, two additional 'external' sources were used to collect data; they are lean management consultants and staff members who are part of the lean team in a private hospital. Thus the data was collected in four different sources, which aimed to understand barriers for future implementation of lean in the emergency level of the Brazilian healthcare system (UHS).

The sources in the emergency areas of the UHS were named as UHS Site 1 – ECU, as it is related to the emergency care unit (ECU), and UHS site 2 – ED, as it is related to the emergency department (ED). The main difference from an ECU is that this ED is part of a hospital and not physically detached as an ECU. Also, an ED is more focused on trauma

(similar to A&E) rather than emergencies, such a heart attack or other situations not related to trauma that will be treated in an ECU.

There is also the source lean management consultants. The are from four different consultancy companies that have been working implementing lean in the healthcare area and can contribute with their experience in this area.

The last source of the case study is the lean private hospital – lean team. They represent staff members in a private hospital that work as part of the team implementing lean in this hospital. All these case study sources will be explained in the following sections as well as preliminary results from the interview themes.

It is regarded as important to clarify certain expressions in order to keep the consistency of the analysis. All participants will be called by the gender 'he', as no names or other types of identification will be used. References to system, UHS model, public administration, they all have the same meaning and represent the UHS administration. The title doctor and physician are used in different parts of the thesis and they have the same meaning. The reason that both titles are used, is that it was translated verbatim from Portuguese into English, and the interviewees in Brazil referred to a physician by the title doctor. In order to keep the consistency of the writing the title doctor will be used during the direct citations from the interviews; the title physician will be used in other areas of the thesis; the term junior doctor is not affected by this standardization of the term doctor and physician, it is used consistently as junior doctor to refer to early career physicians.

It is also regarded as relevant to clarify the procedure related to the use of a 'stamp' in the emergency department. This stamp procedure is mentioned several times across the thesis; the junior doctors do not have the authority to discharge patients after medical assessment. The only person that can discharge a patient in the ED is the senior physician, who will provide a stamp in the medical record of the patient. Thus, because the senior physician is not physically present in the ED, the junior doctor has to wait until a group of patients is available to be discharged, then he calls the senior physician to come and stamp the documents or discuss specific cases'.

The following section will address the summary of the interview process.

4.2. Summary of the interview process

The interviews carried out were semi-structured, which means that the interviews started with a set of main question. In this case, it was called an interview theme and other topics related to this interview theme were used to extract deeper answers from the interviewees. This

process in encouraged by Robson (2011), who argues that in the semi-structured interview process, the interviewer has a checklist of predetermined questions or topics, but the wording and order can also be modified to add more unplanned questions based on the flow of the interview.

The interview themes and questions that were asked of participants in different sources are available in Appendix III. Sometimes, due the nature of the question, it was not asked of all sources of the case study. For instance, patients were only asked about the main problems found in the emergency areas of the UHS. Lean management consultants received a larger range of questions due their knowledge of the lean implementation.

The interview themes were always aiming to provide information that could support the answer of the main research question, which is '*How to understand the barriers to implement lean in the emergency level of Brazilian public healthcare system (UHS)'*.

This chapter presents findings from four different sources during the data collection, and categorisation of the main barriers to implement lean in the UHS. However, the next chapter's data analysis will present an in-depth analysis and interpretation of all information found, including a discussion of the barriers that emerged during the analysis. It is important to highlight that the interviewees used their knowledge about the UHS and how a possible implementation of lean would be accepted or not. For instance, when asked about barriers that could constrain the lean implementation, they used common problems routinely faced to explain that lean would face these problems in cases of implementation.

The questions asked of lean management consultants, staff members who are part of the lean team in a private hospital, staff members and physician in the UHS Site 1 – ECU and UHS site 2 – ED, were related to the main barriers to implement lean in the UHS. Patients were asked about the main problems that they face when they need to find healthcare assistance in the ECU. The next section shows a summary of the Brazilian healthcare system, which provides a background of the setting under investigation.

4.3. The Brazilian Public Healthcare

To understand the relevance of these emergency areas in the healthcare, it is important to revisit the Brazilian healthcare model, which provides information about the structure of the system.

The healthcare system in Brazil consists of a public and private sector. The public healthcare system is 100 per cent funded by government resources and is widely known as the Unified Health System (UHS) (Sistema Unico de Saude - SUS). According to ANS

(2013), over 49 million people (around ¼ of the population) have private health insurance. The Brazilian public healthcare system is underpinned by a constitutional right: the responsibility of the state is to look after ¾ of the population (over 150 million) who do not have private or supplemental health insurance. The UHS is the public system responsible to provide health assistance free of cost to the population. This system is separated into three levels of care as follows: preventive, emergency and high specialisation. The emergency level is the one under investigation in this research and is represented by emergency departments in hospitals (ED) and detached emergency care units (ECU).

The structure of the chapter is divided in four main sections that present the sources of the data collection, including: background, interview process, understanding of lean in UHS (only UHS Source 1 – ECU and UHS Source 2 – ED), main barriers to implementing lean, observation process, main problems faced by patients in ECU and ED and the importance of lean in the UHS only ECU and ED. The next section will address the initial findings from the data collection in the UHS Site 1 - ECU.

4.4. Source One: UHS Site 1 – Emergency Care Unit (ECU)

4.4.1. Background

This emergency care unit (ECU) is considered one of the largest in terms of capacity in the city of Curitiba; it receives over 400 patients per day, and it is open 24 hours a day, seven days a week, which is considered an 'open door' model with free access to healthcare support. Physicians and nurses work in three different shifts with focus on emergencies. The unit is also based in the largest neighbourhood of the city and is considered a poor and violent area (according to the most influential newspaper in the state of Parana, Gaveta do Povo). The population that seek care in this ECU is a mix of young people, elderly people and children. In terms of workforce of the ECU it is divided into physician and nurses. The majority of the physician finished university in the last five years and it is their first job (there are no official numbers, but based on a researcher's observation in the field the numbers are between 60% and 80%)., There are also more experienced physician but the numbers are low. The nurses are divided into two categories: assistant nurse and senior nurse. However, most of the time they perform the same activity, and the majority of these nurses have wider experience as they also work in a second job in a private hospital.

The leadership team is divided in two: one that looks after the physician and it is called physician coordinator, the team who looking after another team of physician in another ECU. The second leadership is the one responsible for nurses and management activities in

the unit. Its job title is sanitary authority (this name is odd even in Portuguese language, and it is related to hygiene and health, but it is the name given by the government to this ECU leadership).

The patients' access to ECU is free of charge as well as all services in public healthcare in Brazil and is funded by the City Hall and Federal government budget. The selection of this specific ECU to carry out the data collection was made by the research committee of the city hall under the justification of the high volume of patients.

4.4.2. Interviews process in the UHS Site 1 - ECU

The interview process was carried out during the months of May and June of 2016, and 20 face-to-face interviews took place in this site The length of interviews with nurses and physician varied between 40 to 50 minutes, and interviews with patients lasted no longer than ten minutes, as they only answered one question, which was about the main problems that they face in the UHS (Appendix III). Table 15 depicts the number of interviews carried per type of respondent in this site, and the code used to refer to the sources of the data analysed. This code will receive an additional number in the end, which is the identification of the interviewee during the data collection. For instance, the code 'ECU_S_NU' will receive a number and becoming the code 'ECU_S_NU_1'.

Table 15 - Interview Codes UHS Site 1 - ECU

Source	Title	Interview Code	Number of Respondents
Emergency Care Unit	Nurse	ECU_S_NU	8
	Physician	ECU_S_DR	6
	Social Carer	ECU_S_SOA	1
	Patient	ECU_PAT	5

The access to data and engagement of the interviewees in this site during the data collection was considered particularly positive. Nurses and physicians were pleased to use their time to contribute to the research (this was the researcher's overall perception during the interviews as well as informal moments that he had the chance to talk with these people). Access to patients was also easy, but most of the time with a very short contribution, which can be related to the lack of time after a long waiting time in the unit. However, it was not a problem, as they had to answer only one question about the main problems faced during their

time in the unit. The following section will address the understanding of lean from the participants' point of view.

4.4.3. Understanding of lean in the UHS

In the UHS, the level of lean understanding was low, so the respondents gained basic knowledge about lean before the interviews so they could be make a better judgment about lean. A day before the interview the participants received a newspaper article about some applications of lean in Brazilian private hospitals. On the day of the interview, the researcher delivered a comprehensive PowerPoint© presentation about lean, illustrating its applications with pictures and some concepts focused on healthcare. An in-depth explanation of this process of the 'lean induction' to UHS respondents was provided in the methodological chapter of this thesis, in the section 'data collection sources' item B. This process did not include patients, as they do not need any knowledge about lean to participate in the interviews.

After the lean induction, to confirm whether the respondents understood what lean is at a basic level, they were asked to describe lean using their words. The results are words used in the lean approach, such as standardisation, organisation of the process, benefits for patients, less cost, less time.

> *'it would be a standardisation process, this is what I thought when I first read the text. I can see it clearer; it is an organisation (of the process)'.* (ECU_S_SOA_8)

> *'To organise things better in order to save money, save time, medication (resources); trying to identify where are the failures so we can make things work using less time and less money'.* (ECU_S_DR_9)

The UHS respondents were also asked to relate lean to their work, and identify how the lean approach could be used in the processes in which they are involved; some of the comments are below:

> *'The time optimisation, the fact that I don't need to perform twice the same activity, also is about the organisation, isn't it? Because this way I don't need to do, or maybe I'll arrive in the morning to start my shift and I'll not need to rework what my night shift colleague already did'.* (ECU_S_NU_1)

So, today just in this process of seeking the forms, I spent 15 minutes to find the form and then start my work with patients (...) instead of walking across the ECU to fix all these situations, this routine of lean could help this situation… (ECU_S_NU_2).

Finally, at the end of this lean induction process, the respondents were asked to describe what caught their attention the most about everything that they read in the newspaper article and in the lean presentation. The answer in this case were examples of what they saw about lean, as follows:

'Look, I think this question of workflow (...) we see a lot of things about flow and that's one of the things we see here that should have an improvement on healthcare. Here in ECU, this 'flow thing' doesn't work, there is a lot of unnecessary comings and goings, that should be improved; we see that it needs an improvement but we end up getting used to it. (ECU_S_DR_6)

'What caught my attention was the organisation, because it's nice to see everything organised'. (ECU_S_NU_12)

The following section will address the main barriers found to implementing lean in the UHS.

4.4.4. Main Barriers to Implementing lean

During the interview process when asked questions about the acceptance of lean and possible barriers that could emerge during the implementation process, there were common answers related to barriers found in the literature, such as lack of resources, lack of commitment, slow pace of change, resistance to change, communication disruption amongst staff members (Table 16).

There were also specific barriers that emerged which are more related to the context of the data collection, for instance slow pace of change in the UHS, the UHS management style, performance management in UHS. These barriers will be discussed in this section; they emerged based on thematic analysis that showed repetitions (frequency) from similar codes. This process is described in the methodology chapter (Section 3.13). The barriers found in the sources two, three and four (that will be further discussed) present similar tables that followed the same coding procedures.

Table 16 - Lean Barriers in the UHS Site 1 - ECU

Lean Barriers - UHS Site 1 - ECU (presented in the order that emerged from data)	Frequency of reference from data analysis
Physicians lack of commitment	9%
Fear that lean will cause job losses	10%
Non-urgent patients create unpredictable demand in emergency areas	13%
Emotional stress between patients, staff members and physicians	4%
Financial barrier to implement lean (lack of resources)	6%
Nurses performing different activities that are not core	4%
Poor management of resources	11%
The structure of the system affects the physicians	3%
Physicians spend time performing activities that are not core	3%
The UHS bureaucratic style as a barrier to lean	2%
Slow pace of changes in UHS	3%
Performance management in UHS	4%
Public system lack of interest/motivation in changing	7%
Staff resistance to change	6%
Lack of lean knowledge and experience	5%
Public servant tenured career (physicians and staff)	4%
Communication disruptions amongst staff and between shifts	7%

A total of 17 barriers to implement lean were identified from the interviews in this site (UHS Site 1). Table 16 presents the complete list of the barriers found; they are presented in the same order that they emerged in during the data analysis. These barriers as well as evidence of these findings with sections of the interviews will be presented in this section:

4.4.4.1. Physicians lack of commitment

Before addressing this barrier, a question that naturally might arise from this subject is why in this analysis are physicians not considered part of the staff group in this classification?

There are some logical explanations for this situation. First, it is because the physicians are the ones that deliver one of the most important parts of the service (value) towards the patients, which is the diagnosis. This activity is highly skilled and not transferable in the UHS, which is different from the UK context, where nurses (with extra training) can prescribe, refer patients and carry out some diagnoses. Moreover, the staff members in UHS see the physicians as a different part of the team or in a superior position; also some physicians are third party and are not part of the daily routine, coming in once or twice a week to the emergency department.

The lack of commitment was found in different areas of the UHS emergency, which can be understood as low engagement with the service delivered towards the patient and amongst colleagues. It is important to highlight that as a physician mentioned, sometimes it is difficult to find commitment working with other colleagues:

> '*whereas there are many doctors who send them (patients) with no care at all. Sometimes the doctor who works in the corridor (normal appointment) send me some patients and I have to make a medical consultation all over again… then the patient is waiting for 6 hours and has to do some things all over again*'. (ECU_S_DR_13)

Sometimes even amongst physicians is difficult to find commitment, as a physician complained about:

> '*I'm used to it, I arrive here and there is no-one to give me the shift, there is nothing written, I have to figure it out on my own; or the nurses have to help me. So we have a lot of failures'*. (ECU_S_DR_13)

The lack of commitment was also highlighted by nurses that found difficulty finding physicians working at the weekends:

> *'there's the commitment question too. Because what we see is doctors going out at the same time to drink coffee, or at lunch time… or we see nobody working and we don't know where the doctors are'.* (ECU_S_NU_14)

The idea is not generalise that all physicians lack commitment or involvement, but to discuss a common situation found in this context of the research.

4.4.4.2. Fear that lean will cause job losses

A new project with the aim of providing improvements and eliminating wastes, will naturally create a fear of redundancies amongst physicians and staff members will be carried out during the implementation. A code that emerged from the analysis related to this barrier is that 'new things bring insecurity' of which a nurse in the ECU provided an illustration:

> '*this is something new, always the new brings some insecurity….. always have people who can think: so if they will decrease the time I can lose my job, they may need fewer people'*. (ECU_S_NU_2)

It is important to raise a discussion about this issue in UHS, mainly because there are two categories of employees. One is part of a tenured career category, they do not have the risk of contingencies, but they fear changes within the organisation structure that might result in a possible transferring to another department or unit. The second category of employees is the one that is subcontracted, and most of the cases are about physicians . They fear that improvements in the process can bring either headcount reduction because they are not part of the tenured career, or increase the workload. Thus, in the end the work that used to be carried out for two physicians will be done by only one. That is exactly what a doctor said during the interview:

> '*So if you see 100 patients, if you do your best, you get discouraged… they'll fire one person and the group will get smaller, they keep firing people till the limit. It already happened here at night, there were ten doctors working at night, now we have four, because they could handle the demand'*. (ECU_S_DR_13)

4.4.4.3. Non-urgent patients create unpredictable demand in emergency areas

There are a great number of complaints from staff members and physicians about the presence of non-urgent patients in emergency areas. When asked about the barriers to implement lean, they have highlighted that a process of changing in this environment is complicated, as they have to face an unpredictable demand from patients that not supposed to be in these areas. This also creates a problem in terms of excessive demand, as it is difficult to predict the number of patients that will come to the unit per day, when the right resources are not available. As a consequence, this excessive demand cannot be seen by a physician.

There are days that these non-urgent patients come to the emergency unit and the place becomes overcrowded. This kind of patients behaviour is highlighted by a physician in one ECU:

> '*there is a huge demand of patients that haven't got any problem, and among these patients there are those who really need to be seen, so they are waiting when they shouldn't be waiting'*. (ECU_S_DR_7)

When it comes to numbers, nurses and physicians agree that around 80 per cent of the patients in emergency areas should not be there, because they are considered non-urgent patients, as explained by a nurse from the triage area:

> '*Out of ten patients, at least eight could be seen there (basic units) and only two would be an emergency. They are very few, we perform very little the emergency activity, it's pretty hard'*. (ECU_S_NU_5)

These non-urgent patients are also blamed for disturbing the routine of the unit, one of the physicians in the emergency care said:

> '*It's the non-urgent patients, it is one of the main problems that end up wasting of time, increasing the waiting time, reflecting on our patience; these are the ones who cause troubles outside (waiting area of the unit), it bothers us*. (ECU_S_DR_09)

This situation about problems created by non-urgent patients in emergency areas, is also confirmed by another physician who explained:

> '*this is what causes troubles here, the chaos. It is what makes the police come here, the television, they're the patients who shouldn't be here. Out of ten patients who arrive here, eight shouldn't be here, it is an absurd number'*. (ECU_S_DR_10)

This kind of behaviour will be addressed in depth in the next section about the underlying barriers. However, it is relevant to raise this issue in terms of lean implementation and the effect of these patients in creating unpredictable demand.

4.4.4.4. Emotional stress between patients, staff members and physicians

Patients are the users of this process in healthcare, they act and demonstrate their 'users' behaviour' complaining about the service, when they do not receive the expected service, even though when the request is unnecessary or not important. When we asked the interviewees about the problems that a possible lean implementation could face in the emergency areas, one of the answers that emerged was about the patients' behaviour and how it affects the staff members and physicians. This behaviour sometimes creates an emotional stress that affect staff members and physicians, as confirmed by a physician:

> *'Sometimes there are verbal aggressions; I've never seen physical aggression, only verbal or oral aggressions'.* (ECU_S_DR_10)

The most common cause is the sick note request to justify the work absence. As nurses and physicians already know with this behaviour, if they refuse to issue this document patients become nervous, as a physician explains:

> *'there are some cases of violence, we know that if the doctor doesn't give the patient a sick note, this patient can come back and do something. So I feel more forced, more threatened'*. (ECU_S_DR_11)

A similar situation was reported by a nurse in an emergency care unit:

> *'There have been a lot of cases here of aggression, patients hitting the nursing staff, and even doctors. Physical aggression has become a common thing*'. (ECU_S_NU_12)

A point to consider about this barrier is that lean implementation will have to consider this type of patient behaviour which changes the focus of the process and puts staff members and physicians performing non-core activities and engaging in uncomfortable situations with patients.

4.4.4.5. Financial barrier to implement lean

There is a view that lean will bring the need to invest a considerable amount of money and this is identified as a barrier for the implementation. Nurses in the emergency care unit explained their view about this financial issue:

> *'I think the first barrier would be financial (barrier to implement lean)'*. (ECU_S_NU_4)

> *'first of all we would have the financial question'*. (ECU_S_NU_5)

One of the justifications for this barrier was that the UHS lacks of financial resources for so many basic things, and then it is difficult to imagine resources being invested in a project such as lean. The current situation of the UHS in terms of lack of resources make some people sceptical in case a lean project needs investments, as a physician explained:

> '*As regards the money, it is a problem (if the lean implementation request expenses). We aren't able to buy all the necessary things at the moment'*. (ECU_S_DR_10)

Barriers related to financial decisions are common within the literature (Section 2.7). What is interesting about this barrier is that people do not suggest or see that this could be overcome and savings could return on any initial investment (as it was never mentioned during the interviews), but the statements above from the interviews shows that the idea of spending money in UHS is not very welcome in the first instance.

4.4.4.6. Nurses performing different activities that are not core

Nurses perform crucial activities providing support for patients and physicians . However, it is not unusual this support being mistaken by other non-core activities, such as solving minor problems, going after material and medication, as explained by a nurse in the emergency care unit:

> *'If I say I do it 30 per cent of the time it's too much. The rest of the time I'm giving orientations, trying to solve problems, going after material, going after medication, going after relatives, going after doctors, most of the time is this'*. (ECU_S_NU_5)

'*even if you're at the observation room, you have to pick up a needle, or serum, medication, so you have to leave the room and go get them. We have to come and go all day, running after medication-controlled. I don't know but, here we have all the kinds of problems you can imagine'*. (ECU_S_NU_12)

This creates frustration as nurses do not spend time performing their core activity which is looking after the patients and providing care, but they become part of the new job activity and sometimes do not see a change on it:

'I basically do not spend my time doing things that I should do as nurse. The triage is a nurse activity, but currently my duties are summarised to only this activity. But my duties are much more than this'. (ECU_S_NU_1)

During lean implementation, nurses, as part of the staff members are important elements of the project implementation and sustainability. When they cannot focus on their core activities adding value to patients it can create constraints such as lack of engagement or commitment to the new process.

4.4.4.7. Poor management of resources

Another barrier to implementing lean is related poor management of resources, which sometimes are expressed in different ways, such as poor quality of the materials, lack of material control. For example, it generates frustration and a waste of time with poor quality of material, as a nurse explains:

'*the waste of time with poor quality this's a problem, sometimes you install the 'equipo' that does not work, that 'equipo' is bad you know? I have to redo the work for the poor quality of our products'*. (ECU_S_NU_2)

The waste generated with poor material is not just related to a waste of time but also with waste of resource, as most of the times a material with poor quality means it has to be used twice:

'The part of contaminating the material; when the material isn't that good, in the end we end up using more material' (ECU_S_NU_3)

This situation related to poor management of resources creates an unstable operation and it is difficult to implement and keep standard processes that do not have support of the reliable resources to perform that expected activity. In terms of lean, it can help providing a better control of the resources, but in terms of quality of the material it will be a challenge as the flow of the process might find disruptions for the reasons explained above.

4.4.4.8. The structure of the system affects the physicians

Another barrier found was related to the structure of the system affecting the physicians' performance. This relates to a lean barrier of the organisation creating barriers to change processes or implementing new ones. This can be in the form of regulations, internal procedures, bureaucracy. For instance, the capacity of appointments could be increased but because of a rule in the system this is not possible:

I mean, you send 10 patients home, you gave 80 prescriptions with medicines for pain to 80 people" I don't know about this, because the Regional Medical Council says we should see three or four patients during an hour, so this is not a doctor's appointment, it would be a triage. Then enters the question: will the population see this as a doctor's appointment? (ECU_S_DR_10)

There is also a situation when physicians are obligated to keep patients in the emergency level when they should be in a proper hospital with more resources available. This is just an illustration that the physicians have to follow the system's guidelines, even when it is not the correct procedure or the effect can be a disruption in the patient's journey. The result in this case will mean a bottleneck in the emergency due the lack of bed available.

'We have to keep patients hospitalised that maybe they couldn't handle, so these patients just remain here with us, you know? It is something that puts a lot of pressure on us. (...) I get a little frustrated sometimes but I deal with it; because of my philosophy of life I always face the fact thinking that the nervousness will only disturb, you know'? (ECU_S_DR_13)

The bureaucratic process is also a hurdle for the physicians, meaning they sometimes have to follow endless procedures to perform basic and daily activities, becoming a constraint on their performance, which reduces the time available to see patients:

> *So we have those steps to do many things here, for example, to send a patient to the observation room, you have to make a basic prescription with medication. So I'll have to do some research and many times we don't have the medications in the right place, I've already complained with them, I don't know why, but they don't give some medicines, maybe because they think it won't be used, but if we have to use the system, we must have all the medicines.* (ECU_S_DR_10)

All these examples about the structure of the system affecting physicians show that it is important to consider all the influences around the physicians when implementing lean, as they are the ones that perform the value added activities and constraints like those explained above were highlighted as barriers to performing a new process such as lean.

4.4.4.9. Physicians spend time performing activities that are not core

The main complaint from the patients is about the long time to see a physician in the emergency area. During the data analysis this theme related to physicians spending time with non-core activities emerged as one of the reasons for this long waiting time. Physicians spend a reasonable part of their work dealing with other problems rather than seeing patients. One physician in the emergency area said:

> '*30 per cent or 40 per cent of my time I spend doing unnecessary referrals, filling out forms, this kind of thing; going after materials that aren't on its place etc'.* (ECU_S_DR_6)

The focus seems to be on activities that generate waste and even the physician without a proper knowledge about lean and valued added activities understand it, as a physician explains:

> '*So first I have to solve all the problems, I have to search the material, get papers, if the printer does not work I have to go after a person to fix the it… Every time I leave*

here to answer a phone call, or to call someone, I'm wasting time; everything is a waste of time'. (ECU_S_DR_6)

When physicians are not perceived as performing their core activity it becomes a barrier to lean implementation and sustainability, as they are the ones that will deliver the added value to patients. Without their involvement the focus is not on the user, which will create disruptions in the process.

4.4.4.10. The UHS bureaucratic style as a barrier to lean

This barrier can be related to the organisational structure. Basically there are problems within the system that inhibit attempts to improve the process. When asked about the impact of this bureaucratic system in a possible lean implementation in UHS, a physician said:

'*I think this bureaucratic style makes things more difficult, I don't know it (lean) would have space, but the application could happen, with no doubt.'*(ECU_S_DR_13)

'I'd say there's a barrier on this bureaucratic part, everything depends on liberations, papers, etc'. (ECU_S_NU_3)

4.4.4.11. Slow pace of changes in UHS

Another barrier raised by several interviewees, was about the slowness to change in the UHS. There is a feeling that simple things take a long time to happen. When it comes to substantial changes, such as a lean approach, that involves structure and even cultural changes, this lack of pace is exacerbated.

'The speed that each change occurs in the public service is something that bothers us: it is a complete slowness, because people aren't always involved and committed to solve the problem'. (ECU_S_DR_6)

This quote sheds understanding of another barrier that will be addressed further in this section, which is the lack of commitment and involvement from the leadership. As a consequence it is possible to state based on these quotes, that people want to change and see the things improving, because this affects their work. However, they start to get frustrated with the slowness in UHS changes, which is exactly what a nurse in an ECU said:

'everything takes a lot of time, the desire to make things happen is very big; We have ideas, we want to do things, but everything depends on this, on that, etc. Health Council, local Council, "you can't do this", "you can't do that". So year after year it is a complicated thing, it's even a little frustrating.' (ECU_S_NU_4)

The situation above can be summarised in a least three main elements: slow pace of change, frustration and feeling that lean will not survive in the sluggishness of the UHS. Lean is a long-term approach, it is not something that will provide quick changes and great results in a short period, unless it starts with small *kaizen* projects, but even though the sustainability of these project can be affected by the slow pace of change.

4.4.4.12. Performance management in UHS

The analysis has shown that there are differences in management between private and public healthcare in Brazil, and this affects the way performance management is undertaken in the UHS. Amongst the codes that emerged during the analysis it is possible to highlighted the one related to the use of private and public money in healthcare. A physician during the interview raised this issue:

'On private system the money is mine, I'm a businessman, I do what I want, the way I want, and it's faster. On public system there is a huge bureaucracy… Honestly? I think people do not have the obligation to show results on UHS.' (ECU_S_DR_6)

The findings in the UHS site - 1 gave some understanding about the differences between private and public system:

'There is no-one supervising the public system whereas on private you must do what you got to do otherwise you're out. It's necessary to have someone supervising, demanding'. (ECU_S_NU_16)

4.4.4.13. Public system lack of interest/motivation in changing

This is an important barrier related to the context of the research. The UHS is a public system and all decisions are made in a political environment, this situation is confirmed by a physician in the emergency care unit:

'*So I think that on this political part, the organisation would help, but I don't know if the policy/politics would be interested in fixing the problem, you know? Because of course, when things get very clear, very evident, depending on what you want to, I don't know if it's a proper thing to do'*. (ECU_S_DR_6)

This lack of interest in changing can be also related to a feeling that things do not work properly in UHS, as a physician in an emergency care explained:

'*many times you open the door of the cabinet and you see the tag with the name of a material but the office material itself isn't there, or it is incomplete; man, it makes me depressed; but I don't even care about this anymore, this problem is so common nowadays that I open the cabinet (...) You start considering it as a normal thing, exchanging the monitor four times and it still doesn't work…'* (ECU_S_DR_10)

The quote above shows that this lack of interest in changing is a behaviour that is becoming part of the UHS culture; people are considering lack of standardisation or organisation something normal.

4.4.4.14. Staff resistance to change

Similar to physicians, resistance to change was found amongst the staff members as well. Sometimes resistance is also related to the period that one works in the organisation that is implementing lean, or even the age, which some interviewees highlighted as resistant people, in the emergency care unit a nurse said:

'*there are a lot of people, we have people who unfortunately, of all ages, all types of professional, doctors, nurses, assistants, and they work here for ages, so they are very resistant to change'*. (ECU_S_NU_2)

There is also resistance that comes from people that do not support the project and expect that it to fail, as explained by a physician in the emergency care unit:

'People who look at it as a good thing, and those who work hoping it doesn't work out; it's not only here, but everywhere you go…' (ECU_S_DR_6)

4.4.4.15. Lack of lean knowledge and experience

The lack of lean knowledge in the UHS might be a barrier, an approach based on lean philosophy will be something new for the majority of people in the UHS, this can become a constraint as a physician in an emergency care unit explains:

'*because we're having changes all the time, always receiving new things, and a lot of time we get lost'*. (ECU_S_DR_6)

This lack of understanding might create confusion and even lead to resistance, but as soon as people start to understand the concept it is likely that the project will have the staff buy-in, this is illustrated buy a nurse who said:

'I also believe that it is just until understand that it is for our own benefit, because in the end we will take advantage of it'. (ECU_S_NU_1)

'I think everything is solved with training; if the employee is well trained to develop that job, he won't have the difficulty, however if there is no understating about the new process (lean) so this can become a barrier'. (ECU_S_NU_3)

4.4.4.16. Public servant tenured career (physicians and staff)

In the Brazilian public system in general the public servants have different benefits from workers from the private sector. One of these benefits is the tenured career, which provides a type of job security as these professionals rarely can be fired. When it comes to lean implementation there are some disadvantages to this model, and the data analysis process raised some relevant points related to the difficulties to replace people or transfer to other areas, a nurse in emergency care unit explained:

'here is about public service, there is a question of tenured career, is more difficult to change this situation. The person comes to public service, I can tell you that many people here in the nursing area they don't have the profile for the emergency department, but I can't change this person'. (ECU_S_NU_1)

This situation also leads to another one, which is the lack of involvement and commitment of the public servants, which is highlighted by a physician within the emergency care unit:

> '*I really think that those employees who are here for 20 years and don't want to improve anything, they shouldn't be there. There is a lack of commitment because of being a public employee'.* (ECU_S_DR_13)

This situation creates a different behaviour amongst the public servants, as sometimes they start to act as they do not need to follow the rules, as explained by a nurse:

> *'I've worked with permanent doctors (public servants) here, and it's worse; because they're permanent, so they arrive on their own times, and if they think there are too many patients to be seen, they'll get a sick note and go home'.* (ECU_S_NU_4)

In an environment where people do not follow the procedures or tend to avoid the 'rules', the lean implementation can be jeopardised, as the project engagement and involvement will be difficult to achieve.

4.4.4.17. Communication disruptions amongst staff and between shifts

Issues related to communication is a common problem when implementing lean, and this was one of the points highlighted for several staff members during the interviews. In one occasion a nurse from ECU said:

> '*So everybody gets mad because no-one knows what is going to happen with our lives. That's why I think the lack of information is a problem; we attend these meetings when they allow us to go, even so we make questions and they never give us a complete answer'.* (ECU_S_NU_5)

Information is not clear, there are things communicated to a group of staff in one shift but it is never shared with other shifts, as explained by a nurse in a ECU:

> '*So this has to change, all times, all shifts must receive the same information, but WHAT happens during some meetings is that sometimes many people do not attend it,*

or the meetings are not performed on all shifts and ends up that those who did not attend the meeting, they will not receive the information in the same way and it begins to "truncate" the thing'. (ECU_S_NU_2)

The lack of communication is presented as a barrier to lean project, as people do not understand it:

'the unknown can cause impacts, then the lack of communication (about the new project) could be a barrier'. (ECU_S_NU_16)

The next section will present information related to the observation process in the UHS site 1 – ECU.

4.4.5. Observation process in the UHS Site 1 - ECU

The use of multiple sources to collect data is a common approach in case study, for example, interviews, observations, documents and artefacts (Creswell, 2013). The observation is considered one of the key tools for collecting qualitative data in the real world. Through this natural technique it is possible to watch and analyse people's actions and behaviours in laboratory or natural setting, as well as interpreting what was observed (Collis and Hussey, 2014; Creswell, 2013; Robson, 2011).

Considering one of the purposes of this research is collecting data from staff and patients interaction (patient's pathway) within the emergency areas of the UHS, the participant as observer model was more suited to be conducted. A detailed explanation about this method was already described in the methodological chapter.

When the patient arrived in the ECU he was approached by the researcher and asked if he could participate in the observation process. The researcher then followed the patient during the whole journey within the ECU (excluding the private parts such as appointment with the physician or medication room).

The table 17 shows the main problems found during the observation of the patients pathway in the ECU. These problems do not affect only the patients but also nurses and physicians.

Table 17 – Patients Main Problems Observed in the ECU

Problems Observed – ECU **(presented in the order that emerged from data)**	**Frequency of reference from data analysis**
Patient does not have easy access to medication	11%
Facilities layout as a problem for patients and staff	7%
Non-urgent patients	11%
Lack of resources and structure	18%
Nurses performing different activities that are not core	4%
Waiting times	32%
Patients spend time trying to find the room within the ECU	18%

A total of seven main problems that affect the patients were observed during the researcher's observation of the patients' pathway. The observations were all registered in the observation field notes, and received the code: OBS_ECU, plus a sequence number as a way to identify each observation. For instance, observation number 3 will be OBS_ECU_3. All these problems will be discussed in-depth in the chapter data analysis; however to illustrate the finding two main problems will be presented here.

One of the main problems found during the observation was related to waiting time to see a physician, for instance when the patient found the doctor's office and after almost five hours waiting, the appointment duration was less than three minutes and he was referred to the medication room. In this case it is not just the long waiting time to see a physician that takes the attention, but also the consultation length, which seems very short. Another relevant problem found was about the presence of non-urgent patient in emergency areas and their affect on the physician's work. For instance during the observation process, they were working without two doctors, so one doctor said: 'today I'll give sick note to everyone'. This is because they do not want to waste time and need to reduce the queue. As sick-note request is one of the main requests from non-urgent patients in the ECU and they were operating with a reduced team of physicians , this physician just decided to reduce the queue giving sick note without further questions.

Nurses performing different activities that are not core is another problem observed by the researcher. It seems that nurses are there to perform all activities even when it is not related to their job. It was not unusual to observe nurses trying to find the medication; during the observation process in the emergency care unit, a nurse had to go after the medication two times, because the medication has not been delivered in the room as supposed to be.

The section 4.4.6 will discuss the main problems faced by patients when they seek healthcare assistance in the ECU.

4.4.6. Main problems faced by patients in the ECU

The ethics committee granted access to ask question to patients during their waiting time in the ECU. The interview process always occurred after the appointment with the physician in a private room. This way it was possible to obtain an overall impression of the patients experience during their entire time in the ECU. The patient was introduced to the adult participant information sheet (Appendix IV) and Informed consent form (Appendix V). The patient had time to read and ask questions about the documents.

It is relevant to capture the patients' point of view as they witness the situation first-hand and explain what is going on there. Moreover, the patient is one who is affected the most during the service delivery process and the one who expects to receive value added service. The patients were asked about the main problems faced during their time in the ECU (interview theme available in the Appendix III). The problems in the ECU that emerged from this interview are similar to the one presented in the literature review chapter, but with high prominence on long waiting time to receive treatment, which includes to seeing a physician and performing tests or finding a hospital bed (according to Brazilian researchers: Azevedo and Costa 2010; Piola *et al*., 2009; Solla and Chioro, 2008) Table 18 displays a list of eleven problems found in the UHS Site 1 - ECU that were highlighted by patients.

Table 18 - Main Problems in the ECU

Main Problems in the ECU **(presented in the order that emerged from data)**	**Frequency of reference from data analysis**
Long waiting time	36%
Lack of physicians	7%
Lack of trust in the service	2%
Lack of courtesy from staff members	2%
Lack of basic resources	9%
Lack of medication	14%
Lack of interest in help the patient	16%
Physician lack of commitment	5%
High level of patients' movement	2%
Only one ECU for a massive neighbourhood	2%
Lack of Intensive Care Unit beds	5%

As previously mentioned and confirmed by the literature, the long waiting time to see a physician and receive care is the one of the main problems faced by patients when they see care in the ECU:

> *'It is always this long waiting time, it is not the first time that I come here and it's Always this way. Last time that I came with my mum she was waiting five days for a hospital bed, everything it's always a long waiting'.* (PAT_ECU_3)

> *'It's waiting time, yesterday one person arrived at 14:00 in the unit and left only at 22:00'.* (PAT_ECU_1)

There are also problems related to the way that patients are treated in the ECU (lack of courtesy from staff members). It was a common complaint that some staff members do not show courtesy when dealing with patients, as explained by some patients:

> *'There are some nurses that they are terrible, they treat us very bad, the contact with customer is horrible'.* (PAT_ECU_3)

> *'I said good morning and the receptionist didn't say anything, it's a lack of courtesy with us'.* (PAT_ECU_1)

Another issue that was highlighted by patients is the lack of physicians' point of view, but there is also the case where they see it as lack of commitment from the physicians that should be working in the unit:

> *'I see this as a humiliation, a person have to stay here five or six hours waiting, the doctor sees one person and goes out to drink a cup of coffee, play on his cell phone and stays there, meanwhile the patient is waiting'.* (PAT_ECU_4)

As shown in table 18, there are more problems that emerge from interviews with patients. However for the purpose of this research some are not relevant to discuss, whereas some will be related to some barriers to implement lean.

4.4.7. The importance of lean in the UHS

The last question asked during the interview process was an attempt to summarise the conversation and understand if lean is seen as something important for the staff members and physicians in the UHS. The majority of the answers that emerged were positive, and they see lean as a new approach that can support improvements across the unit, especially with focus on time reduction to see a physician:

> *Look, I think it is very important, if it really brings more time available, that is it, decreasing waiting time (to see a doctor), because if you ask any person, the waiting time is making us sick!* (ECU_S_SOA_8)

> *Wow, it would be great; on organisation in general, it would reflect on all our work process. You know, to see things actually happening is our dream here.*
> (ECU_S_NU_16)

The overall view of the data collection in this site is that there are many problems that patients, nurses and physicians face every day, but these problems also seem to have become part of their routine and sometimes they are ignored and there is no interest in change or people do not believe that this will change one day. The interview sessions were almost a time that some of these people found to have their voice heard about the problems that affect their work. It was noticed that this place sometimes looks chaotic, with patients waiting for more then five hours to see a physician, it was also noticed that there are tensions between patients, staff members and physicians . The UHS seems to offer the basic resources to this place and as a consequence there is a lack of almost everything.

This is a typical system before the lean implementation and it has presented several opportunities to make improvements. It is also a system with people that want to make the system work better with focus on the patient. The next section will present the initial findings at UHS site 2 – ED.

4.5. Source Two: UHS Site 2 – Emergency Department (ED)

4.5.1. Background

This is an emergency department (ED) or also commonly known as accident and emergency department (A&E). The ED selected is in the city of Curitiba which is the capital of the

southern Brazilian state of Paraná. It is considered one of the most important EDs in the city with reference to treatment of trauma. Since 2005 it is also a university hospital that trains juniors physicians and students that are studying to become a physician. The hospital treats over 200 patients per day; the patients' access is made by themselves or referred by the mobile service ambulances. The service is performed 24 hours per day, seven days per week, and nurses and physicians work in two shifts of 12 hours. This ED only has senior nurses working. However, the physicians are divided into junior doctors that are learning on the job and senior physicians that already have experience in this area.

In terms of the management team, nurses and physicians have supervisors that look after the area. However, as this place is part of a hospital, the main management team is based on the hospital management board.

The access to ED is free of charge, and it is funded by the State government as well as the Federal government budget. The selection of this specific ED to carry out the data collection was made owing to the previous networking developed by the researcher with the management board of the hospital. It is also justified as being part of the emergency level of care of the UHS as well as due the high volume of patients in this ED.

4.5.2. Interviews process in the UHS Site 2 - ED

The interview process was carried out during the months of June and July of 2016, and 16 face-to-face interviews took place in this site, however, the content of one interview with patient was not considered due the lack of interaction and perhaps interest of the patient'. Due the nature of the place (A&E) it was not possible to schedule an interview with physician in this site, so eleven interviews were carried out with nurse and five with patients. The fact the interviews with physicians were not possible in this site did not affect the results of the research as information from nurses covered the routine in this ED. The length of interviews with nurses varied between 40 and 50 minutes, and interviews with patients no longer than 10 minutes as they only answered one question. Table 19 depicts the number of interviews carried per type of respondent in this site, as well as the code that will be used to display the sources of the data analysed. The justification for a reduced number of participants when compared to ECU is due to the availability of people in this site. As explained before, physicians could not be interviewed and also this was the number of nurses that volunteered to participate in the interview process.

Table 19– Interview Codes UHS Site 2 – ED

Source	Title	Interview Code	Number of Respondents
Emergency Department	Nurse	ED_S_NU	11
	Patient	ED_PAT	4

The access to data and engagement of the interviewees at this site during the data collection can be considered very positive. However, due the nature of the place and the understandable priority to patient treatment, the researcher had to reschedule interview sessions several times. Regardless of this problem, with time the nurses were pleased to use their time to contribute to the research (at least that was the perception during the interview and informal conversation, the research was seen as something that could improve the process in the ED). Similar to what happened in the ECU, the access to patients was considerably easy, with a very short contribution, which can be related to the lack of time after a long waiting time in the unit. The selection of the patients was made based on their availability and considering their healthcare condition to be well enough to participate in the study. The following section will present the understanding of lean from the participants' point of view.

4.5.3. Understanding of Lean in the UHS

Similar to what happened in the ECU in the ED the respondents gained basic knowledge about lean before the interview. Thus the same process of lean induction, which was already explained in the 'UHS Site 1' section was also carried out with respondents in this site.

After the lean induction, to confirm if the respondents understood what is lean in a basic level, they were asked to describe lean using their words. The results are words used in the lean approach, such as, organisation of the process, benefits for patients and professionals, less cost, waste of time:

> *'I understood that the LEAN brings an easier way of working… Not only bringing benefits for us, the professionals, as for the patients too. It ends up generating less cost, less expenses, less stress in the team, that is it, I think it would be very interesting'*. (ED_S_NU_06)

> *'I understood that this would be a project to make the work easier and to organise the time, because we waste a lot of time here'.* (ED_S_NU_1)

The UHS respondents were also asked to related lean to their work, and identify how the lean approach could be used in the processes that they are involved, some of the suggestions are below:

> '*So this technique would be very interesting in my job, because it would organise the flow and cut a lot of unnecessary things off, you know'?* (ED_S_NU_04)

> *'I guess it would be something that would improve a lot. For example, I think some things are unnecessary on UHS, such as an emergency room with 20 different kinds of flexible catheters unnecessarily, it is a high cost, and it happens every day here, like 10 unnecessary tomography a day'.* (ED_S_NU_05)

Finally in the end of this lean induction process, the respondents were asked to describe what caught their attention the most about everything that they read in the newspaper article and in the lean presentation. The answer in this case were examples of what they saw about lean, as follow:

> '*What caught my attention the most is that the impact we'd get with the medical team's service; about defining where the patient must go, if they'll be referred to do a test, if they'll only receive medicine etc. because the patient is in pain. Like, deciding whether the patient will be referred because of some medical specialty or they'll continue the treatment here'*. (ED_S_NU_7)

> '*The flow going just to one direction, unidirectional. Because it is a mess here, like, they go to the tomography, then they come back here, then they need a medication so they go to the pharmacy. I wonder how much I walk during my shift…'*
> (ED_S_NU_10)

The following section will address the main barriers to implement lean in the UHS Site 2 - ED.

4.5.4. Main Barriers to Implement Lean

This section addresses the main barriers to implement lean in the UHS from the ED staff members' point of view, the participants (as previously explained in the Section 4.5.2) only nurses not doctors) were asked to share possible barriers that could emerge during the lean implementation. Similar to what happened in the UHS site 1 ECU, two type of barriers emerged. Firstly, barriers are common within the literature, such as lack of resources, resistance to change. Secondly, specific barriers that are related to the UHS, such as UHS slow pace of change, non-urgent patient present in emergency areas, public system lack of interest/motivation in changing (Table 20).

Table 20 - Lean Barriers in the UHS Site 2 - ED

Lean Barriers - UHS Site 2 – ED **(presented in the order that emerged from data)**	**Frequency of reference from data analysis**
Non-urgent patients create unpredictable demand in emergency areas	15%
Emotional stress between patients, staff members and physicians	4%
Nurses performing different activities that are not core	15%
Poor management of resources	11%
Slow pace of changes in UHS	7%
Public system lack of interest/motivation in changing	4%
Staff resistance to change	11%
Communication disruptions amongst staff and between shifts	22%
The administration or leadership can be a barrier for a new project	11%

A total of nine barriers to implement lean were identified from the interviews in this site (UHS Site 2 - ED). To avoid overlaps and repetition of the barriers' explanation, as most of the barriers are common in the ECU and ED and they were already explained in the UHS Site 1 - ECU. Only barriers found specifically in the UHS Site 2 – ED context will be fully explained instead.

4.5.4.1. Non-urgent patients create unpredictable demand in emergency areas

This is a common problem in the UHS, as both ECU and ED have problems related to this barrier. As mentioned by this physician this kind of behaviour from non-urgent patient, affects patients that have a serious health situation as they increase the waiting time, as a consequence this affects the quality of the service:

> *'This (non-urgent patients in emergency areas) is what causes this huge demand, and this demand causes low quality on our service'*. (ED_S_NU_02)

An interesting point suggested by this nurse is that the presence of a non-urgent patient in emergency is not only the patient's mistake, but the UHS's that does not provide enough information about the UHS levels of care:

> '*The population isn't well informed about what we treat here, why the hospital is here, what is the BHU's (GP) function, what is the ECU (24h)'s function… I think even the 24 hours is full because of that, there are things that could be solved on a BHU, but they go to the 24 hours because it is open'*. (ED_S_NU_8)

4.5.4.2. Emotional stress between patients, staff members and physicians

One of the main reasons for this barrier is the patients requesting a sick note when it is not necessary, so the physicians and nurses engage in arguments with patients. There are times that staff member just give up arguing with the patients and accept the request even when they know that it is wrong:

> '*I stopped getting stressed with those things, because you can start a huge fight if you say you don't give them a sick note, and this is absurd… there is verbal violence all the time'*. (ED_S_NU_10)

4.5.4.3. Nurses performing different activities that are not core

This kind of situation seems to incorporated as part of the nurses' duties when they should be only be an occasional situation. They are the people that will be requested to all situations:

> '*If they have to call a doctor, the nurse will do that, if they have to ask for tests, the nurse will do it and if they have to search for vacancies, the nurse will do it as well.*

This is a reference to the medical staff, everything is up to us, we have to solve everything and then we lose a lot of time'. (ED_S_NU_02)

4.5.4.4. Poor management of resources

Another barrier is related to resources and the constraints related to manage it; it was found that there is a poor management of resources in the UHS:

'when I arrived here I was criticised because I used to oversee this waste of the team, like "why are you using too many needles, it's too much", and they used to say "don't worry about it, this is the less important". I have some junior doctors here who open four serums, just because they don't write the date in which they opened them, the expiration day' (ED_S_NU_1)

The other common problem is the lack of control of the material, because it is public money people seem not to be concerned with spending when compared with private system:

'*I come from a private hospital where you have to justify all the materials you used; you must do an audit report saying everything you used, such as serum, needle, etc. But it doesn't happen here, and now we're having a lack of materials and people are getting scared'*. (ED_S_NU_1)

This poor management of resources appears as low quality of material and lack of control creating waste across the processes; it also creates difficulties to implement and keep new standards that come with lean implementation.

4.5.4.5. Slow pace of changes in UHS

When this situation was raised within the emergency department, a nurse shared her frustration about this issue:

'*the reality of our unit is not different, just for changing a light bulb it takes time, it's difficult. Now, can you imagine trying to change the whole structure?'*. (ED_S_NU_03)

The concerns about the changes that lean can bring and the slow pace of the UHS is clear in this quote from a nurse in the ED:

> '*For a simple printer we have to wait for a year, can you imagine having to make a refurbishment, not only in the structure, I mean, in the whole service, right? It will generate a huge impact'*. (ED_S_NU_10)

4.5.4.6. Public system lack of interest/motivation in changing

The participants related that in the UHS things are not taken as serious because it is public and there is a mind-set that there is no owner. People just have a feeling that there is no need to improve, but prefer to keep the old style of work, as a nurse said:

> '*I think they don't take it seriously because it's UHS, it's public, like "let's keep doing this in the way we can"'*. (ED_S_NU_02)

4.5.4.7. Staff resistance to change

The literature shows resistance to change as a common barrier to implement lean; this was also one of the barriers highlighted during the interview process that could affect the lean implementation in the UHS site 2 – ECU. Changes create different types of conflict and people become resistant, sometimes it is an attempt to protect itself against the unknown, as explained by a nurse from an emergency department

> '*every new thing that comes here, people complain about it; they're afraid of the new so they give us the 'no'*. (ED_S_NU_2)

> *'I guess for every new thing that appears people start creating barriers'*. (ED_S_NU_3)

This barrier related to resistance to change is a common barrier that affects lean project in different areas. When it comes to the UHS that is an uncharted field for lean; it can be a relevant barrier to be considered during the lean implementation, especially when it was found staff members explaining that there is resistance to new things in this environment.

4.5.4.8. Communication disruptions amongst staff and between shifts

Issues related to communication is also a common barrier during the lean implementation. Sometimes it comes in forms of lack of leadership communication, and sometimes as in this case. found in this UHS site, it is the communication disruptions amongst staff and between shifts that it is seen as a barrier.

The lack of communication is confirmed by nurses in an ED:

> '*we had a meeting with the nurses and look, I've worked here for nearly two years and there was only one meeting to sit and talk to the leaders, to say like "tell me what do you think, what are the difficulties, what is your point…'.* (ED_S_NU_3).

> '*The problem is that it seems that the nurses don't speak the same language...*' (ED_S_NU_05)

There is also a situation where communication between shifts is a problem; when one shift finishes and another starts they do not have enough information about the patients in the process (or a work in progress), as explained by a nurse:

> *'For example, the patient is at the surgical centre and they forgot to pass to the next shift, then they call saying "they are going to come and get the patient X" and I'm like "but I don't even know where this patient is…" So it happens a lot'.* (ED_S_NU_06)

If communication does not flow amongst the staff members it can be a barrier to implement lean, especially a new project that demands information in all levels of the organisation.

4.5.4.9. The administration or leadership can be a barrier for a new project

This is the only barrier that was not found in the previous source UHS Site 1 –ECU, however it was found in the UHS Site 2 – ED. Leadership commitment is one of the keys to implement lean, however it is not unusual to find the top management as the main barrier to lean. During the data analysis several codes were related to this issue, such as middle manager can be a barrier, staff members sceptical about the UHS administration involvement and UHS management is a barrier to UHS, among others.

Leadership is seen as a barrier in the emergency department of UHS, as explained by a nurse:

> *'Because people don't know how to adapt themselves to these new opportunities (lean project), you know? They end up putting more obstacles in the way and we have plenty of bosses so the management would be a barrier, that's what I think, you know'?* (ED_S_NU_9)

> *'The people (leadership group) who allow us to start these changes many times aren't here; (….) These people aren't here on our routine, they think "it works like this" but they aren't here to see how things work. I think maybe it's because things are "working"… I think this is the reason'.* (ED_S_NU_3)

The literature shows that lean is about senior and medium management involvement. When barriers emerge from the administration, it might create constraints not just for the lean implementation but for the sustainability of the project as well.

The next section will address the findings from the observation process carried out within the UHS Site 2 – ED.

4.5.5. Observation process in the UHS Site 2 - ED

As previously explained the use of additional sources of data such as observation in a case study is encouraged for many scholars (Collis and Hussey, 2014; Creswell, 2013; Robson, 2011).

The process of observation in this site was similar to the one carried out in the UHS Site 1- ECU: the patient was approached by the researcher at that moment of his registration and asked about his participation in this data collection. The researcher then followed the patient during the whole journey within the ED (excluding the personal parts such as appointment with the physician or medication room). Four observations of the patients' journey were carried out on different days, the length of this observation is directly related to the time that the patient remained within the unit which sometimes was between two to four hours.

During the observation process several problems emerged and were registered in the research field notes. Table 21 summarises the main problems found during the patient's pathway observation that not only affect the patient, but physicians as well as nurses.

Table 21 - Main problems observed in the ED

Problems Observed – ED (presented in the order that emerged from data)	**Frequency of reference from data analysis**
Patients waiting to be discharged (bottleneck)	18%
Triage working with 'batch' of patients	6%
Waiting time to see a physician	18%
Patients spend time trying to find the room within the ED	12%
Emotional stress between patients and physicians	6%
Lack of hospital bed	3%
Lack of resources and structure	12%
High influence of the junior physician in the process	9%
Non-urgent patients	6%
High level of patients' movement	12%

A total of ten main problems that affect the patients were observed during the researcher's observation of the patients' pathway. The observations were all registered in the observation field notes, and received the code: OBS_ED, plus a sequence number. Some of the problems are similar to the ones found in the ECU, for instance lack of resources and structure on waiting time to see a physician, but also different problems emerged in this site. All these problems will be discussed in depth in the chapter on data analysis. However, to illustrate the findings two common problems will be presented here.

Some of the examples of the problems found during the observation were related to patients waiting to be discharged (Figure 18) and how the junior physicians work with a batch of patients. Almost all doctors in this area are junior doctors but they do not have the authority to discharge the patients without the supervisor's approval. What they usually do is to accumulate a 'batch of patients' wait for the supervisor and then discharge them all together. There is no flow in this procedure it is a batch work. In some situation most of the patients are ready to be discharged but they have to wait for a long time because the junior doctors cannot discharge the patients so they have to wait for the doctor supervisor. In this

case the junior doctors have to keep a ‘batch of patients’ and then discharge all at the same time.

This process of waiting creates a considerable bottleneck in the discharging area. Most of the cases it is only a stamp from the physician’s supervisor and the patient can go home. However, this process sometimes takes hours, because the junior physicians have to create a batch of patients and then the supervisor will come and authorise the discharging process (Figure 18).

Figure 18 - 'Batch' of patients waiting to be discharged in the ED

Another specific problem witnessed in this site was about the high level of patients’ movement in the ED (Figure 19): the patient has to follow at least 16 different steps to finish his journey within the ED: 1) reception; 2) waiting area; 3) Admission; 4) waiting area; 5) triage; 6) waiting area; 7) signature; 8) waiting area; 9) doctor’s office (student); 10) waiting

area to perform the X-ray; 11) X-ray; 12) Waiting time to see the doctor; 13) Doctors Analysis; 14) Discharge waiting; 15) Discharge procedure; 16) Leaving the building'.

This high level of patients' movement creates several problems to patients and staff members; most of the times it was difficult to track the patient within the unit (Figure 19). Another problems was that the patient seems to be lost without information about the steps that he has to follow. In the emergency department patients do not have the information about where is the appointment with the doctor, they are verbally called but there is no visual information to indicate where they should go.

Figure 19 - High level of patients' movement in the ED

The next section will present the main problems faced by patients when they seek healthcare assistance in the ED. These problems were identified during the interviews with patients in the ED.

4.5.6. Main problems faced by patients in the ED

The interview process was carried out with patients to understand their point of view as a 'user/customer' of the system about the main problems faced during their time in the unit. The interview process occurred after the patient being discharged and they were invited to a

private room to answer questions. This way it was possible to obtain an overall impression of the patients experience during their entire time in the ED.

It is relevant to capture the patients' point of view, as they are the ones who are affected the most during the service delivery process and the one who expect to receive a service with value added. The patients were asked about the main problems faced during their time in the ED (interview theme available in the Appendix III).

The problems that emerged in the ED are the same that emerged in the ECU. The only difference is that in the ED, they are concentrated in five problems that were underscored, and other problems that emerged in the ECU did not emerge in the ED (Table 22).

Table 22 – Patients Main problems in ED

Main Problems in the ED (presented in the order that emerged from data)	**Frequency of reference from data analysis**
Long waiting time	53.8%
Lack of medication	15.4%
Lack of courtesy from staff members	7.7%
Staff member and physicians commitment	7.7%
Lack of basic resources	15.4%

The long waiting time to see a physician is the problem that all patients interviewed have highlighted, this is a common problem in the UHS and it was already underlined in the literature as explained in the section 4.5.5 about the problem in the ECU. Some examples of these problems that emerged during the interview are below:

> *'I'd say that the problem is the long time waiting, but it is because there is a high demand of people here, but the biggest problem is the long waiting time'.* (PAT_ED_2)

> *'It wasn't just with me that happened this long waiting time, because I was there sat and other patients also complained about the long time waiting, so in my point of view it takes a long time when I have to see a doctor'.* (PAT_ED_1)

Another interesting problem highlighted by patients was about the lack of commitment from physician and staff members, they noticed that there is a long waiting time to see a physician, however at the same time some physicians and nurse walk around using their cell phones:

> *'I saw a lot of people (doctors and nurses) walking all the time with the cell phone, I don't know why, but I think it has to be improved'.* (PAT_ED_4)

It is important to argue that this is the patient point of view, and it was also based on things that they observed during their time in the ED. However, further analysis of this barrier (data analysis chapter) will show that this is a problem that also emerged during the interviews with physician and staff members. Another problem that emerged from interviews with patients is related to lack of basic resources, the patients highlighted that the ED lacks of material in the toilet, suitable area to wait and others. The next section will present the importance of lean for the UHS based on staff members' point of view.

4.5.7. The importance of lean in the UHS

This question was asked to understand the overall feeling about lean and how it would be accepted in case of implementation in the future. The answers that emerged were positive and people understand that lean can support the improvement across the ED. Some of the words that emerged were based in lean principles, such a waste elimination, time reduction, organization of the process, improve the service:

> *'If it was implemented, it would be awesome for the nurses. It would help that 'waste thing' for the institution; first because it makes no difference for us, we don't make profit with the things we're doing here, but for the institution it would help as regards the waiting time and the wastes in general. The service would be more aligned. I think we would have a better control of the space… And it is very important for us; so it would be something positive, no doubts'.* (ED_S_NU_07)

> '*I think it's important because we can work with organisation (of the processes); there are days here in which you arrive and you just don't know where to go. You don't know who's hospitalised, who is not… so if this project could organise and improve our service here, accelerating the service, it would be important'.* (ED_S_NU_11)

To summarise the data collection at this site shows that there are two main situations in this place. Firstly is the presence of junior doctors. As a university hospital there is a considerable presence of junior doctors and students in this ED, the only problem is that there is also a problem with supervision of them, which directly affects the patients that have to wait for a simple stamp sometimes. Secondly, as already underscored in the observation process, there is a high level of patients' movement within the ED, which creates a problem that there are people walking around all the time. In addition, it becomes very difficult to be lost in the ED as most of the times information is not available.

The positive view about the UHS Site 2 – ED is related to the dynamic workplace that was found. It was very interesting to observe people motivated to perform their activities and also find time to contribute with the data collection. The environment that these people work in seems to be under pressure all the time; as one of the largest trauma centres in the region they never know what will come through the door. However, they are prepared to work despite the normal difficulties already highlighted in this chapter. A future implementation of lean in this place would have a great impact on patients but also on staff members and physicians.

The next section will tackle the initial results found from the data collection with lean management consultants.

4.6. Source Three: Lean Management Consultants

4.6.1. Introduction

During the selection of lean management consultants, elements such as experience with lean healthcare, practical implementations of lean in healthcare were considered, as well as reputation, which includes publication in media such as newspapers, magazines, books. It was also considered the participation of these consultants in conferences for lean practitioners, workshops and summits. The researcher identified four main practitioners in lean healthcare in Brazil from different consultancy companies, they were contacted and accepted the participation in the interviews. However, their names, due the fact that it can be associated to customer, will be concealed. A summarised background of the consultants (informed by the consultants) will be dealt with in the next section.

4.6.2. Consultants Background

4.6.2.1. Consultant I

He is considered the first physician in Brazil to become a specialist in lean. He holds an MBA from OHIO University and is a certified Lean Healthcare Black Belt by The Logistics Institute Canada. Since 2008 he has developed several lean projects in healthcare, and has also developed training in these areas. He has been keynote speaker in national and international conferences for lean practitioners. He has also published a book focused on lean and its benefits to the patients. His areas of interest include: lean thinking, lean healthcare, quality assurance in healthcare, healthcare management and quality initiatives in healthcare.

4.6.2.2. Consultant II

He holds a degree in business management, and has been working with lean for 17 years. In 1999 he joined one of the largest consultancy companies in Brazil. Initially he has been implementing lean and delivering training in manufacturing companies and offices. In the last years, due the increase demand for lean in healthcare, he has been working with lean in private hospitals and clinics. Considered one of the pioneers in lean healthcare in Brazil, he has also developed international initiatives with Europe, USA and Australia. He is also a co-author of a book focused on lean transformation in healthcare area, and the main organiser of the largest practitioner conference in lean healthcare in Brazil.

4.6.2.3. Consultant III

He holds a degree in biomedicine, worked previously as hospital manager, also assessing quality and safety healthcare systems. He is also an examiner for accreditation Canada International in Brazil. Currently he is developing a consultancy business for flow optimisation and clinical performance improvements. He has been working with lean in healthcare since 2007, with 16 medium-sized lean healthcare projects implemented until 2010, including eight projects focused on surgery rooms. The main outcomes from these projects were financial savings, increase in patient's satisfaction, queue reduction, and capacity improvement. From 2011 to 2014 he worked with a training team in lean healthcare approach in a large hospital in Sao Paulo, with more than 600 hospital beds and 500 employees. He has experience planning and implementing lean in emergency areas of the private healthcare. He is one of the keynote speakers of the largest lean healthcare summit in Brazil, where several case studies have been presented. He currently works as a lean

management consultant as well as healthcare quality and process manager in a private healthcare company.

4.6.2.4. Consultant IV

He hold a degree in production engineering, has a masters degree in the same area and started his career as a management consultant in 2010, when he joined a lean consultancy company in the Central-West Region in Brazil. In the last four years he has focused in implementing more than 20 lean projects in healthcare, has been working with a private hospital as well as charity hospitals, which is similar to public, as the government funds a small part of the budget. He has a consolidated experience in projects to improve the healthcare settings, and is considered a specialist in solutions, such as, lean manufacturing, lean healthcare, plant layout, continuous improvement, process management, logistics management. Currently he is working in a large project of lean implementation in a charity hospital in the Central-West Region of Brazil, which the administration is similar to public hospitals.

The next section will address the interview process carried out with lean management consultants.

4.6.3. Interviews process with lean management consultants

The interview process was carried out during the month of June 2016, a total of 4 interviews were undertaken, three face-to-face interviews in the state of Sao Paulo, and one via Skype due the distance of the consultant who was located in Goiania (Central-West Region of Brazil). As these sources have a vast experience on lean implementation; they had a considerable amount of content to share, thus the length of interviews with management consultants varied between 60 to 90 minutes. Table 23 depicts the number of interviews carried with this source, as well as the code that will be used to display the sources of the data analysed. This code will receive an additional number in the end, which is the identification of the interviewee during the data collection.

Table 23 - Interview Codes Lean Management Consultants

Source	Title	Interview Code	Number of Respondents
Lean Management Consultants	Practitioner	PRA	4

Overall the lean management consultants were very approachable to the research and interview process. They also made suggestions and practical comments about lean in UHS. They have used their experience implementing lean healthcare as well as their knowledge about UHS to provide reasonable answers to the interview themes. The only request was related to confidentiality, so for this reason their name as well as the name of the customer will be concealed.

The section 4.6.4 will address the main barriers to implement lean in the UHS underscored by the lean management consultants.

4.6.4. Main Barriers to Implement lean the in UHS

This section addresses the main barriers to implement lean in the emergency areas of the UHS from the lean management consultants' point of view. The participants were asked to share possible barriers that could emerge during the lean implementation (Appendix III). From these sources two types of barriers have emerged; first barriers that are common within the literature, fear of job losses, lack of commitment. Secondly, specific barriers that are more related to advanced knowledge in lean and needs a 'practitioner's' mindset to be developed, such as, lack of long-term strategy as well as lack of lean knowledge and experience (Table 24).

Table 24 - Lean Barriers in the UHS - Management Consultants

Lean Barriers - Lean Management Consultants **(presented in the order that emerged from data)**	**Frequency of reference from data analysis**
Physicians lack of commitment	3%
Fear that lean will cause job losses	3%
Poor management of resources	12%
The structure of the system affects the physicians	3%
The UHS bureaucratic style as a barrier to lean	9%
Slow pace of changes in UHS	3%
Performance management in UHS	6%
Public system lack of interest/motivation in changing	3%
Staff resistance to change	9%
Lack of lean knowledge and experience	15%
The administration or leadership can be a barrier for a new project	24%
Physician's resistance to change	6%

Lack of long-term strategy	6%

A total of 13 barriers emerged from the interviews with lean management consultants, all barriers and sections of the interviews will be presented here. However, to avoid repetition of the barriers' definitions, this will be provided only to barriers that were not previously explained in the UHS Site 1 - ECU and UHS site 2 – ED, but all barriers will be related to the interview quotes.

4.6.4.1. Physicians' lack of commitment

When asked about the physicians impact during the lean implementation, a lean practitioner that has implemented lean project in private hospitals in Brazil made an interesting comment about the physician commitment:

> *'it is difficult for doctors to understand that they're not the most important person of assistance anymore; they need other professionals to help make the decision, and sometimes they will have to help too*'. (PRA_3)

4.6.4.2. Fear that lean will cause job losses

When implementing lean, one of the barriers that commonly emerges is the fear that lean will cause job losses. This was exactly what a lean practitioner reported about one of the barriers to implement lean in UHS:

> *'The other barrier is the feeling that we are there to fire people.'* (PRA_4)

4.6.4.3. Poor management of resources

In the UHS there is a common complaint about lack of resources which was addressed in source UHS site 1 – ECU. However, another barrier related to poor management of resources was also identified by management consultants:

> *'I think there is a lack of resources because we manage badly'*. (PRA_2)

> *'I do not know what you have seen, but in the UHS all services are falling apart.'* (PRA_1)

4.6.4.4. The structure of the system affects the physicians

There are situations where the structure of the Brazilian public healthcare system was identified as a constraint for the physicians:

> '*the problem is not the lack of doctors, the problem is the lack of structure of the system, the problem is the fact that the structure of system has wastes inside its roots, wastes that exists because of the way the model was created, the model/style is very prone to generate waste'.* (PRA_1)

4.6.4.5. The UHS bureaucratic style as a barrier to lean

The lack of structure and the bureaucratic style of the UHS was also highlighted as a barrier to a lean implementation.

> **'***the problem is not the lack of doctors, the problem is the lack of structure of the system, the problem is the fact that the structure of system has wastes inside its roots, wastes that exists because of the way the model was created, the model/style is very prone to generate waste'.* (PRA_1)

Another practitioner highlighted the bureaucratic situation of the system as a barrier:

> '*The UHS system is a constraint, it is bureaucratic'*(PRA_4)

4.6.4.6. Slow pace of changes in UHS

Change in UHS takes time. It was already illustrated in the previous sources ECU and ED. To illustrate this situation, a lean practitioner stated that changes, such as lean will take time in UHS:

> *'so if the guys who created that (lean) took 20 years to transform the system… take a minute to think about the Brazilian Public health system, it hasn't got an owner it is a unique system, it'll take a long time*'. (PRA_2)

The way that changing process is faced in UHS is also a barrier found to implement lean, as cultural and structural changes appear to take time to occur, as highlighted by a lean practitioner:

'*Because the change is cultural and structural in the way things happen, so you can't do this, you will see and will keep seeing a lot of experience in there, specific results such as ours, a huge change won't happen so soon'.* (PRA_1)

This also leads to another situation, which is a feeling that because the system is public and there is not private money involved, then there is no interest to improve or change, as explained by a lean practitioner:

'*You have a service that spends a lot of money. Brazil's budget is guaranteed, so what exactly moves a manager in Brazil doing the best? Nothing!'* (PRA_2)

4.6.4.7. Performance management in UHS

Performance management in the UHS was one of the barriers that emerged. As previously explained this is a barrier that comes from advanced lean knowledge, therefore this emerged from sources such as management consultants or staff members that are part of the lean implementation and have received deeper knowledge about lean.

In the UHS there is a problem, which can be common in private and public, but is different from the private system. In the public system there is no clear direction to address the situation and understand what is happening, and that kind of accountability is directly related to performance measurement. This problem was addressed in the healthcare setting; however it seems to be a problem across the public services in Brazil as explains a lean practitioner:

'*today the public healthcare service performance is very similar to the performance of any other public service: bad. So the public service in Brazil does not work, or works very badly, with very high costs. Health is just a piece, so if there's a lack of management for anything, there will be lack of management for health'.* (PRA_2)

'it *works for both systems: public and private. The difference between them is the maturity, intellectual level, difference in the transparency of decision making, this is what differs.* (PRA_3)

This might be associated with a change in the political scene every four years; it might create a situation that leads to a system that only focuses on the visible problem, but does not tackle the cause of the problems, mainly because there is a lack of control which makes difficult to manage performance.

4.6.4.8. Public system lack of interest/motivation in changing

In the UHS several decisions are made in the political environment, and this was an issue identified by a lean practitioner:

> **'***so, the barriers are the same… the same that we would have to face if we changed any kind of public service in Brazil, basically it's in the politics classes' hands and these guys are not concerned with the value to the customer and to the citizen.* (PRA_2)

4.6.4.9. Staff resistance to change

When it comes to an explanation from a lean practitioner point of view, it is clear the difficulty is to change standards and people's mindset towards the new procedure:

> '*People are used to standards that they've followed for years and you have to change this standard, and that's what we couldn't change until now*'. (PRA_1)

Regardless of all arguments and justification about people being resistant to lean, there is a different issue raised during the interview, which is directly linked to the UHS context about political nomination. In the UHS there are people that have political sponsorship. They are not working in these areas because they have the suitable skills, but because they have been working with a politician instead and as a result they were offered a job in the UHS, as explained by a practitioner:

> '*we will have resistance from people who are there because they had a nomination (political) and not because they have knowledge*'. (PRA_4)

4.6.4.10. Lack of lean knowledge and experience

When people do not understand something they tend to become frustrated, because someone will try to perform something, but because of the lack of knowledge it is likely this person

will fail and will either be frustrated or blame the methodology as something that does not work. This kind of attitude during the lean implementation might be also related to the lack of confidence in performing something new or unknown, it is explained by a lean practitioner:

> *'people say: "oh damn, we tried to do and it did not work." So the lack of knowledge can lead to brittle applications, which can make people think that this is not the right way'*. (PRA_2)

> *'to a person who doesn't know how to do a reading of indicator, who doesn't know how to extract a report, make a visual management, it is almost like talking about a super advanced business. (...) but that's the resistance of not having basic knowledge of management'*. (PRA_4)

4.6.4.11. The administration or leadership can be a barrier for a new project

The commitment of the senior management in UHS highlights the point made by the lean management consultants, mainly because the leadership in the UHS is not involved, they usually do not know what is happening in the operations:

> *'So the guy is an expert in public health who's never been in a clinic in his life. And that guy is in charge of setting the policies, practices, routines; whether he got there on merit or politically, is a man completely disconnected from the tip of the system, and this disconnection of who makes the strategy with the point of the system is a form of perfect failure, he's never gone there'*. (PRA_1)

> *'is the commitment of senior/top management. For an institution to be lean, the CEO has to think lean;, this guy has to show to the entire institution that he will support it'*. (PRA_4)

4.6.4.12. Physicians' resistance to change

This is a common barrier not just among physicians, but also other professionals. In this case it is relevant to raise this topic because the physicians are highly involved to the service delivery process, thus any change in the process will affect these professionals, and as a consequence it can be regarded as important to have their engagement. When it comes to resistance to change, a lean practitioner who is also a physician, said:

'at least with other people we can work in terms of change, but with the doctors it is difficult. Because the doctors do not work only here'. (PRA_1)

In the majority of the cases the physicians are self-employed and work in different places, then it is difficult to have them involved and also become part of the new routine, as a consequence there is a resistance to change. This situation was confirmed by another lean practitioner who related this situation:

'*If I had to highlight in terms of the hospital, the figure that has greater resistance is the doctor'*. (PRA_4)

As presented in this section the resistance to change impacts directly on the lean transformation. Practitioners and even a physician made the affirmation about the relevance of the physician in a process of changing. Another point to consider is the role of the physician within the process of service delivery. He is the one that performs the most important part of the treatment. Patients come to emergency areas to see the physicians. There are several affirmations where patients ignore any other professional involved in the process and just want to see the physician, who is supposed to solve the health problem. Thus, making sure that the physicians are part of the lean transformation can be vital for the success of the project.

4.6.4.13. Lack of long-term strategy

Another barrier that also only appeared in sources with an in-depth knowledge of lean was about the lack of long-term strategy:

'because of a cultural issue, people are not organised for long-term projects. The manager's culture in Brazil is immediate; they want a result soon, fast. But it's not just that; when we speak of culture, it's necessary to think in the long run, so that's the first thing'. (PRA_3)

Because the lean approach is a long-term culture this lack of long-term strategy might be a barrier in terms of lean sustainability as this project will not survive to politicians and

government changes that happen every four years. This also links to the next barrier, which is the UHS bureaucratic style:

> '*the problem is not the lack of doctors, the problem is the lack of structure of the system, the problem is the fact that the structure of system has wastes inside its roots, wastes that exists because of the way the model was created, the model/style is very prone to generate waste'.* (PRA_1)

The interviews with a lean management consultant showed invaluable data about barriers to implement lean in the emergency areas of the UHS. It was a confirmation of the barriers found in the sources UHS Site 1 and Site 2, but also a critical point of view about barriers that might emerge from a management side of the lean implementation, which will affect the sustainability of the project.

More than an interview process it was a friendly conversation about lean and main problems that it might face in the UHS. It was also a great opportunity to establish networking with a group of lean management consultants that have high influence in the Brazilian healthcare system.

One important point about the management consultants is that they were unanimous in highlighting the quantity of opportunity to make lean work in the UHS and countless benefits this might bring. In one of the conversations one of the consultants said that lean might be one of the solutions for this chaotic public system.

The next section will tackle the initial findings from the data collection with Lean Private Hospital - Lean Team.

4.7. Source four: Lean Private Hospital – Lean Team

4.7.1. Introduction

Another way to access data is also establish contact with people that have experience about the subject, which in this case is the lean implementation. Thus a group that is part of a lean team in a private hospital in Brazil was selected to contribute to this research. The hospital was selected based on its reputation about the successful lean implementations (especially in emergency areas) that was published in media such as magazines for practitioners. Moreover, this hospital made a presentation showing the case study of the lean implementation in one of the largest conferences for lean healthcare practitioners in Brazil. The name of the hospital

and the participants were not authorised to be published. The next session will present a summary of the hospital.

4.7.2. Lean Private Hospital

4.7.2.1. Background

The hospital was founded in 1945 and is located in the Southeast Region of Brazil. It is divided into three surgery centres, eleven rooms for surgeries, 20 wards for recovery after surgery and rooms for treatment specialising in kidney problems. There are also 173 hospital beds including an area of intensive care. For emergencies, the hospital offers around 15 rooms and over 60 hospital beds. The emergency room works 24 hours a day and seven days a week. They started to implement lean four years ago in different areas of the hospital, currently they have been developing several projects with a strong focus on the emergency area. There is a lean team that it is not dedicated to the implementation, apart from one project manager that works only developing and implementing the project. This hospital has also support from two of the management consultants interviewed in this research.

The section will address the interview process carried out with lean team in the private hospital.

4.7.3. Interview process with lean team in private hospital

The interviews were carried out during the month of June 2016. Four face-to-face interviews were undertaken with project managers, part of the lean team in the hospital. With fours years implementing lean in this hospital, these participants had demonstrated a considerable understanding of the lean implementation as well as its pitfalls, therefore the length of the interviews varied between 60 and 90 minutes.

Table 25 shows the number of interview carried out and the interview code that identifies the origin of the interview's section used to validate the theme found.

Table 25 - Interview Codes UHS Site 1 - ECU

Source	Title	Interview Code	Number of Respondents
Lean Private Hospital - Lean team	Project Manager	STAFF_PRIV	4

Overall, the lean team was very approachable and welcomed. They volunteered themselves to participate in the interviews; this was a suggestion of the project manager leader. The participants used their knowledge and experience with lean implementation to answer the questions related to barriers to implement lean in UHS. Some of them had also worked previously in the UHS, which provided some interesting associations and contributions to the barriers to implement lean in the UHS. Similarly, the lean management consultants the only request was related to confidentiality as this can affect their customers.

The following section will address the main barriers to implement lean in the UHS according to the lean team in private hospitals.

4.7.4. Main Barriers to Implement lean

This section presents the main barriers found to implement in the UHS according to the point of view of the lean team in private hospital. The participants were interviewed and asked about possible barriers that could be faced in a possible lean implementation in the UHS. The results are displayed in table 26.

Table 26 - Lean Barriers in the UHS - Lean Team

Lean Private Hospital - Lean Team **(presented in the order that emerged from data)**	**Frequency of reference from data analysis**
Fear that lean will cause job losses	9%
Non-urgent patients create unpredictable demand in emergency areas	14%
Poor management of resources	9%
Physicians spend time performing activities that are not core	5%
Performance management in UHS	9%
Staff resistance to change	5%
Lack of lean knowledge and experience	9%
The administration or leadership can be a barrier for a new project	9%
Physician's resistance to change	14%
Lack of long-term strategy	18%

A total of 10 barriers emerged from interviews with this source in private hospital. They will be individually presented and a short discussion will be provided. There are no new barriers

identified in this source; they are similar to the barriers found in the previous three sources ED, ECU and lean management consultants.

4.7.4.1. Fear that lean will cause job losses

The mind-set that lean can bring redundancies might create resistance during the implementation process, however lean is not about a new project of headcount reduction, and actually, as explained by a member of lean team from a private hospital, this will not solve the problem or make the project successful:

> '*Just to conclude: just putting pressure of resignation in people you will not be able to make it, ever'.* (STAFF_PRIV_4)

4.7.4.2. Non-urgent patients create unpredictable demand in emergency areas

Patients that seek assistance in emergency areas create several problems across the process, The main one is certainly related to unpredictable demand, which creates bottlenecks in the normal flow. These patients come to the emergency area for different reasons, sometimes because they want to avoid the GP waiting time, and most of the times just to have a sick note to justify work absence. A physician in a lean private hospital who previously worked in the UHS highlighted these situations:

> *'there is a group of people that goes there in the emergency units only to request sick note, there is another group that comes about a simple cold, there are people that say that it is too difficult to make an appointment with a doctor in the GP, then they come to emergency areas because they will be seen in the same day. So, let's say that more than 50 per cent is a group of people that could be seen in the GP, but they don't have access'*. (STAFF_PRIV_2)

4.7.4.3. Poor management of resources

A common barrier found in the previous three sources, a staff member also reported this from a lean hospital that worked previously at UHS:

> *I don't believe that there is lack of resources, but poor management of resources, they do not control anything, there is not control. You have the resource available but you don't control, every person control its resource individually.* (STAFF_PRIV_3)

4.7.4.4. Physicians spend time performing activities that are not core

A staff member from a private hospital that worked previously in the UHS explains that the UHS does not recognise the relevance of this element in the process, but instead just treat him as one operator:

> *'The problem is that they were left behind in the Brazilian system to take care of health management, they were seen more as a performer, as an operator, but the man is essential to the hospital'*. (STAFF_PRIV_4)

4.7.4.5. Performance management in UHS

This is related to control, measurement and goals and others. Because it is public and there is a feeling that there is no focus on profits and most of the times it shows a lack of control, as explained by a project manager in a lean private hospital:

> '*I don't know if there is this accountability in the public sector, I'm not saying that they are not committed, but for me it is the big difference the public and the private system, and the lack of monthly supervision, if the P&L (profits and losses) is negative, what was the problem? What's happening? So you need certain accountability.* (STAFF_PRIV_4)

4.7.4.6. Staff resistance to change

In this case the resistance to change will come from staff members that have political sponsorship. These people might bring a different type of resistance, as they are not committed with the process in long term, if the government changes. It is likely that this person will no longer be part of the process. This is also confirmed by a physician that works as part of lean project in a private hospital in Brazil, but also had experience in public hospitals:

> '*I think that the UHS here in Brazil people have political sponsorship, they have their job but they are not very interested, they only follow what they have to follow in terms of politics. Many times they only follow what they have to, without a real interest in provide improvements'*. (STAFF_PRIV_2)

4.7.4.7. Lack of lean knowledge and experience

It is not unusual to find barriers that are connected to other to other barriers, for example, lack of lean knowledge is recognised as one of the main causes for people being resistant:

> *'in general there's a lot of resistance to change, and that's because of the structure of the organisation. I believe the barrier exists because of the lack of knowledge, this is my opinion, maybe ignorance'*. (STAFF_PRIV_4)

The lack of knowledge is confirmed by a member of the lean team who was presenting the results of the lean implementation in private hospitals in a conference about public healthcare system:

> '*I believe that the lack of knowledge has negative influence; we had an experience presenting our lean project in a conference about public healthcare. It is like something dangerous, they said 'this thing called lean is very dangerous'. They understand that make more with less is dangerous in the healthcare area, we tried to explain about the wastes and other things, but they already had their mindset closed, so they excluded us from the discussion, we were put aside and didn't have any more discussion about lean with us'*. (STAFF_PRIV_2)

This is also linked with other barriers within the literature, which are 'insufficient understanding of the potential benefits' and lack of training and skill'.

4.7.4.8. The administration or leadership can be a barrier for a new project

The leadership commitment is one of the key elements during the lean implementation and perhaps with a great impact in the sustainability. It can be regarded important to show the entire organisation that there is an alignment between the lean project implementation and top management support:

> *'You can't improve any process without the leadership commitment, without someone that can make the decisions; there is no change in the process without the support of the decision makers. Voce can have the best process, the best tool available, but if you don't have the support of the management team you don't go ahead, I can tell you based on our on experience'*. (STAFF_PRIV_3)

'*I believe that the leadership commitment is the key, if the leadership are not committed we cannot implement lean'*. (STAFF_PRIV_2)

4.7.4.9. Physician's resistance to change

The physician has a great impact in the process. He is the one that delivers the main part of the service in the healthcare; then have the physicians involved in the project will avoid not just the resistance but will also support the sustainability of the project. A member of the lean implementation team explained that physician's resistance was also found also in the private setting but there are ways to overcome it and it works in private and public context:

"*in my point of view, we have to understand that the doctors have a strong influence in the hospital, however there are ways to overcome their resistance as happens in other places that are not hospitals and you also have people against the lean process. So, if don't involve this person in the changing process since the beginning of the project it won't work, because the implementation team will make the change but when they leave they will backslide to the old style'*. (STAFF_PRIV_1)

4.7.4.10. Lack of long-term strategy

Lean is about changes in the long term, and one of the hurdles that can constrain the lean implementation, is the mentality that things can be changed in short-term and results will be shown immediately; it is important to understand that it will take time.

This need for short-term results can be explained by the model of the system. The UHS is managed partially by three levels of the government: city hall, state and federal administration. The problem is that at least every two years there is a new election and everything can change. Most of the leaders in these places are there due to their political connexions and not because of their technical skills. This situation creates a cycle that seeks for results in the short term, and this can be a barrier to implement lean in UHS, as explained by a staff member from a lean hospital in Brazil:

'*I don't know how they can manage this political cycles, because everything changes as soon as the new governor or mayor is elected….this is crazy because lean is about long term strategy'*. (STAFF_PRIV_2)

Overall the interviews with the lean team in private hospital did not bring any new barrier. However, it was important to confirm other barriers that were found in the UHS Site 1 – ECU, UHS Site 2 – ED and Lean management consultants.

It was also interesting to witness a lean project ongoing in a private hospital, understand their challenges, and have a reflection that the largest barrier that differs both private and public is the style and structure of the Brazilian public healthcare system.

Moreover, it was interesting to talk with motivated people that believe that it is possible to improve the public healthcare system with initiatives that can create a large impact in the patients' lives.

The next section presents a summary of this chapter and heralds the data analysis chapter.

4.7.5. Summary of the chapter

To access the data about the barriers to implement lean in the UHS a total of 43 interviews were carried out in four different sources. The mix of interviews per source is shown in table 27. In addition to the interviews, ten observations of the patients' pathways were undertaken in the emergency level of the UHS.

Table 27 - Summary of the Interviews and Sources

Source	Title	Interview Code	Number of Respondents
Emergency Care Unit	Nurse	ECU_S_NU	8
	Physicians	ECU_S_DR	6
	Social Care	ECU_S_SOA	1
	Patient	ECU_PAT	5
Emergency Department	Nurse	ED_S_NU	11
	Patient	ED_PAT	4
Lean Management Consultants	Practitioner	PRA	4
Lean Private Hospital - Lean experts	Project Managers	STAFF_PRIV	4
TOTAL			**43**

The initial findings from this data, have shown that there are 20 barriers that might constrain the lean implementation in the UHS (Table 28). Most of these barriers are well known within the lean literature, such as lack of resources, communication disruptions. However, there are also contextual barriers that are related to the UHS, such as the UHS bureaucratic style, slow pace of change in UHS, public servant tenured career. Table 28 displays the complete list of barriers found in the UHS per source.

Table 28 - Barriers to Implement Lean in the UHS by source

Lean Barriers in UHS	UHS Site 1 ECU	UHS Site 2 ED	Lean Management Consultants	Lean Private Hospital - Lean Team
Physicians lack of commitment	**X**		**X**	
Physicians' resistance to change			**X**	**X**
Fear that lean will cause job losses	**X**		**X**	**X**
Non-urgent patients create unpredictable demand in emergency areas	**X**	**X**		**X**
Emotional stress between patients, staff members and physicians	**X**	**X**		
Financial barrier to implement lean (lack of resources)	**X**			
Nurses performing different activities that are not core	**X**	**X**		
Poor management of resources	**X**	**X**	**X**	**X**
The structure of the system affects the physicians	**X**		**X**	
Physicians spend time performing activities that are not core	**X**			**X**
The UHS bureaucratic style as a barrier to lean	**X**		**X**	
Slow pace of changes in UHS	**X**	**X**	**X**	
Performance management in UHS	**X**		**X**	**X**

Public system lack of interest/motivation in changing	**X**	**X**	**X**	
Lack of long-term strategy			**X**	**X**
The administration or leadership can be a barrier to a new project		**X**	**X**	**X**
Staff resistance to change	**X**	**X**	**X**	**X**
Lack of lean knowledge and experience	**X**		**X**	**X**
Public servant tenured career (physicians and staff)	**X**			
Communication disruptions amongst staff and between shifts	**X**	**X**		

A total of 20 barriers separated in four different sources emerged from the findings. All barriers are common in at least two sources, excepting financial barrier, the structure of the system that affect physicians and public servant tenured career. Those only appeared in the ECU; however they are relevant for this study when compared to literature or context of the research.

The barriers found during this research can be also separated into three main categories. It does not mean a strict categorisation where one barrier cannot be part of another category, but it is just a way to illustrate that they are common within some areas. The areas from where the barriers emerged and create categories are: 1) literature, which represents barriers that are common within the literature; 2) practitioners' knowledge, which represents barriers that emerged from specific/advanced lean knowledge that comes from lean management consultants and staff from a lean private hospital; 3) UHS context, which represents the barriers that were found within the emergency level of the UHS.

Overall, when analysing these barriers is it possible not notice the influence of four elements in the creating of the barriers. The elements are: patients, physicians, staff members and the UHS, which it is possible to separate in stakeholders (patients, physicians and staff members) and UHS.

The influence of the stakeholders and UHS will be part of the in-depth discussion in the chapter 5: data analysis. However, at this point it is possible to state that the barriers found in the UHS have common and deeper causes either related to behaviour of the stakeholders or to the UHS management style. Thus, these barriers found in the UHS will be entitled 'ostensible barriers', as they appeared to be true, but possibly there are other causes

behind influencing the creation of these barriers. The term ostensible will be explained in the next chapter, together with the data analysis.

5. Chapter 5 - Data Analysis

5.1. Introduction

This chapter aims to provide the interpretation of the findings by providing evidence, which involves the description of the thematic analysis carried out and a triangulation of the data from four different sources and methods (Bryman and Bell, 2015) that provided information about barriers to implement lean in the UHS. This data comes from interviews and observations undertaken in these sources. A brief discussion of the outcomes will be provided as an introduction of the following chapter. During the thematic data analysis a considerable body of information was generated and managed based on interviews and observation from the field; it was separated into codes, sub-themes and themes (Section 3.13 explains this process). Thus, it has formed two categories of lean barriers: ostensible (barriers that emerged from case study findings) and underlying (barriers that emerged from data analysis or interpretation), which will be further defined and explained together with extracts from the data and thematic maps that support these outcomes.

There are some points that are relevant to be explained before starting the discussion of the data analysis, as follows. In order to keep the consistence of the analysis, all participants will be called by the gender 'he', as no names or other type of identification will be used; when the underlying barriers are discussed, it is possible to notice a small repetition of the quotes from interviews used to explain the ostensible barriers in the case study findings chapter. This is justified by the fact that the ostensible barriers are part of the underlying barriers, so in this case it is necessary to use the same quotes twice; the thematic maps present all codes related to one main theme and sub-themes; thematic maps present all codes found during the data analysis, regardless of their impact or repetition, therefore only codes that had a considerable frequency of repetition will be discussed. Moreover, the thematic maps shown in this chapter have versions in larger sizes on appendix VIII.

The structure of the chapter is divided into four sections that support the data analysis, which include the ostensible barriers summary, underlying barriers and their interpretation, and chapter summary. The next section will address the ostensible barriers summary.

5.2. Ostensible Barriers Summary

This section presents a summary of the ostensible barriers found during the case study findings, as this will be a frequent term recalled across the following sections. The first aim is to establish the common understanding of the word 'ostensible'. According to The Oxford Dictionary (2016) ostensible is an adjective and its definition is: 'stated or appearing to be

true, but not necessarily so: *the real dispute which lay behind the ostensible complaint*'. In other words, it can be illustrated as a given situation that apparently is responsible for causing a problem or affecting something (in this case it is considered ostensible causes), but in reality, there are other deeper and real causes behind this situation that are not visible at the moment. Another illustration that helps the understanding of the word ostensible is about a person who has a cold and it is coughing or sneezing; these symptoms will be commonly identified as the causes of the cold, however these are only the ostensible causes of the cold, the underlying and real cause is deeper, which can be a virus or other cause attacking the person's immune system, thus more difficult to visualize and see.

In the context of this research, the word ostensible will be the adjective given to the barriers that are well established within the literature and which also emerged during the interviews. They are presented as main causes of the lean constraints, however there may be deeper causes not fully discussed that might lead to underlying barriers. For instance, a summary of the most common ostensible barriers includes people and lack of attitude and commitment to change the process, resistance and scepticism to change to something new, including leaders' resistance, poor communication, leadership failure and lack of commitment and support, lack of understanding of the potential benefits, personal and professional skills of healthcare professionals, lack of know-how and lack of resources and budget constraints, among others (Bhasin, 2011; Brandao de Souza and Pidd, 2011; Deloitte and Touche, 2002; Kundu and Manohar, 2012; Lean Enterprise Institute, 2007; Massey and Williams, 2005; Radnor *et al.,* 2006).

As explained in the case study findings chapter, these and other ostensible barriers were found during the research carried out within the Brazilian healthcare system.

Table 29 – Ostensible Barriers found in the UHS

Ostensible Barriers (presented in the order that emerged from data)
- Physicians' lack of commitment
- Physicians' resistance to change
- Fear that lean will cause job losses
- Non-urgent patients create unpredictable demand in emergency areas
- Emotional stress between patients, staff members and physicians
- Financial barrier to implement lean (lack of resources)
- Nurses performing different activities that are not core
- Poor management of resources
- The structure of the system affects the physicians
- Physicians spend time performing activities that are not core
- The UHS bureaucratic style as a barrier to lean
- Slow pace of changes in the UHS
- Performance management in the UHS
- Public system lack of interest/motivation in changing
- Lack of long-term strategy
- The administration or leadership can be a barrier for a new project
- Staff resistance to change
- Lack of lean knowledge and experience
- Public servant tenured career (physicians and staff)
- Communication disruptions amongst staff and between shifts

Table 29 shows a list of 20 ostensible barriers found in the UHS; the order of barriers presented in this table is not relevant, it is just a visual illustration of the barriers found during research findings, and it does not represent the importance or impact of each barrier. These barriers are considered ostensible in this research context, as they appear to be causing constraints in lean implementation, however there are other causes behind these barriers that will be explained in the next section. A common characteristic from these barriers is that some of them have strong influence of stakeholders' behaviour and others are influenced by the UHS management style. This influence of stakeholders' behaviour and UHS management style will be analysed and discussed in depth in this chapter. The section 5.3 presents the analysis of the underlying barriers.

5.3. Underlying Barriers

Once the ostensible barriers have been identified, it is important to move the research findings to another level, which is the identification of underlying barriers. In contrast to the ostensible barriers that were identified within the literature and during the interviews, the underlying barriers emerged from the data analysed (through thematic analysis), thereby they bring a new perspective.

The definition and categorization of the underlying barriers were based on Braun and Clarke's (2006) suggestions about thematic analysis. This analysis was carried out based on an inductive process of clustering the codes, sub-themes around one main theme and checking the theme repetition (Robson, 2011). For instance, the underlying barrier 'Patients' behaviour in emergency areas' (Figure 21) is a main theme that reflects a cluster of codes and sub-themes around this subject. The sub-themes that emerged include: 'stress', 'against the physicians' and 'non-urgent patients' presence in emergency areas' (ostensible barrier). These sub-themes are strongly related to a predominant theme which in this case is 'patients' behaviour in emergency areas'. In the context of this research, all ostensible barriers found during the data analysis are influenced by underlying barriers; research initiatives in other contexts might show different ostensible barriers.

Table 30 shows the information from the thematic analysis, which provides the frequency that respondents during the interviews provided information (codes or subthemes) related to a specific underlying barrier (Section 3.13 of the methodology chapter discuss this process). This table is an illustration of the underlying barriers that emerged from thematic analysis, and it does not aim to display a specific order of relevance.

Table 30 – Frequency of reference from data analysis

Underlying Barriers	Frequency of reference from data analysis
Physicians' influence within the process	9.6%
The UHS model impacts on physicians' work	10.3%
Constraints related to resource management affecting staff	14.4%
The model that the UHS operates creates constraints	15.8%
Patients' behaviour in emergency areas	16.2%
Influence of staff behaviour as a barrier to lean	33.7%

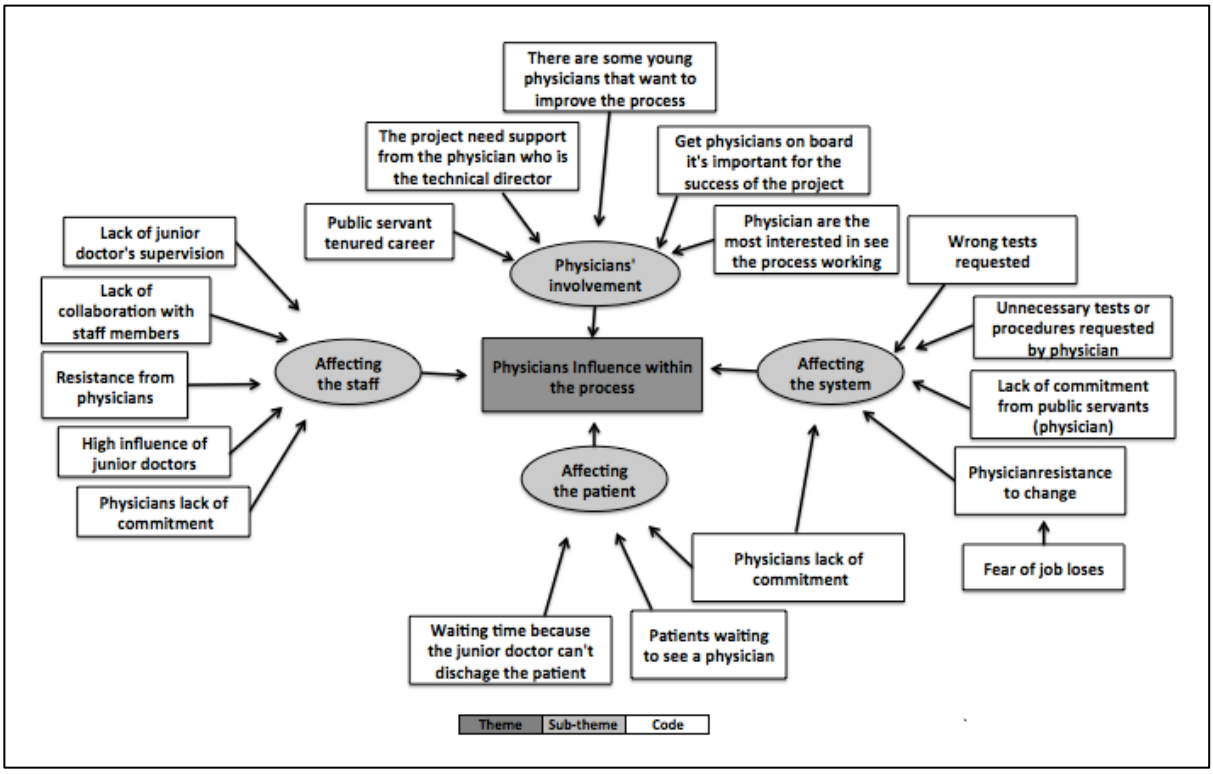
In the context of this research, the underlying barriers can be understood as the real causes of the ostensible barriers. Using Figure 27 (end of this chapter) to illustrate, it is possible to see the underlying barriers beneath the 'surface' act as root causes of the ostensible barriers, that will constrain lean implementation and sustainability.

This section aims to explain all the underlying barriers using the themes, codes and ostensible barriers (which is a code) that emerged during the analysis. There are six underlying barriers mapped in this study and they are displayed in Table 30; they will be addressed and discussed in the sequence presented of the table. In order to provide a comprehensive explanation of the underlying barriers, thematic maps (Braun and Clarke, 2006, Robson, 2011) will be presented with each barrier. The thematic maps as well as the creation of codes, themes and sub-themes were explained in section 3.13 (Figure 10) of the methodology chapter.

5.3.1. Physicians' influence within the process

As physicians deliver substantial valued added to patients during the service delivery process in healthcare, they can be considered an important element in this co-production process. The physician will perform the most skilled activity and will determine whether the patient should receive treatment or be discharged. Thus, a main theme called 'physicians' influence within the process' emerged from data analysis based on several codes related to this subject. These codes were merged in different sub-themes, as follows: affecting staff, affecting patient, affecting system and physicians' involvement. Therefore, to provide an understanding of these sub-themes they will be explained in the following paragraphs and can be observed in the thematic map of the analysis (Figure 20).

Figure 20 – Thematic Map: Physicians' influence within the process



5.3.1.1. Physicians' involvement

This sub-theme tackles the involvement of the physician during lean implementation. It emerged based on codes, such as physicians are the most interested to see the process working, having the physicians' engagement can be regarded as important for the success of the project and physicians are the most interested in seeing the process working. Regardless of all problems raised about the influence of the physicians within the process, there is a positive view that they are the most interested in improving the process, as explained by a lean practitioner:

> '*But if you get to the doctor and say like "doctor, the surgery you were about to do is late, isn't it? So, you're a surgical Centre's client? So... how can we treat you better?" then they go "wow, thank God! I was waiting for someone to think about it, I can't take this anymore, we're having a lack of surgical kit, anaesthesia…" that is, the guy's got a bunch of problems, the doctor'*. (PRA_2)

The physician is the one that will be directly benefited or affected by any change or improvements within the process; if the change provides improvement he will face fewer

problems and will perform his activity in a smoother way. Thus getting the physicians on board during lean implementation can be crucial for the project's success:

> *'if you do a project without having people involved, without having the doctor, without having the pharmacist, it will create a barrier'*. (STAFF_PRIV_4)

Another positive view about physicians is that they are trained to use methods and think scientifically, which is exactly what the lean thinking brings to the healthcare project, as illustrated by a practitioner:

> *'doctors are trained to think scientifically, so what do they do? They make a diagnosis of the patient, which is exactly the scientific method that's in this book that talks about the lean, about the A3 idea'*. (PRA_2)

This is also confirmed by a physician that works in a lean private hospital:

> *'we (lean team) have to show results, practical results that lean works, if we can convince the doctors that it works they will accept the project. This is because the doctors are trained to have all the answers, we never can say that we (doctors) have doubts, especially in Brazil. So yes, the doctors are the most difficult during the changing*'. (STAFF_PRIV_2)

Analysing all these subthemes related to the main theme '*physicians' influence within the process'* it is possible to determine the relevance of the physicians and their impact during lean implementation. Physicians perform one of the most skilled activities during the service delivery process in the healthcare system; patients come to hospital to be seen by a physician. They also have the authority to make decisions that will affect the whole process, for instance they can decide when and where to spend the resources available, requesting tests or referring a patient to another part of the process. A positive view about physicians' participation in lean projects is the fact that they have been trained to follow methods, and lean projects demand people with such skills. This is also confirmed by a staff member that works with lean in a private hospital in Brazil:

'so when you can involve the doctor it's even better, because the doctor is always difficult to convince about something new, they are always open a studies and learn new techniques, however is a little bit difficult to talk with them. When you have a doctor in the project it helps a lot'.(STAFF_PRIV_1)

Moreover, physicians can benefit themselves with outcomes from a lean implementation, which might make their job less problematic in terms of patients' flow.

5.3.1.2. Affecting system

There are situations where the physicians' actions can influence the system, for instance request wrong or unnecessary tests, lack of commitment (ostensible barrier), physicians' resistance to change (ostensible barrier) and fear of job losses (ostensible barrier). When it comes to requesting wrong or unnecessary tests a relevant testimony was given by a physician in the emergency area:

'*So they're too tired, if a child come, they won't know exactly what is the problem, then they just ask for a couple of tests and that's it*. (ECU_S_DR_13)

As this is not unusual to be seen within the healthcare system, a lean practitioner who currently works in a charity hospital implementing lean, said:

'*doctors who are not good trained will ask a lot of tests and will take a long time, will give wrong diagnostics, and they will cause a waste in the hospital'.* (PRA_4)

Some of the physicians are public servants which raises again the situation of the tenured career, as it becomes difficult to have the physicians' commitment. During the night shift this is even more complicated, probably due the lack of supervision, as explained by a physician from the day shift:

'*they (doctors) asked for 2 or 3 tests and left it there, who works in the morning is the one who'll see it. So at night it is more complicated'.* (ECU_S_DR_13)

5.3.1.3. Affecting patient

When it comes to patients and how the physicians can affect the service delivery process, some codes are predominant in this sub-theme, for instance, patients waiting to see a physician, physicians' lack of commitment (ostensible barrier) and waiting time because a junior doctor can't discharge the patient. This situation brings an interesting topic related to the physicians' effect on patients; again the lack of commitment appears as a strong code, this issue is confirmed by a nurse:

> *'problems that are not my responsibility to deal with...these are doctors duties. "look I don't have to answer the patient because you (doctor) are not working'*. (ECU_S_NU_1)

The physician has an important participation during lean implementation, thus lack of commitment can be a barrier that will constrain lean implementation, mainly because he is the one that deliveries important parts of the service, which is the assessment and care. This lack of commitment leads to another problem which is patients waiting to see the physician; certainly this issue is not created only by lack of commitment, but when there is no full commitment of the physician there are fewer patients being seen and in this case they have to wait to receive care. When asking nurses about the main problems that the patients face in UHS they confirmed that it was the waiting time to see a physician:

> *'I think it's the waiting time, it's not a quick service, it takes too long'*. (ED_S_NU_02)

There are situations where the patient has to wait because of the internal process, for example in the UHS a junior doctor cannot discharge a patient without a stamp from the physician that is supervising the shift, however this is not a straightforward process and takes time, as explained by a nurse in the emergency department:

> '*I just saw you (the patient) but I can't let you go home, I have to wait for my boss, because he is the one in charge to give the stamp and let you go. So we can't keep calling the doctor because he can't come here every time, so we wait until we have about 10 patients waiting'*. (ED_S_NU_01)

This situation creates a bottleneck across the patients' journey, as they cannot move to the other stage of the process (or even been discharged) without this approval:

> *'Sometimes it stops everything, we end up with a lot of patients waiting just for a stamp, sometimes they're just waiting for someone to see their x-ray and send them home with some medicines'.* (ED_S_NU_04)

This situation was also spotted during the observation process, almost all doctors in this area are junior doctors but they do not have the authority to discharge the patients without the supervisor's approval. What they usually do is to accumulate a 'batch of patients' wait for the supervisor and then discharge them all together. There is no flow in this procedure is a batch work'. This situation of working with 'batches' of patients instead of a continuous flow was also observed in the triage process, there was a long time without any patient called in the triage and then they started to call many patients back to back, it looks like they were waiting to work with a 'batch' of patients.

5.3.1.4. Affecting staff

One of the influences of the physicians within the process is towards the staff members of the hospital. At least four different codes related to this sub-theme were raised during this analysis: physicians' lack of commitment (ostensible barrier), resistance from physicians, lack of collaboration with staff members and lack of junior doctor supervision. When it comes to physicians' lack of commitment there were different reasons why this code was raised; some are related to complaints that patients make due to the waiting time, as explained by a nurse in the emergency care unit:

> *'We receive a lot of complaints when we're at the reception, like "there's no doctor attending?", then we go see the doctors' offices, one by one to see how many doctors were attending. The right thing would be at least six doctors attending, but there is only one and the rest of them are all at the coffee room, talking'.* (ECU_S_NU_3)

This quotation leads to another code which is physicians' lack of collaboration with staff members; there is a traditional feeling that the physician is special within the unit and does not need to collaborate with other staff:

> '*I see many nurses complaining about it, they say the doctors ignore their knowledge; the doctors don't listen to what the nurses say. I've had troubles with some'* (ECU_S_SOA_8)

During the data collection the researcher could observe this kind of behaviour that shows 'special privileges' to the physicians and staff often complained about this situation, as a nurse said:

> *'so the doctors they behave like they are doing a favour, you know as professional they don't care if they have a shift to fulfil, they're here being paid for but don't care'*. (ECU_S_NU_1)

To sum up, all this information raised about the physicians shows that their influence within the process is an underlying barrier that should be considered during lean implementation, so this can ease the number of ostensible barriers within the process and ease lean implementation and sustainability. Within the literature this is called professional boundaries and its effect on lean is aknowledge by several scholars (Brandao de Sousa and Pidd, 2011; Fillingham, 2008; Stanton *et al.,* 2014; Waring and Bishop, 2010). The section 6.2.2 will discuss the professional boundaries in-depth.

5.3.2. Patients' behaviour in emergency areas

Defining the patient relevance in the healthcare context it is important to understand his behaviour. According to Womack and Jones (1996) providing value at the right time to customers is one of the principles of the lean philosophy. Thus, bringing this concept of valued delivering in the healthcare setting where we have the patient as the main user, it is important to mention that the patient is probably the most important element in the consumption process in healthcare. The patient is the one that will create the demand and receive the service delivered or value.

The influence of the patient within the process is great, especially in open door areas of healthcare, such as emergency areas. In these places it is difficult to control and predict the demand; the patient will seek care in the moment that he judges necessary no matter how meagre the health condition is; the emergency area most of the time will be the place chosen to find the solution to the problem. From the emergency area point of view, this behaviour

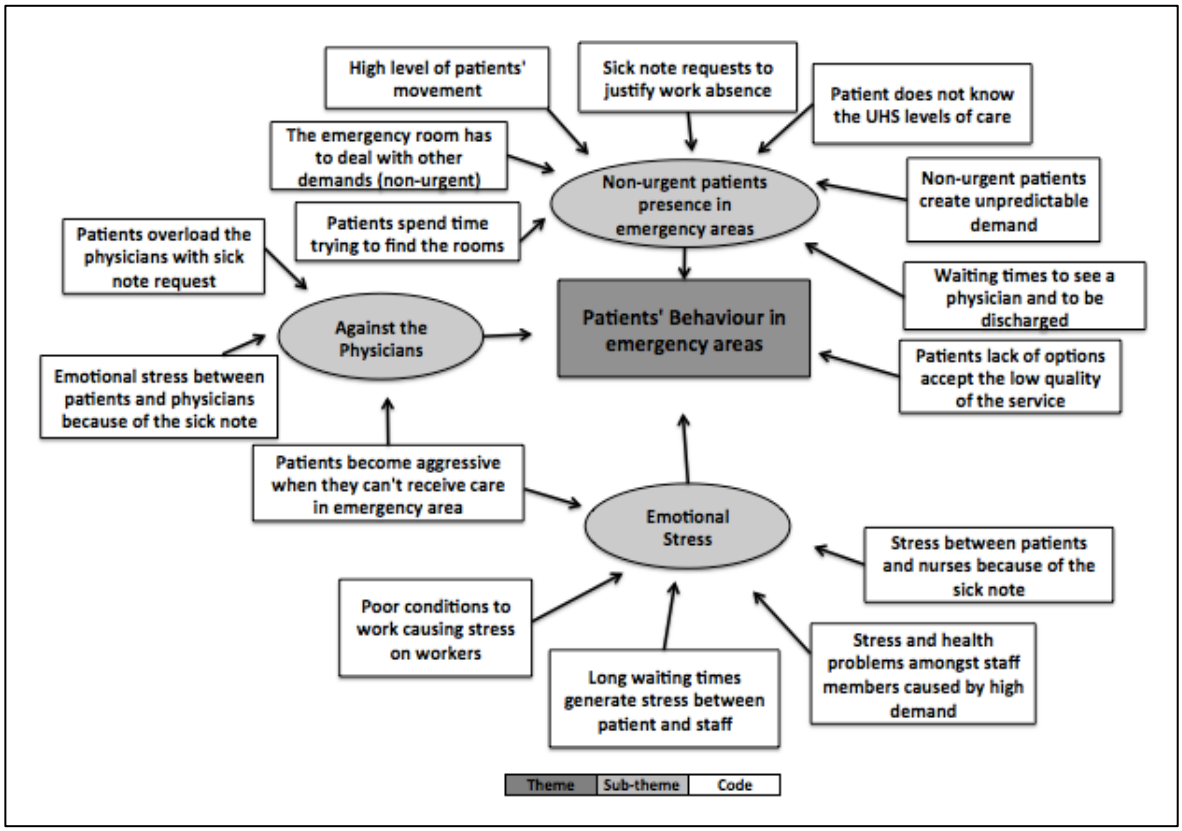
will create problems with patient flow, such as long waiting times, dissatisfaction, stress and poor quality of service, among others.

During the data analysis the theme *'Patients' Behaviour in Emergency areas'* (Figure 21) has emerged as a strong issue in these places; nurses and physicians talk about the great influence of the patients across the process:

> '*Does not matter the problem, it can be a common cold, they just come here which creates a very large flow here; Of 10 patients who arrive here, 8 shouldn't be here, it is an absurd number'*. (ECU_S_NU_2)

To form this main theme related to patients' behaviour, three sub-themes emerged during the data analysis: 'non urgent patients' presence in emergency areas'; 'emotional stress between patients, staff and physicians' (ostensible barrier); 'against the physicians'; these sub-themes will be discussed addressing the main codes that emerged during the analysis.

Figure 21 – Thematic Map: Patients' behaviour in emergency areas



5.3.2.1. Non-urgent patients' presence in emergency areas

This sub-theme has emerged based on similar codes, such as non-urgent patients create unpredictable demand (ostensible barrier), patients do not know about different levels of care in the UHS, sick note requests to justify work absence and the emergency room has to deal with other demands. The emergency areas model is defined as an open door system, where one does not need an appointment to see a physician (Gomide *et al*., 2012; Ludwig and Bonilha, 2003). This may be considered advantageous from the patient's point of view, whereas it also creates a weakness in the system, because the demand cannot be well estimated. Controlling and predicting the demand is certainly crucial for the stability of the operations in emergency areas, however the influence of the patient is great in these areas, especially by non-urgent patients. A non-urgent patient is defined by its situation and risk of death, when a patient is not classified as urgent he should seek treatment in basic units (GPs), however it does not happen, as explained by a physician in the emergency care unit:

> *'On triage, for example, when you tell a patient that they must go to the basic units, they don't want to go and they sometimes get mad; argue with the employees, this kind of things always happen'*. (ECU_S_DR_7)

These patients seek assistance in emergency areas to treat small things that could be solved easily by a GP or even without the need to see a physician, for example a migraine or simple cold, however most of the time they do not find assistance at the GP and have to go to emergency areas, as explained by a nurse:

> '*The delay is because the demand is too big, and sometimes they come from another place, because they've been instructed to come here. If I was this patient I'd be very upset, because they go to the BHU and they can't be seen there, so they come here and have to wait for 4 or 5 hours for a simple thing'*. (ECU_S_NU_5)

This is linked with another code that emerged which is the emergency room dealing with other demand (non-urgent), for example preventive medicine should be addressed by GPs however it is not unusual to find cases like this in emergency areas:

> *'there they will be guided, will learn how to prevent some diseases, etc. I won't teach a mother how to breastfeed here, for example. We aren't here for that, we're here for*

emergencies; This question about non-urgent patients shouldn't exist, they shouldn't come here', (ECU_S_DR_6)

There are cases where the emergency areas have to deal with patients in critical conditions that should be referred to a hospital, but instead the patient remains for days waiting for bed availability in a hospital:

'*Because an emergency department wasn't supposed to have hospitalized patients, you know? At least we learn that they can remain here only for 24 hours. There are patients that have been here for 6 days, sometimes waiting for a surgery'*, (ED_S_NU_03)

Another common problem in these areas is about patients requesting sick notes to justify work absence. There is an immense demand for this kind of request; patients just come without real symptoms of an illness, as reported by a physician in the emergency care unit:

'*There are some patients that arrive here saying "sooo…" I can see on their faces, they say "I'm with a headache, I woke up today and couldn't go to work", so you see that they're here for a sick note'*. (ECU_S_DR_10)

A nurse in the emergency department also reports a similar situation related to sick note requests without proper justification:

'They're always with the same speech "oh, I came here because my sick note is over and I can't go to work, I'm here because I hurt myself that day etc." They already come here saying that they want it'. (ECU_S_NU_04)

The influence of this type of patient is considerable within the process; physicians and nurses have shared numbers that show 80% of the patients coming to these places to request a sick note:

'*but I mean, the population who comes here, 80% didn't need to come, didn't need a medicine, didn't need to be seen, they only want a sick note'*. (ECU_S_DR_13)

Amongst these patients there are those that are in critical conditions and really need treatment, therefore the non-urgent patients create the problem of the waiting time, as resources have to be dedicated to all patients that come to the emergency area.
The UHS have different levels of care (basic, emergency and specialised), which will be defined according to the situation of the patient, however during the interviews physicians and staff members explained that most of the patients do not have the knowledge or even the information to decide which level of care they should seek care:

> '*I think they should educate the population because they don't understand what is an urgency and emergency, they don't understand, so "Oh, I have a headache, I'll go there"; "I have a back pain for 3 months, I'll go to ECU". So I think that is why there is this huge patient demand and waiting time*', (ECU_S_NU_3)

This lack of understanding might be justified by a lack of information from the UHS; the patient does not receive enough information and just wants to seek treatment:

> *'There is a lack of information by those who come directly here, they think it is the Hospital and they should be seen here, so we receive a lot of different cases here',* (ED_S_NU_02)

A physician explains that the patients should receive more information about the levels of care in UHS:

> *I think the population should have further information about ECU, which is an Emergency Department, the population should know more about "using the closest BHU" because ECU isn't here for everything.* (ECU_S_DR_11). '*The population isn't well informed about what we treat here, why the hospital is here, what is the BHU's (GP) function, what is the ECU (24h)'s function… I think even the 24 hours is full because of that, there are things that could be solved on a BHU, but they go to the 24 hours because it is open'*. (ED_S_NU_8)

This situation was also spotted during the observation process, in the emergency department patients do nott have the information about where is the appointment with the doctor, they are verbally called but there is no visual information to indicate where they should go..

A nurse explained that patients think that it is easier to be seen by a physician in an emergency care unit than at a GP surgery; then they prefer to come and wait but to be seen in the same day than wait for days to receive treatment:

> *'This incorrect demand of non-urgent patients, because they things are easier here, sometimes they come here thinking that it's quicker comparing to BHU'*. (ECU_S_NU_14)

5.3.2.2. Emotional Stress

This sub-theme emerged as result of the other situations that generate tension between patients and staff members, which is linked with some of the issues already raised in the previous paragraphs. The codes that formed this sub-theme are: stress between patients and nurses because of the sick note; stress and health problems and amongst staff members caused by high demand; long waiting times generate stress between patient and staff; poor conditions to work causing stress on workers.

The long waiting time to receive care within the emergency area is an issue that creates different problems, but one is related to stress between patients and staff members. Patients become anxious because they have to wait to see a physician, sometimes this waiting times is between 5 and 8 hours, therefore they naturally find someone to blame and in this case is the workers in front line:

> '*This is the point when generally they start the discussions, the verbal aggression, I see the patients like "I have my child here without being examined" then the professional answers "now you'll have to wait because there isn't space to receive (shelter) the child." So I think it's difficult, right? As difficult for the customer (patient) as it is for me, as a professional, because I have to tell him "look, unfortunately you'll have to wait." There are some people who understand it, and some who doesn't*', (ECU_S_NU_3)

When the answer is different than the one expected patients become stressed and even aggressive, and that is what happened when they want a sick note as confirmed by a nurse:

'I stopped getting stressed with those things, because you can start a huge fight if you say you don't give them a sick note, and this is absurd… there is verbal violence all the time'. (ED_S_NU_10)

This situation was also observed during the researcher's observation process. There was an argument between patient and a doctor in front the doctor's office, basically the patient was complaining because the doctor did not give a sick note after the appointment, according to patient's word he said: *'this is not fair, I was waiting hours to see you and I need to justify my absence to work*'. The doctor just said that it was not a case of sick note. The patient was very aggressive and used swear words to express his lack of satisfaction.

This kind of situation starts to create problem amongst the staff members, there are reports of the staff members having health problems due the level of stress in the emergency areas:

'*The demand is massive and starts to become physically and mentally tough. It creates health problems amongst the staff members and increases the sick leave',* (ECU_S_NU_2)

5.3.2.3. Against the physicians

The influence of the patients within the process also affects the physician, who is the one that will determine the diagnosis and provide a possible solution for the health problem. However, due the presence of non-urgent patients in these emergency areas, physicians have to make decisions that sometimes will affect these patients and it can create unpleasant situations due to the reaction of these patients. These situation are related to some of the codes found during the data analysis, for instance, stress between patients and physicians because of sick notes, patients become aggressive when they cannot receive care in emergency area, and patients overload physicians with sick note requests.

The physician is the one prepared to make the decision whether the patient should receive care in an emergency area or not; sometimes the patient will not accept the decision in a passive way, as illustrated in this situation between a physician and a patient:

'*I say "look, sir, you can leave now. We already talked about it, I won't change my mind, leave now or I'll call someone to take you out." Then they generally kick the table, push the chair, kick the door and go away'*. (ECU_S_DR_7)

This kind of situation generates stress between patients and physicians, but one of the main reasons is when the physician refuses to issue a sick note, in this case the patient becomes aggressive:

> '*if you tell the patient "look, you haven't got anything, you came here to get a sick note and I won't give you" the patient will hit you, you'll suffer physical violence',* (ECU_S_DR_7)

However, when it becomes a very common request the physicians do not want to lose time with this type of patient and start to issue sick notes, as explained by a physician in the emergency care unit:

> '*but then if they start the complaining and I'm not in the mood to be arguing with them I give them what they want; but I always say like "look, I'll give you the sick note but it won't happen again" I make it clear that it wasn't necessary'.* (ECU_S_DR_7)

This situation was also spotted during the observation process. In the day of the observation the ECU was working without two doctors, so one doctor just said: 'today I will give sick note to everyone'. This is because they do not want to waste time and need to reduce the queue. Sick note requests are a serious situation that overload physicians and make them spend time with non-urgent or even situations that are not real; there is this view that patients can come and request a sick note without a real health problem, and when it is denied some patients try it again, creating a massive disruption in the process:

> '*Some people want a sick note so much that they come here and then they put their name on the list again, to be seen again'* said a physician. (ECU_S_DR_10)

As explained in the beginning of this chapter, from the valued added perspective patients can be considered as the most important element in the consumption process within the service delivery in healthcare. They generate the demand and sometimes are responsible for influencing some issues across the process, for instance as explained in the previous

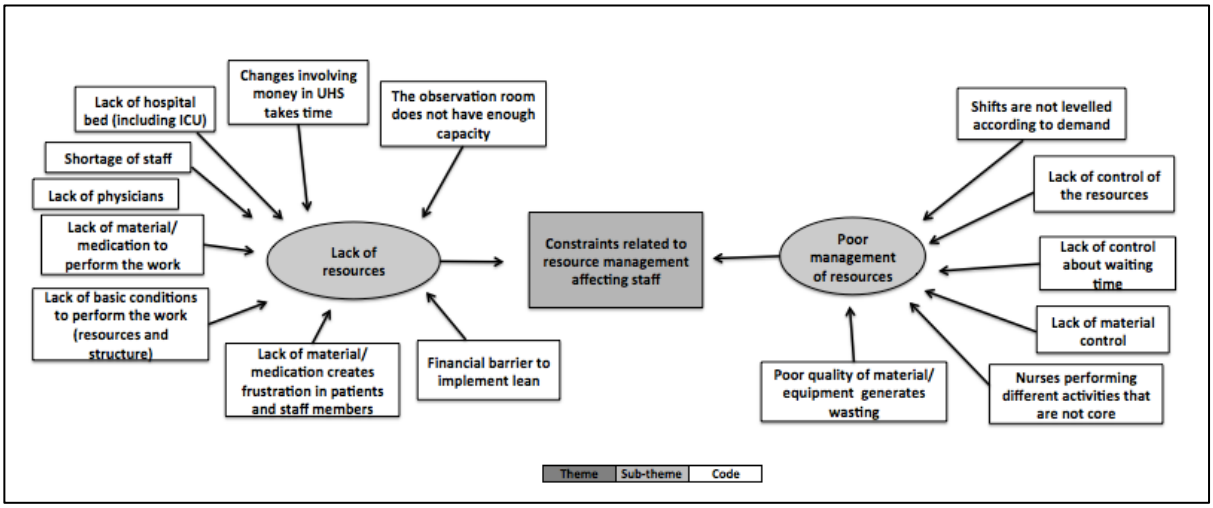
paragraphs, non-urgent patients in emergency areas create great impact with minor demands, such as sick note requests.

When it comes to lean implementation and sustainability, it is important to consider the impact of the patients' behaviour within the emergency areas, especially but not limited to unpredictable demand. If demand cannot be predicted it will generate hurdles to keep lean standards and sustain the changes, therefore patients have to be educated to follow a flow which includes seeking assistance in other levels of the UHS. If the new flow based on lean principles cannot be understood and followed by patients, it can be a barrier for lean implementation.

5.3.3. Constraints related to resource management affecting staff

When resources are not available it starts to impact on staff workload, and based on interviews with staff members and observations of the process, this main theme about resource constraints emerged. Resources can be defined in different ways; it can be financial resources, human resources, material and equipment availability. Thus based on a variety of codes two main sub-themes were created to provide an understanding of the main theme: 'lack of resources' (ostensible barrier) and 'poor management of resources' (ostensible barrier) (Figure 22).

Figure 22 – Thematic Map: Constraints related to resource management affecting staff



5.3.3.1. Poor management of resources

These sub-theme emerged based on codes that repeated during the data analysis; some of these codes are: lack of control of resources, lack of control about waiting time, shifts are not

levelled according to demand, lack of material control, nurses performing different activities that are not core (ostensible barrier), poor quality of material/equipment generates waste. When compared to the private healthcare system and how they control resources, the UHS appears to have some problems controlling the resources, which becomes a waste of public money:

> '*I spent all my life in the private sector. The impression that I have is that here (public service) there is no control, there is no one controlling the costs. Sometimes we're shocked about the waste of the public money',* (ECU_S_NU_1)

This situation is also illustrated by a nurse in the emergency department that talks about the controls in private system and the lack of it in the UHS:

> '*I come from a private hospital where you have to justify all the materials you used; you must do an audit report saying everything you used, such as serum, needle etc. But it doesn't happen here, and now we're having a lack of materials and people are getting scared'*. (ED_S_NU_1)

The poor quality of the materials is another issue that was raised during the interviews, this occurs mainly because in the UHS all materials have to be bought using the public bid, however this bid most of the time only focuses on price and quality is not the main concern, and it creates a serious problem during daily work, as explained by a nurse in the emergency care unit:

> '*Sometimes also our difficulty is with the poor quality of material…. And then comes the wasting thing, we end up using a 10mg needles because we don't have a 20mg needle, and this generates a stress too, the shortage of material also causes stress'*. (ECU_S_NU_2)

A similar situation related to poor quality of material was reported in the emergency department, however in this case nurses have to use several materials until they find one that works, which generates more waste:

'Materials, we not always have materials with a great quality "because it's cheaper", ok, it is cheaper but then I have to use 3 or 4 to make it work'. (ED_S_NU_6)

This situation where the public bid aims only for the cheapest material creates a problem, because the material does not have good quality, nurses and physicians start to use more than one unit of this material until they find one that will work properly, and in the end cheaper material becomes more expensive as waste was generated and public money was spent.

The poor management of resources is not just related to financial resources, but also to human resources. During the interview different nurses in several occasions reported that they spend most of their time performing activities that are not related to the core of their job, as explained by nurses in the emergency care unit:

'*About 30% - 20% of the time I spend doing my job, that is, the procedures etc. the rest of the time is all about solving problems. With that question you mentioned about filling out files, running after the doctor's stamp, all these unnecessary back and forth make us waste a lot of time.*' (ED_S_NU_03). '*I guess 70% of my time I spent just solving problems that sometimes aren't my own obligation...for example, to be running after things because the doctor has forgotten. I have to go after files, then I have to see whether the patient did the exam or not, you know? This isn't my obligation, and it takes much time'.* (ED_S_NU_09)

This situation becomes even more complicated when it starts to affect the patients:

'*Sometimes the patient has to wait to do the injection because the nurse in charge of doing it is on the pharmacy or at the reception; or the nurse is in the injection room but they're doing the paediatric service',* (ECU_S_DR_6)

Sometimes it is just about dedicating the right resource at the right time and avoiding imbalance between shifts as a nurse suggested:

'*I could put more staff in this busy shift rather than in the morning… this shift levelling is something to think about it'.* (ECU_S_NU_1)

5.3.3.2. Lack of resources

When a new project is suggested the main concerned is about the lack of resources, there is a fear that it can increase the cost or even demand new investments, also it is a common ostensible barrier to implement lean. In this sub-theme several codes emerged related to lack of resources, such as shortage of staff, lack of material, medication and conditions to perform the work, among others. One of the common complaints in the emergency areas in UHS is about the lack of resources and conditions to perform the work, this situation creates frustration amongst physicians and staff members as reported by a physician:

> '*the doctor at the observation room doesn't even have a place to see the patient, when I'm in the observation room I don't even like to see the patients there...*'. (ECU_S_DR_13)

The situation also affects the patients when the medication or equipment is not available due financial constraints:

> '*Medicines too, there are some medicines that we need but we don't have them, so when the question is money it is the greatest barrier on UHS (...) when then comes to the end of the doctor's appointment the patient is with the prescription, he arrives at the reception because the reception is also the pharmacy, the receptionist looks and say that there is no medication available.'.* (ECU_S_DR_10)

> *'we didn't have electrocardiogram so we couldn't see if the person was having a heart attack'.* (ECU_S_DR_11)

This lack of resources to perform the work is also reported by a lean practitioner that has experience in the UHS:

> '*doctors aren't the only problem, it's about lack of resources in general. There are no gloves, needles, then you have doctors but you don't have a single needle…'* (PRA_3)

Another common problem is the lack of physical structure, it affects both patients and staff members, creating bottlenecks across the system, as explains a nurse:

Finding a bed for the patient to stay is very complicated; (ECU_S_NU_3)

The observation room also presents problems with capacity:

> *'We have a huge demand and only ten seats, so many times they don't sit only on armchairs (more comfortable), and sometimes they have to sit on those normal chairs. We take the chairs from the waiting room and put on the observation room*. (ECU_S_NU_5)

Sometimes it is simple things that could be easily solved as explained by this nurse:

> *'Yesterday we were out of devices to measure the pressure, to verify the blood pressure of those who needed it (...) And why didn't we have a device to measure the pressure? Because it hadn't got battery. This is one example'*. (ECU_S_NU_14)

The lack of resources is not limited to financial resources, but it is also about human resources. This issue is about shortage of staff in the process for different reasons, but in this case is because the workers are overloaded and having sick note, as reported by a physician:

> '*Another thing: the more reduced number of people in the shift, the more sick employees I'll have, because the employees are overloaded, they're working, for example, on 3 different sectors'*. (ECU_S_DR_6)

Another cause of this shortage of staff is due the lack of replacement in case of retirement:

> *'There aren't enough employees. Our team has a lack of workers, for example, I had a couple of workers who retired and weren't replaced'*, as explained by a nurse. (ECU_S_NU_4)

There is a frustration about decisions to reduce the number of staff members due budget constraints, according to a physician:

> '*This ECU has about 60% of the number of doctors it should have, comparing to the others. Other thing that happened here: they reduced the number of doctors in the*

shift. We used to work with 10 doctors , now, at night, they're releasing 5 doctors to stay all night and other 3 to stay here until midnight, to reduce costs too; I think it isn't right'. (ECU_S_DR_7)

Another strong code that emerged during the data analysis is about the long time for changes that require financial investments, as explained by a nurse:

'*if I'm going to make a change here and I need something, for example in the emergency room we need a board and it costs money, then this will take time'*. (ECU_S_NU_2).

The bureaucracy in the UHS is underlined as one of the barriers that creates this long time for changes:

*'I think it can affect, considering that everything on UHS takes a long time to be done; because of the bureaucracy…' (*ED_S_NU_9)

One of the reasons to explain the slow time of change is because everything in public service have to be part of a bid, which takes time, and only after this process the order to spend money will be issued:

'*when you have to make a change that you have to buy something that will involve money, it also becomes difficult to the public service. (…) You know that everything takes time and need a public bid',* (ECU_S_NU_2)

Based on previous testimonies and descriptions of each code and sub-theme it helped to understanding about how the constraints related to resources can affect staff in UHS. However the most significant part of this analysis is to understand how this relevant theme can impact a future lean implementation. In a public system where the resources are very limited and when they are available there is a problem with resources management, lean might face hurdles to be implemented. This situation related to scarce resources has a considerable impact on staff members, but it also affects patients that cannot have access to proper treatment, because the resource is not available in time. The lack of resources also

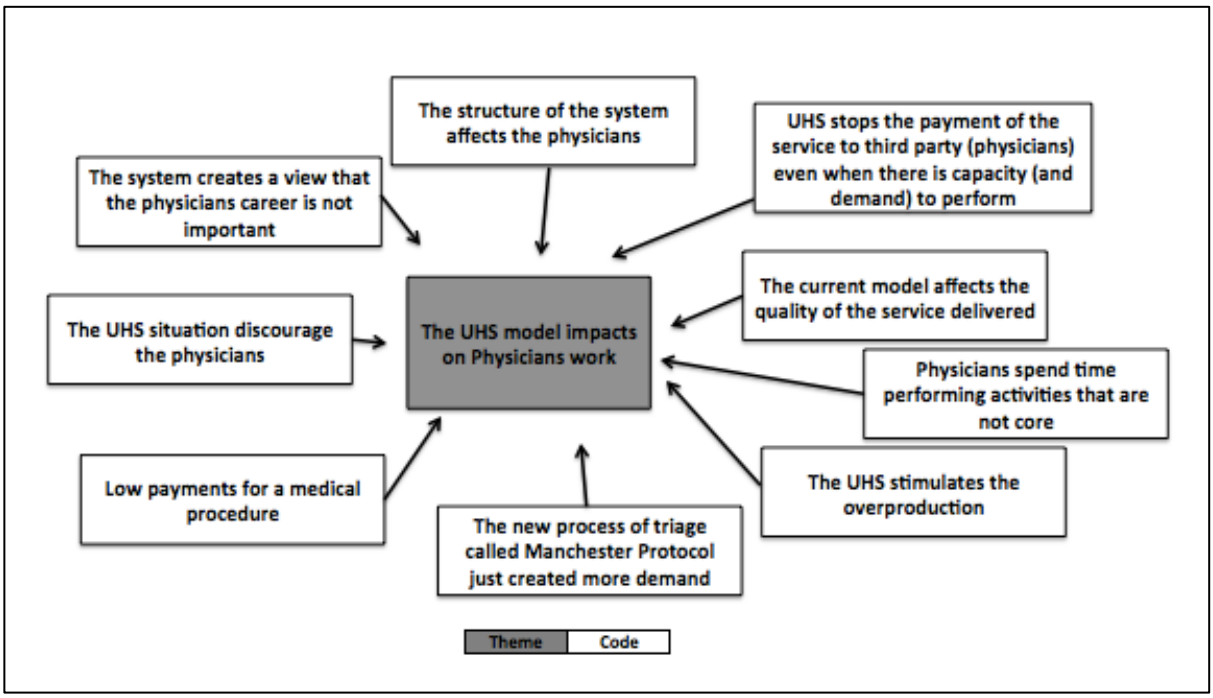
creates frustration among physicians, as they do not have the suitable resources and structure to provide a reasonable care to patients.

To sum up, if lean is attempted to be implemented in this scenario of lack and poor management of resources, resistance might arise from staff members that will be discouraged to support changes and will claim not having enough resources to provide and sustain the changes. Lean is about providing value added which includes high quality and with less cost, such situation about poor management or lack of resources might be a constraint for the lean implementation, but also it is an area that lean can provide improvements with more control, distribution of the workload. Another situation is that the change might take more time than expected as the UHS has a slow pace for changes when financial resources are involved.

5.3.4. The UHS model impacts on physicians work

After the patient, the physician is the most relevant figure in the healthcare service delivery, this was also explained during the ostensible barriers. However, during the data analysis several codes indicated that the UHS model has an impact on physicians work, creating several disruptions and leading to a demotivated professional. These codes are related to the structure of the system affects the physicians (ostensible barrier); physicians spending time with activities that are not core (ostensible barrier); the UHS stimulates overproduction and low quality; low payment for the physicians services; the current model affects the quality of the service delivered; the UHS situation discourage the physicians (Figure 23). These codes will be addressed and explained in the following sections.

Figure 23 - Thematic Map: The UHS model impact on physicians work



5.3.4.1. The structure of the system affects the physicians

On several occasions during the interview process the UHS structure was highlighted as a barrier for physicians' work. This was linked with the UHS bureaucratic style (ostensible barrier), for instance as being a system with a substantial bureaucratic process, that generates waste across the patients' pathway. This issue was confirmed by a lean practitioner who is also a physician:

> '*the problem is not the lack of doctors, the problem is the lack of structure of the system, the problem is the fact that the structure of system has wastes inside its roots, wastes that exists because of the way the model was created, the model/style is very prone to generate waste'.* (PRA_1)

This model or style that the system operates also shows that the physicians are affected when they have to perform activities that are bureaucratic and not specifically related to deliver value to the patient, as explained by a physician in the emergency care unit:

> '*even for hospitalizing the patient back there, it takes a lot of time so it isn't an efficient system, if we use our own hands it is better, you know? If someone took all*

this and put on the system, just typing like "the doctors prescripts this and this" and making an electronic record because it is necessary; it would be better because we have to fill out a form and this person has to transcribe in the computer. (ECU_S_DR_10)

5.3.4.2. The current model affects the quality of the service delivered

Because there are problems related to the structure of the system, low payment rates and other problems that will be further discussed in this section, it starts to affect the quality of the service delivered by the physicians, as explained by a practitioner:

'if I make the doctor get many appointments, considering that he has to think that in order to earn more, he needs to do a lot of appointments, so that doctor will produce a lot, which is not necessarily good for the patient; and what's not necessarily good for the service...'. (PRA_1)

The situation mentioned in the last quote is related to third party physicians, when the system does not have enough capacity, they tend to subcontract some of the services.
There are also cases related to the safety of the patient, as the level of quality goes down, the risk for the patient might increase, as reported by a physician in an emergency care unit:

'Can you imagine waiting for 6 hours to know if the patient is having a heart attack? Sometimes I'm here and I receive a call from the laboratory, when they see an abnormal result they let us know. But it's generally from an examination that I collected 6 hours ago, the patient was already having a heart attack that moment'. (ECU_S_DR_13)

Another situation is when by mistake the risk of the patient is not well defined during the assessment, and this then increases risk to the patient's life:

'*Once I saw a patient with a serious pathology, her heart wasn't working very well, she needed to come already to the red or yellow room (emergency room), but no, she waited there for 6 hours because they had done a failure triage; so she waited for 6 hours, risking her life'*, explained a physician. (ECU_S_DR_7)

5.3.4.3. Physicians spend time performing activities that are not core

This is one of the ostensible barriers that emerge during the research findings (Sections 4.4.4.9 and 4.7.5.4). When it comes to value in healthcare, physicians are the ones that deliver the most part about what is considered value, which basically is what the patients want. Therefore, practitioners and physicians have spoken about the lack of focus on core activities that the UHS brings to the daily basic routine of the physicians:

> '*Sometimes I have to go after people, I don't know how to measure exactly but I can say I spend about two hours making prescriptions, doing these bureaucratic things, in my opinion this is where we waste more time, in this bureaucratic question. (...) I think most of the time, about 90% is solving problems, calling people, updating the system. The other part of my time is seeing patients'*. (ECU_S_DR_10)

Performing activities that are not core is something that most of the physicians admit to be a waste of their time and creates frustration amongst them, which is understandable when analysed from the point of view that a physician spends a reasonable time of his life learning how to improve patients' health conditions and not on administrative tasks:

> *'The problem is that they were left behind in the Brazilian system to take care of health management, they were seen more as a performer, as an operator, but the man is essential to the hospital'*. (STAFF_PRIV_4)

5.3.4.4. The UHS stimulates the overproduction

One of the wastes mentioned by a lean practitioner in the previous paragraph (Section 5.3.4.2) is about overproduction. The UHS operates in a way that stimulates the physicians to create the overproduction; this most of the time was related to the low payments (rates per appointment) made to the physicians, as explains a practitioner:

> *'that is, you pay poorly, so the only way to make money is producing a lot, and anyone can see that 'waste'',* (PRA_1)

Thus, the mentality of the physicians starts to be adapted according to the situation. If they do not earn enough money performing a normal appointment, they will use the system's options

to generate another appointment, however the cost of this will be unnecessary tests, as illustrated by this lean practitioner:

> '*Today you pay badly so the doctor has to produce a lot, so it generates a lot of waste, and what is the easiest way to get the patient out of my face? By asking for a test (laughs), isn't it? Simple, if one asks for a test, one generates a second appointment, and not necessarily solved anything, but you run the system/flow and produces'*. (PRA_1)

5.3.4.5. Low payment for medical procedures

Some specific services in the UHS are carried out by third party companies/physicians. There is a standard list of services and prices agreed to pay for these services, which is considered out-dated when compared to prices in the private system. Practitioners that have carried out some lean project in hospitals have shared a similar view about the low rates that the UHS pays to these physician and third parties. For instance, when a physician receives low rates for a service, it starts to create situations where the system will somehow be affected, as explained by a lean practitioner:

> *'when you pay $ 40 for a surgical procedure you must be expecting two things: either the surgery to be badly done (or to be done by someone unable), or that you're cheating the system somehow….'. There is also a feeling that the doctors' work is not financially recognized: 'it is clear that they are not paying a thing that they should pay, the guy is working and aren't receiving, the biggest complaint is that the UHS pays less'*. (PRA_1)

This problem of low rates does not affect only the physicians in the UHS, but also the ones that are third party physician within the system. There is demand, patients want to be treated, however the system stops the payment at some point, as explained by a lean practitioner who is also a physician:

> '*They have a thing called "payment limit", that is, if I have a limit in a department and I'm already at the limit of capacity (….) I have a contract with the UHS that I'm going to do 1000 surgeries a month, if I do just 1 more, I don't receive for this'*. (PRA_4)

The same situation was highlighted by a staff member from a lean private hospital:

> *'Another thing, inside the UHS you have an institution that has a structure to have appointments, for example the hospital can see 1000 patients a month, but it is actually able to see more, if it starts seeing more than the ceiling/top stop, than the structure of billing the Government doesn't pay, that is, that to me is something that has no logic'*. (STAFF_PRIV_4)

This situation was also highlighted by a staff member of a lean private hospital who previously worked in the UHS:

> *'so the goal that you saw in our department, we have to fulfil it having patients or not, otherwise you won't receive 100% of the money, if you perform more then you don't receive at all. Thus it is a crazy system, you have to perform what is told, nothing more or nothing less, it is not flexible. So people end up adapting themselves to this but without the focus on patients, it is a system that is disconnected from the patient, there is no flow with the patient'*. (STAFF_PRIV_2)

5.3.4.6. The UHS situation discourage the physicians

All these situations that affect the physician's work will lead to demotivation and discouragement:

> *'So if you see 100 patients, if you do your best, you get discouraged… they'll fire one person and the group will get smaller, they keep firing people till the limit'*. (ECU_S_DR_13)

This also relates to cost reduction, and the physicians feel discouraged to complain about the situation:

> *'But, as long as I know, it was done to reduce costs, because we're having a lack of toilet paper, water etc. We complained to them and they said "do you prefer to have a lack of these things or not getting paid?" It was kind of a threat, you know? Like, 'stop complaining',* (ECU_S_DR_7)

The situation becomes even more relevant when decisions are related to patient health conditions and lack of structure:

> '*Sometimes you have to choose who'll live, you have one vacancy at the emergency department and two patients waiting for it, there is no place else to send them, there is nothing left to do, so you just have to choose. Like, the one who has more chances to survive, the youngest etc. It is complicated, sometimes it's revolting for us, for the doctors, I mean, you don't go to medicine school for that, any doctor get revolted because of the lack of structure'*. (ECU_S_DR_7)

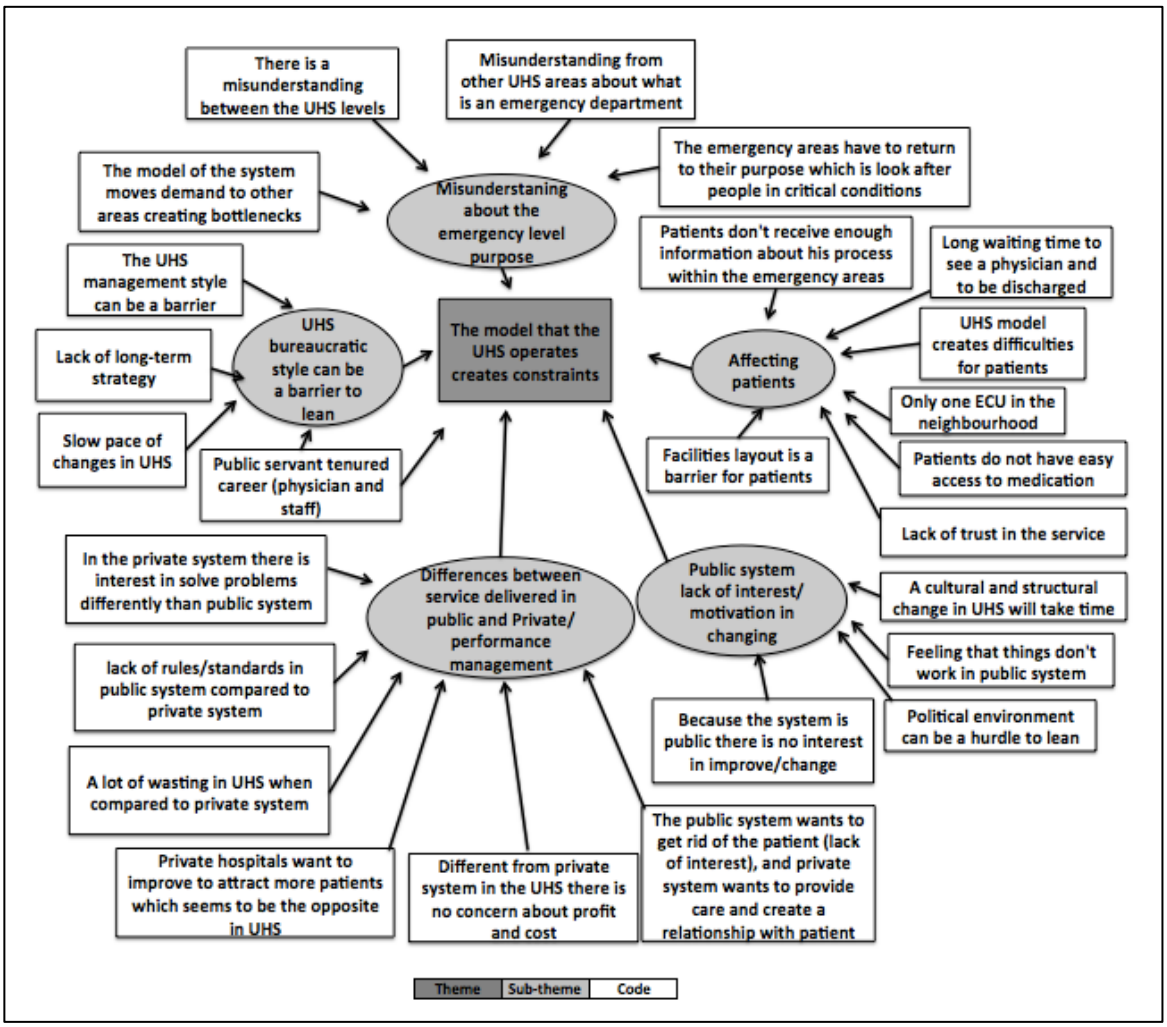
This situation was also spotted during the observation process, a doctor said that they had to discharge patients due the lack of hospital beds, but the patients should go to a hospital because they are not well and said: '*it is the risk that we assume due the shortage of resources'*. Another doctor said that they do not have hospital's stretchers to put patients in observation and some are very old which are broken and were 'fixed' with bandage.

The situation above illustrated how the UHS model of operation can impact on the work of this relevant figure called physician. These constraints can be in terms of bureaucratic process, stimulation of overproduction that will generate more waste, low payment rates that will affect the physicians who will spend more resources, impact on quality of work affecting the safety of the patient, time consuming with non-core activities and low motivation of the physicians. This situation shows that lean might face difficulties to be implemented in this environment, especially because physicians are the ones that deliver the value to patients. Patient-physician contact it is the most important part of the patient journey; if the UHS impacts on their work they might not get involved or sustain changes to improve the process.

5.3.5. The model that the UHS operates creates constraints

This is one of the strongest themes that emerged during the data analysis, mainly because it is related to the UHS and its impact on improvements. This main theme was separated into five sub-themes: 'public system lack of interest/motivation in changing' (ostensible barrier), 'differences between service delivered in public and private', 'UHS bureaucratic style as a barrier to lean' (ostensible barrier), 'misunderstanding about the emergency level purpose' and 'affecting patients' (Figure 24).

Figure 24 – Thematic Map: The model that the UHS operates creates constraints



5.3.5.1. Misunderstanding about the emergency level purpose

This sub-theme emerged from similar problems found at the emergency level of care, for instance the model of the system moves demand from other areas creating bottlenecks in the emergency areas. There is also a misunderstanding about the purpose of each level (preventive, emergency and specialized) of the UHS; even other areas in the UHS do not understand the aim of the emergency area.

The normal process in the UHS is that if a patient has a minor problem he should seek assistance from his GP which is called the basic unit, however the system does not provide enough resources to attend to this demand at GPs; what happens is that the demand naturally moves to the other level, which is the emergency level. This situation can also be related to non-urgent patients, differently from the underlying barrier '*patient's behaviour in emergency areas*' where the patient deliberately seeks assistance at the emergency level; this

is the system moving the demand from one place to another due to lack of capacity. However, this situation just creates bottlenecks in the emergency units, as explained by a physician in the emergency unit:

> *'So they have a limited flow there (Basic unit), a limited number of patients to be seen, like "the unit will close, you aren't an emergency, you can come tomorrow." That's why they come here, because we work 24hours, like "I can wait 3, 5 or even 6 hours, but I'll be seen" (laughs)'*. (ECU_S_DR_6)

From the patient perspective it is also a question of finding what seems to be the best option, as illustrated by a nurse:

> *'we've got people / patients who think: "why I'll be 4 or 5 o'clock in the morning waiting for a consultation it in the Basic Unit (GP) and still have the risk of not being seen for the doctor in the same day, then I rather go to ECU sit there and wait because I know I'll be seen for a doctor"'*. (ECU_S_NU_2)

There is also the internal problem between levels, where one level refuses to see the patient and refers to another one, but sometimes it is not the other level's responsibility:

> *'But if you send them to ECU, they send the patients back to you again… I really wanted to work on ECU to get to know their reality so I could stop complaining about them'*. (ED_S_NU_10)

Both levels (preventive and urgent) are struggling to see patients because of the lack of capacity; sometimes they just try to refer the patient but do not know the reality of the other level, as a physician in the emergency unit explained:

> '*Sometimes the patients go to BHU, can't get a doctor's appointment then they come here, it happens daily. "Oh, I went to the BHU and I couldn't be seen, they sent me here", so they also have to guarantee their flow on BHU; but I don't know how things work there'*. (ECU_S_DR_10)

The emergency level has to deal with hospitalization of patients which is not the responsibility of this area, it happens because there is a lack of hospital bed at other levels of the system:

> *'These patients who are here, downstairs, shouldn't be here, you know? Emergency Department isn't a place to keep patients hospitalized... the patients should go upstairs to a room or if they're too bad, they go to ICU, so there's a huge lack of hospital beds here'*. (ED_S_NU_11)

Based on the previous testimonies it shows that there is a misunderstanding about the emergency area's purpose; patients just use it as they go, sometimes minor situations that should be solved in the basic units are referred to an emergency unit, or even the patient makes his own decision to seek care in these places:

> **'***The main reason for ECUs existence was to deal with urgencies (paediatrics and adults too). This is the philosophy, emergency care for those who needs it. If we could do it, you know, if we could put someone inside this philosophy on emergency care, ECU would make sense. Working here would be pleasant'*, explained a nurse in the emergency care unit. (ECU_S_NU_4)

5.3.5.2. Affecting patients

There is a stage that the UHS model also starts to affect the patients; it was identified based on the following codes that emerged during the data analysis: 'UHS model creates difficulties for patients'; 'facilities layout is a barrier for patients'; 'patient don't receive enough information about his process within the emergency area'; 'Patients do not have easy access to medication'.

One of the difficulties that the UHS creates for patients is related to constraints to have access to diagnosis and treatment on time, as explained by a lean practitioner:

> '*long wait for everything and there are some things that you just can't wait, considering an emergency such as cancer. Even the access to diagnosis, the time you waste until you have access to diagnosis and then have access to treatment is something crazy, so looking at it as a patient, it is about the difficulty of access, there is no access'*. (PRA_2)

This situation only creates more problems in the system; once treatment is delayed the patient situation might become worse, which increases the cost of the treatment, but also directly affects the health condition of the patient. There are also some rules created by the system that make the patient wait for treatment or sometimes not receive the correct treatment:

> '*in Brazil we have difficulties with treatment, if you arrive here with your foot swollen, you are seen and then you have to wait, but if you wait for more than 24 hours I can't send you to an orthopaedist and, plus: we don't have orthopaedists here; so if you aren't with a broken bone or a lesion etc and I send you home'*, explained a nurse. (ECU_S_DR_10)

Another situation that was identified during the data collection is the lack of information or the difficulties that the patients face to receive accurate information in the emergency areas. This affects the patients, but also the physicians and staff members involved in delivery process, as a physician explains:

> '*On the corridors of ECU, things are not really organized, the panel, for example, people don't look at it, sometimes I call the patient and wait for about 3 minutes, sometimes even more, and it isn't a really efficient system too*'. (ECU_S_DR_10)

This lack of organisation and information starts to affect the patient, who is already suffering with the health situation and becomes more stressed:

> *'Then the patient is already nervous because he wants to be seen, he wants to be informed at least how many doctors are working. "he wants to know how many people are in front of him in the queue*". (ECU_S_NU_2)

It becomes critical when the patient cannot have access to medication; it is not just due to the lack of medication but because the UHS has changed the way that patients can have access to medication, as explained by a nurse:

> ‘*a patient is going home, all right he goes home, but he does not have enough medication here, because the government has created a way that the patient has to go to his unit’*. (ECU_S_NU_2)

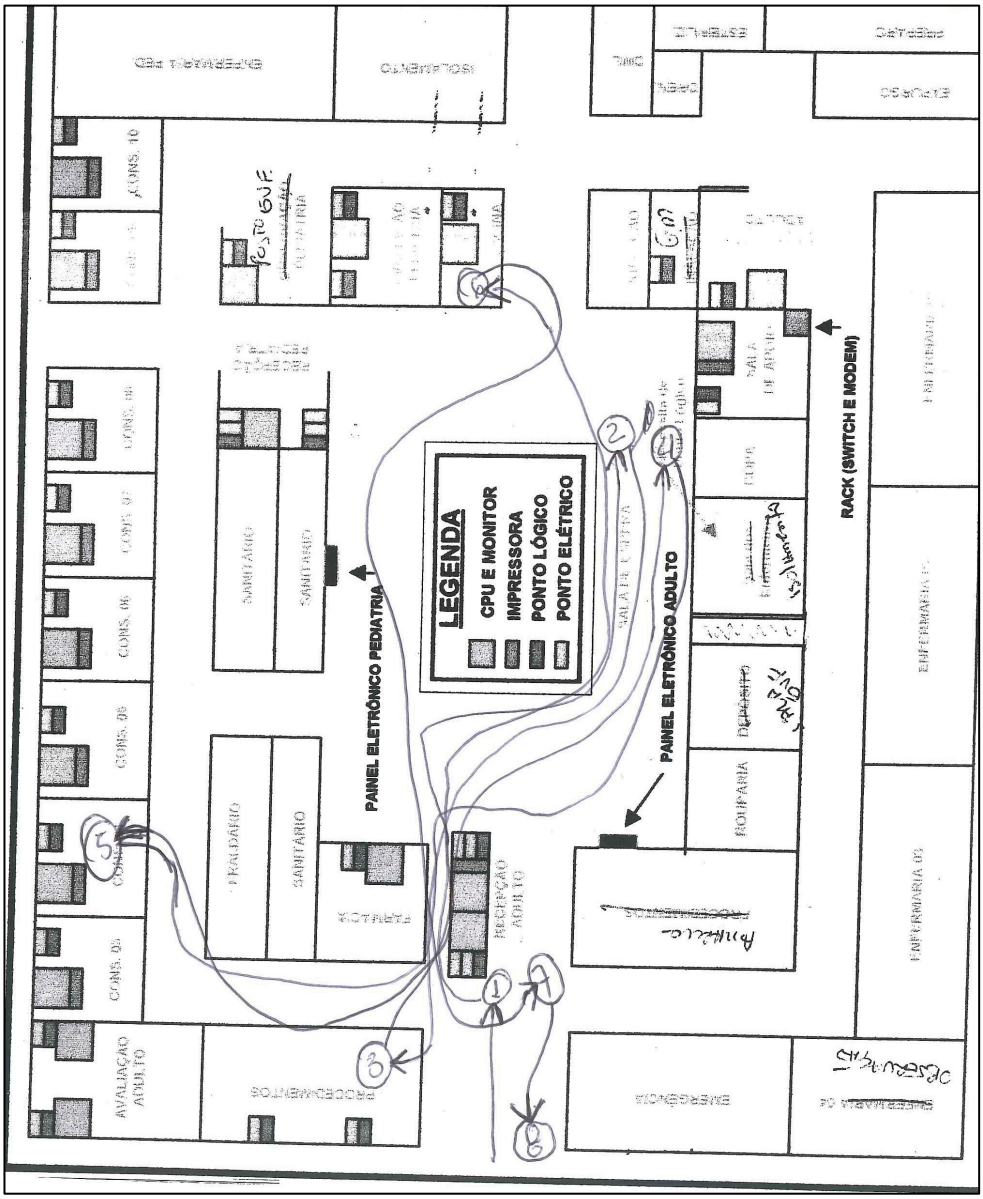
This situation was also noticed during the observation process in the emergency care unit. In the reception, only antibiotics were delivered to the patients, other type of medications the patient has to go to the GP. According to one of the doctors they do this will to ‘teach’ the patients to go to their GP, as it can help to avoid patients in the emergency areas.

There is also a constraint related to the emergency areas layout: sometimes the patients are affected because they cannot be accommodated in the space available or the structure available is not the correct one:

> ‘*The lack of space to accommodate the patient is one of the problems that bother them*. (…) *Look when the patient arrives there is a barrier, for example our reception I find totally wrong, it’s not like a proper reception (.....) sometimes has only one worker and a long line waiting’*. Explained a nurse. (ECU_S_NU_3)

The situation related to facilities layout was also reported during the observation in the field. From the patient arriving in the emergency area until the moment that he is discharged there is movement, as illustrated in Figure 25 (the low quality of the image is justified due the fact that this is original material used during the data collection).

Figure 25 – Facilities Layout – Spaghetti Chart



Source: (OBS_ECU_3)

Using one of the lean tools (spaghetti chart) the patient journey was mapped during the observation process carried out by the researcher, as follows: The patient had to go through eight different steps until he finished the process. 1) reception; 2) waiting area; 3) Triage; 4) waiting area; 5) Doctor appointment; 6) medication room; 7) reception to collect the medication; 8) leaving the building. In the same observation it was noticed that because of the facilities layout a physician had to assist a patient in a wheelchair.

5.3.5.3. Public system lack of interest/motivation in changing

During the interviews lean practitioners and staff members from the UHS shared the view that in the UHS there is a lack of interest in and motivation to change. Different codes have emerged to justify this sub-theme, for instance because the system is public maybe there is no interest in change; there is also a high political influence which can create a barrier to lean, and slow pace of changes especially when related to a cultural changes.

Because the system is public there is no motivation or goals to improve; most of the time the budget is secured and people involved only need to control and spend it, without any interest in improving it, as explained by a lean practitioner:

> '*you have a service that spends a lot of money. Brazil's (healthcare system) budget is guaranteed, so what exactly moves a Manager in Brazil doing the best? Nothing!'*. (PRA_2)

Another point of view about the UHS is a feeling that people do not care about public money, basically the money is there, the service is there so there is no interest in improving or changing the situation:

> *'I think they don't take it seriously because it's UHS, it's public, like "let's keep doing this in the way we can"'*, explained a nurse from a emergency department. (ED_S_NU_02)

This situation leads to another important code found during the data analysis which is the feeling that things do not work in the UHS; when people start to consider that it is normal not to follow procedures or standard work, the situation starts to discourage the workers:

> *'many times you open a cabinet and you see the tag with the name of a material but the material itself isn't there, or it is incomplete; man, it makes me depressed; but I don't even care about this anymore, this problem is so common nowadays that I open the cabinet (...) You start considering it as a normal thing, exchanging the monitor 4 times and it still doesn't work…*', (ECU_S_DR_10)

The system is known as a bureaucratic system, where ideas can be presented and suggestions can be made, however when it comes to implement or make this work, the situation becomes complicated, as explained by a physician:

> *'bureaucratic style of UHS can be a barrier because the UHS doesn't work. On paper, everything is beautiful, but as regards the practical application it doesn't work, nothing works'*. (ECU_S_DR_7)

The UHS is a public system, managed by the government, thus there is a considerable political influence within the process; this can affect attempts to provide a system that is more transparent, as described by a physician:

> '*So I think that on this political part, the organization would help, but I don't know if the policy/politics would be interested in fixing the problem, you know? Because of course, when things get very clear, very evident, depending on what you want to, I don't know if it's a proper thing to do…'*. (ECU_S_DR_6)

The politicians control the system, so any change or improvement has to be aligned with their interests, otherwise it will be difficult to have the support:

> *'So, the barriers are the same… the same that we would have to face if we changed any kind of public service in Brazil, basically it's in the politics class' hands and these guys are not concerned with the value to the customer and to the citizen'*, (PRA_2)

The political influence in the UHS is also highlighted by a nurse in the emergency department as an obstacle to lean implementation in this setting:

> *'we know that it's all about the politics, we know that the politics can be a barrier to many things, that is the political interest can be a barrier in these situations, this would be the only obstacle'.* (ECU_S_NU_8)

This and other factors highlighted in this section about the public system lack of interest/motivation in change lead to a view that cultural and structural change in the UHS

will take some time to happen, as explained by a lean practitioner who is involved in the UHS:

> '*Because the change is cultural and structural in the way things happen, so you can't do this, you will see and will keep seeing a lot of experience in there, specific results such as ours, a huge change won't happen so soon*'. (PRA_1)

5.3.5.4. Differences between service delivered in public and private/performance management (ostensible barrier)

Healthcare in Brazil is divided into public and private, thus during the interviews professionals from both systems were interviewed. This provided a different point of view. The codes that have motivated this sub-theme are related to the private system interest in solving the problems, lack of standards in the UHS, amount of waste in the UHS, private system working to attract more patients and the UHS doing the opposite, cost and profits in both systems.

When it comes to rules and standards the private system shows more reliability as there is a strict control about it, explained a nurse who works in both systems:

> *'On private system, they have standards and rules, you know? Like, if you are there, you know that you can't pass through a certain room without wearing the right clothes (surgical scrub). We can't apply it here'*. (ECU_S_NU_5)

Also in terms of interest in solving the problems it is clear that the private system has been more proactive than the public one:

> '*Agility, there is not so much paperwork to fix something because they (private) are more objective, it is broken has to fix it… but the government ah ... they will see if is possible to fix .... then in the private they are interested in repair it*'. (ECU_S_NU_2)

This view is also shared by a lean practitioner:

> '*it is a matter of interest; in the private hospital, the interest is to improve the quality and reduce costs, basically because there's an owner who wants it. First because they want to make money, and that's not wrong, or this owner wants to improve the*

quality, they want the hospital to be a quality hospital, they want to have patients, so the major difference is the interest'. (PRA_2)

This lack of interest in the UHS might be justified as lack of concern about profit and cost in public healthcare, as explained by a nurse in the emergency department:

'On private hospitals things are easier because when you arrive there, they tell you "write down every material you use", because the hospital depends on it, but here (public) I don't know (laughs), do you understand? They don't have this concern here'. (ED_S_NU_01)

This is a specific situation in the UHS where the money is public and there is a lack of control, so there is no concern about waste and costs:

'*There is a huge lack of incentive. On private hospitals they spend their own money, on public they spend other people's money, money that doesn't belong to anybody so it is distributed badly and they aren't concerned with this'*. (ECU_S_DR_7)

This situation was also raised during the interview with a physician that works in a lean private hospital:

'I don't think that is only about revenues, it is also about become competitive and you need to improve your quality, you know that you will have more quality. If you don't have quality and don't solve the patient's problem, he will seek another hospital. So you have to provide quality, low price, so you need to provide what the customer wants. So in the UHS does anybody is going to complain? And if complain what is going to change? But the private area feels the need to improve the quality because the competition is fierce'. (STAFF_PRIV_2)

There is an interesting contrast between private and public healthcare systems. In the private, patients represent more revenues, thus it is good practice and also a question of survival to attract and retain more customers, as in the future they will increase the hospital's revenues:

'In private hospitals they also make it work, not only because the patient is money but also because they want to be useful so the patient will return etc', (ECU_S_DR_13)

However, in the public system, more patients will represent more expense and they will not increase the revenues but the cost instead, and the patient starts to realize this, as explained*:*

'they (patients) are unsatisfied and have to spend their money on UHS, a system that doesn't want to treat them well'. (ECU_S_DR_7). *'In private system the service is fast because it generates profits to the hospital. Now, thinking about the public hospital, it belongs to the state; I think that's why there is resistance'*. (ECU_S_NU_11)

Moreover, there is a feeling that the public system only wants to offer basic care and make sure that the patient will never return:

'Look, in my point of view, the focus on private system is to serve the patients and improve their lives. On public system, on my point of view, the focus is to do something so the patient can go home happy and never return again, you know? Whether their problems are solved or not, like: "I just want to take this person out of here to avoid troubles.". (ECU_S_NU_5)

5.3.5.5. UHS bureaucratic style as a barrier to lean (ostensible barrier):

This sub-theme covers the bureaucratic process within the system and how this impacts on changes across the UHS. One of the codes that emerged in this sub-theme during the data analysis is about the impact of the public servant tenured career (ostensible barrier for physician and staff); these workers have protection from the law against redundancies, which means that only in very specific cases this can happen, as explained by a physician:

'*Something that is a barrier too, I don't want to sound against the public servant, but the stability of work is a barrier'*. (ECU_S_DR_13)

This situation creates difficulties to provide changes in the system:

> ‘*here is about public service, there is a question of tenured career, is more difficult to change this situation. The person comes to public service, I can tell you that many people here in the nursing area they don’t have the profile for the emergency department, but I can’t change this people for other hospital (because of the nature of the service)…’,* (ECU_S_NU_1)

The pace of change in the UHS (ostensible barrier) is also something that was raised during the interviews. When compared to simple things that need to be changed and take a long time to happen, lean demands a massive effort from the organization and can be frustrated due the slow pace of change in the UHS, as shared by a nurse in an emergency department:

> ‘*For a simple printer we have to wait for a year, can you imagine having to make a refurbishment, not only in the structure, I mean, in the whole service, right? It will generate a huge impact’*. (ED_S_NU_10)

Changes in the UHS will take time and it is necessary to have commitment to make this work:

> ‘*It’ll take a long time, it’s necessary to clear this Government, change this culture that the Brazilians have of outsourcing the responsibility, I think they should be more responsible and have more commitment, (...) I think it will take a few years, unless they make a very big movement of improvement of processes in hospitals with the main institutes of lean’,* (PRA_3)

This situation is related to lack of long-term strategy in the UHS (ostensible barrier) as explains a lean management consultant:

> *‘because of a cultural issue, people are not organized for long-term projects. The manager’s culture in Brazil is immediate; they want a result soon, fast. But it's not just that; when we speak of culture, it’s necessary to think in the long run, so that's the first thing’*. (PRA_3)

To summarise this section, lean principles have already been implemented in the private healthcare system in Brazil, however in the public system lean application is still scarce. This

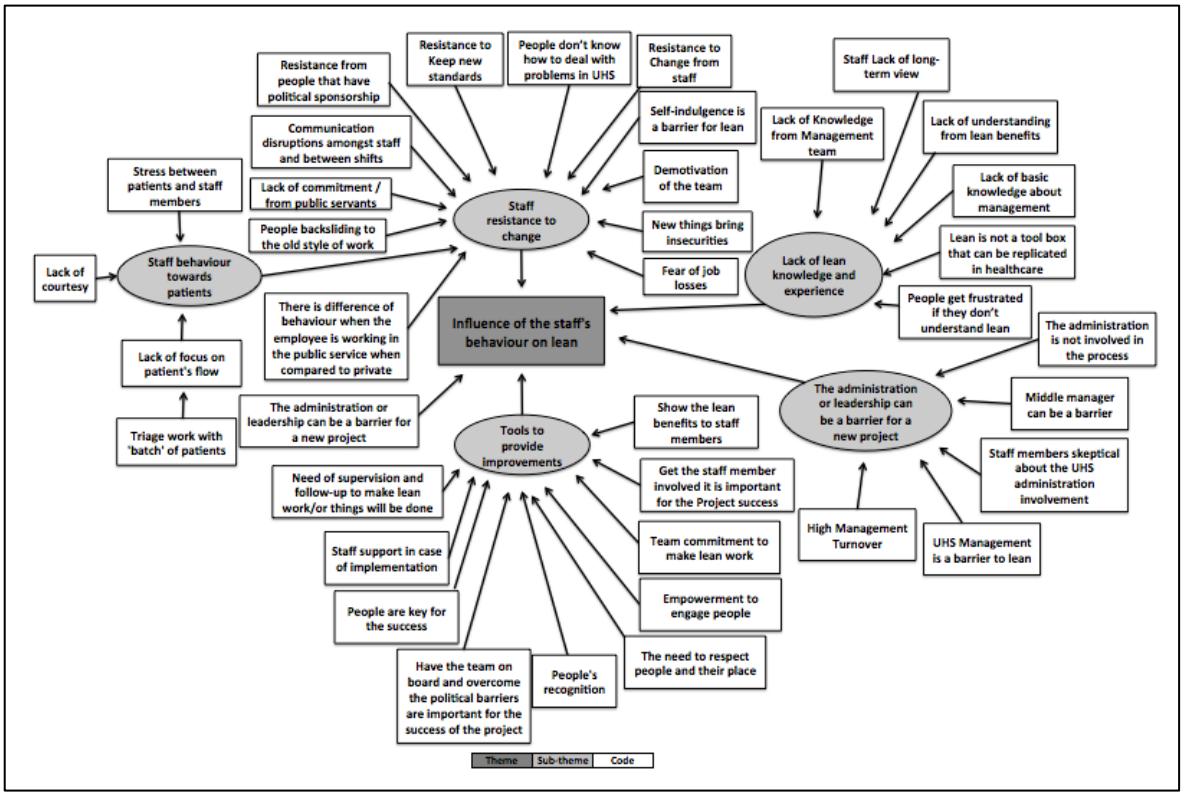
lack of application leads to a scenario where lean approaches might face constraints related to this uncharted public healthcare system. One of the issues raised during the data analysis is about the differences between the service delivered in public and private healthcare, with evidence shown that in the private system there is interest in providing improvements as this will be reflected in benefits for both patients and the organization. However, in the public system because the resources are public, the aim seems to be to deliver a basic service with less focus on improvements. There is also a feeling that 'things' will not change or will take a long time to happen. The UHS cultural style influences the patients but also can influence attempts to implement lean, in an environment that lacks interest in improving or shows resistance to provide changes, lean might face difficulties to be implemented as well as sustain such changes

5.3.6. Influence of the staff behaviour as a barrier to lean

Similar to physicians, the other part of the workforce termed staff is also relevant to the service delivery process and consequently to lean implementation. Staff members work in front line operations, receiving patients, supporting the physicians' requests and performing administrative activities.

During the data analysis five main sub-themes emerged related to staff behaviour: staff resistance to change (ostensible barrier), staff behaviour towards patients, tools to provide improvements and lack of lean knowledge and experience (ostensible barrier), the administration or leadership can be a barrier to lean (ostensible barrier) (Figure 26). Staff members play a relevant role in the service delivery process; they are the first contact with patients and work as support across the patients' pathway, therefore having staff members involved in lean initiatives might be a benefit for the process.

Figure 26 – Thematic Map: Influence of the staff behaviour on lean



5.3.6.1. Staff resistance to change

Several factors might have influenced the creation of this sub-theme, and a discussion about the main codes found will be provided. There is a resistance to change that comes directly from staff members; people are used to following old procedures for years, they rarely question the reasons that they perform their job, however when a new process is implemented the resistance becomes more evident, as explained by a lean practitioner:

> '*People are used to standards that they've followed for years and you have to change this standard, and that's what we couldn't change until now*'. (PRA_1)

Sometimes the reason behind this resistance is purely lack of understanding about the new process or approach; people do not understand what is happening in their environment so they start to become resistant:

> *'in general there's a lot of resistance to change, and that's because of the structure of the organization. I believe the barrier exists because of the lack of knowledge'*. (STAFF_PRIV_4)

This is also confirmed by a nurse that talks about the new things bringing insecurity:

> '*one thing that I always tell people is that we are just afraid of things that we do not know'*. (ECU_S_NU_2)

When the implementation phase is overcome, constraints related to sustainability might emerge, as rather than keep the changes people start to backslide to the old style of work:

> '*Resistance happens in the post-implementation part, which is when you make people understand that the process has changed and then the part of sustainability to let the new standards remain and avoid going back to what it was before, then we find a major difficulty making the employees keep it (...) people tend to go back to the comfort zone'*. (PRA_4)

A similar issue that was also raised during the main theme of physicians' influence on the process is about the tenured career in the UHS (ostensible barrier). Basically the staff members are public servants; they have been performing their work for years, there is a stability that protects the workers in case of redundancies, this somehow affects the commitment of these staff:

> *'but like I told you, they're public employees; there is this lack of commitment (...) I really think that those employees who are here for 20 years and don't want to improve anything, they shouldn't be there'*, explains a physician in the UHS. (ECU_S_DR_7)

Another important situation that was highlighted during the interviews was about the demotivation of the team; it was not unusual to find clinical staff members that were unhappy with their job, this was not just about financial motivation but also about recognition of the career, as explains a nurse:

> '*We say that who is working as nurse or in any other healthcare area is because they like it. Because nowadays there is no more status in this career (....). When I was a child I never thought that I could work as a nurse, I used to play as housewife, I never*

thought that I could be a nurse, but now I can tell that I'm really demotivated with my career… "God damn I used to love to work as nurse..."'. (ECU_S_NU_1)

This is a good example of the mood in the interview sessions; it was very common for the interview sessions to become almost a kind of 'therapy' where the staff members and physicians had the opportunity to share their thoughts and also frustrations.

Finally, another code that emerged from the topic resistance to change was about communication disruption amongst staff and between shifts (ostensible barrier). This shows the difficulties related to communication in the UHS and how this affects the staff members:

'*So this has to change, all times, all shifts must receive the same information, but WHAT happens during some meetings is that sometimes many people do not attend it, or the meetings are not performed on all shifts and ends up that those who did not attend the meeting, they will not receive the information in the same way and it begins to "truncate" the thing'*. (ECU_S_NU_2)

'*we had a meeting with the nurses and look, I've worked here for nearly 2 years and there was only one meeting to sit and talk to the leaders, to say like "tell me what do you think, what are the difficulties, what is your point…'*. (ED_S_NU_3).

5.3.6.2. Lack of lean knowledge and experience

This is one of the common barriers within the literature (Bhasin, 2011; Brandao de Souza and Pidd, 2011; Deloitte and Touche, 2002), and when carrying out interviews in the emergency level of the Brazilian healthcare system. Lack of knowledge and experience about lean also emerged as a strong sub-theme related to the influence of staff behaviour on lean. There is a group of codes that explain this sub-theme, for instance, when asking practitioners about it they informed that there is a basic knowledge about management:

'Then you have managerial functions performed by very good people (technically), and the managerial side does not work, then you have a working environment that is exhausting, most of the times.' (PRA_2)

Also there is a common mentality that lean is a tool box that can be replicated in different settings, which is not true as research has shown that lean is context dependent and attempts

to replicate it purely as a tool box might face constraints, and this is what a lean practitioner explains:

> '*Is that it's no use in bringing the LEAN as a solution of tools to the operational level. This is the main lesson, it will not sustain itself. It has to be a mental model, almost like the Japanese model which already has it in the vein, which is already incorporated'*. (PRA_3)

When people do not understand that lean is a long-term philosophy they might become frustrated, as they cannot understand the approach and its effects, as well as the potential benefits:

> *People can't see what's going on, they come here, they take a look, and most of the time they don't understand and sometimes get frustrated. (....) while they still think that lean is just a method, they are not going to be able to translate the actual gain'*. (PRA_1)

Staff members can influence the service delivery process and therefore lean implementation. Resistance to lean implementation was one of the constraints identified during the data analysis as well as keys to provide improvements. Lean is dependent on people – processes can be redesigned, new ideas can be implemented, but what will make the real difference are people, as explained by a staff member from a lean private hospital in Brazil:

> *'people are the key, because the truth is people will carry out the work and implement the project, we cannot do anything without people'*. (STAFF_PRIV_3)

They are the ones responsible for sustaining the change, thus having staff members on board is crucial for the success of lean implementation.

5.3.6.3. The administration or leadership can be a barrier for a new project

Based on lean principles, leadership commitment is one of the keys to implement lean, however it is not unusual to find the top management as the main barrier to lean. Different codes emerged from the data analysis that show this issue, such as middle manager can be a barrier, staff members sceptical about the UHS administration involvement and UHS

management is a barrier to UHS, among others. Leadership is seen as a barrier in the emergency department of UHS, as explained by a nurse:

> 'Honestly, the administration. I think the first barrier you'll face it's something from up there (top of the pyramid), because for them (the bosses), for everything that is new, they say "Oh, it is now the right time, we are concerned about this, we are dealing with this, implementing that…" this is what I expect'. (ED_S_NU_1)

> *'Because people don't know how to adapt themselves to these new opportunities (lean project), you know? They end up putting more obstacles in the way and we have plenty of bosses so the management would be a barrier, that's what I think, you know'?* (ED_S_NU_9)

Sometimes the interviewees explained that the administration is not involved in the process:

> *'it would be easier if we had someone here, together with us, perhaps a coordinator/leader, like "I'll spend a week with the team, let's see their reality."'* (ED_S_NU_3)

The UHS Management team is seen as a barrier to implement a new project according to this nurse interviewed in the emergency department:

> *'Perhaps people from the direction, because they always have these problems with the system (….) So if there will be somebody against it this person will be someone from the direction'.* (ED_S_NU_10)

5.3.6.4. Tools to provide improvement

Different hurdles and constraints can emerge during lean implementation, however there are also key actions that might help to avoid these problems. Thus, the process will be changed, new standards will be implemented, but in the end all of these changes are dependent on people, they are ones that will implement and sustain the changing as explained by two different lean practitioners:

'*I think the great learning experience I've had, is how people are important in the process. (...) so the big lesson for us is that it is about people, lean is about people, not about worksheet'*. (PRA_4)

However, a positive element is that the employees want to be part of this, they want to know what is going on, so having the staff members involved can be regarded as important for the project's success:

'*We can solve this resilience thing if we let things clear, like, saying that it'll be a benefit, avoiding saying that the employees have the obligation to do it, without listening to their opinion about it*', (ECU_S_DR_6)

It is about having people involved since the beginning of the project; if the staff members understand and participate in the project they will feel part of this, explains a staff member from a lean private hospital:

'*let's make a project here in the ER, so let's see who will be involved here, then you question what are the problems, and they know what the problems are, then you take these people, all of them who participate in the process, explain the purpose, train and leave them doing the process, then I think you can get a large insertion, with everyone involved*'. (STAFF_PRIV_4)

This is also recommended by a staff member that works with lean in a private hospital in Brazil; he suggests that changes in areas of the hospital have to respect people and their environment:

'the idea is to have a group of people and work with lean together, show the VSM and plan the future, work with a timetable, create a Kaizen event and teach people how to work with lean, afterwards encourage people do make themselves. You have to have the leadership together, however don't forget the person that performs the work on the day by day, for example, I'm going to improve a process in the emergency room, so I'll bring the supervisor or nurse of this area to work with me'. (STAFF_PRIV_1)

Especially in healthcare, people have a strong sense of ownership. They also protect each other, which sometimes is negative and they end up working in isolation. However it is important to recognize the nature of the healthcare activity and respect people and their place of work during lean implementation:

> '*if you do a project without having people involved, without having the doctor, without having the pharmacist, it will create a barrier, they are going to say* "*damn, they came here, did a mapping, they said that was ideal way for making it, I didn't say any suggestion, they didn't ask for my opinion, and now they're saying that I have to do it like this'*. (STAFF_PRIV_4)

It is also about showing the benefits of such projects; it not just about the theory, but also showing the results and benefits that lean can bring in their daily routine, as explains a nurse from the emergency department:

> '*Since the moment you make the employee realize that saving time, energy they're saving materials from the storage'* (..) *need to realize that it is going to generate an improvement that will be done and it will not be only on paper'*. (ED_S_NU_01)

This was also recommended by a staff member that works with a lean practitioner; when presenting the lean benefits, he suggested two approaches, one for the management board and another one for the physicians and other staff members:

> *'the truth is, you need to reach two different groups in the hospital, when you talk with the management team is more about the financial return, cost reduction, capacity increase, doing more with the same cost. Then you have the other group which are the nurses and doctors and then you need to show focus on the patients'*. (PRA_3)

During the interview lean practitioners and managers in lean private hospitals were asked about recognition, and how this should be created during the lean project. They all refused the idea of financial recognition, but suggested that people have to be recognized with compliments, appreciation and perhaps even promotion:

'*If you put this routine of involvement, recognition, involvement, recognition, I believe that inside the public area this would work. Who doesn't like to receive a compliment? Every human being likes to be recognized and feel important',* explained a lean practitioner. (STAFF_PRIV_4)

Sometimes this recognition will be delivered in terms of organisation commitment with the employees as explained by a private lean hospital manager:

'*I think people have to be proud of a job well done, you have to come here to work and feel very proud of what you do, and it happens. So our reward system is not related to the performance of the project, it is related to the performance of the Organization, and if the Organization has a good performance, it is collective and not an individual result. (...) We have many friendly mechanisms, we create mechanisms so people can work less, not to work on holiday etc. things that make more sense instead of giving something, because this is something that happens in the automotive industry: "now everybody is "lay-off", here we don't "lay-off" anyone, although we aren't with the demand we need, we don't sent anybody away (fire)'*. (PRA_1)

Regarding recognition, a staff member that works with lean in private hospital said:

'I understand that is about people's involvement and recognition, when we carried out a kaizen afterwards we took some people to have a dinner with the president of the company, one of the employees just told me 'look it has been more than 25 years that I work in this company and I never had a dinner with the president'. So for me it's gratifying, this is a employee that was always involved with improvements, but he was hidden and never received a recognition'. (STAFF_PRIV_1)

People's involvement is also highlighted by another staff member of a lean hospital as one of the keys to succeed during the lean journey:

'*The idea of lean is to build up an idea together, can't be something mandatory but has to be something created by the employees as safety culture. Getting people involved, those who are responsible for the area have to be involved, for example if*

you are going to change a centre of surgeries, you need people from this area involved'. (STAFF_PRIV_3).

5.3.6.5. Staff behaviour towards patients

There is also the impact of the staff behaviours on patients. This is illustrated by two main themes: 'lack of focus on patient flow and 'stress between patients and staff members'. A hospital is compounded by several departments, however these departments become very strong and tend to work in isolation; as a consequence the focus on the patient flow is lost, as explains a staff member from a lean private hospital:

'*In the hospitals (I don't know why) they have this thing about the departments being very strong, the emergency, the surgical centre, the nursing, the coronary unit etc. So these are units that work alone and don't know what's the impact they're causing on other departments, I think this is a great barrier, I must overcome it'*. (STAFF_PRIV_4). *'the nursing team is closed on its group, so are the doctors, there is no relationship or help between them, they sometimes try, but it isn't that harmonious'*. (ECU_S_DR_9)

Sometimes this is due the lack of knowledge of the entire flow, and the staff start to have the mind-set that their part of the work has been done:

'people do things just for their own Department and don't know the next process the patient is going, that is, what is the importance in delivering the patient so that they flow in the best possible'. (STAFF_PRIV_4)

The staff members are the front line in terms of patient contact, however it is not unusual to find conflict between patients and staff members, for different reasons as explained a physician in the emergency area:

'but the employee also thinks "I'm here doing my job and this impolite people (patients) only knows to complain"... so they just don't get along with each other'. (ECU_S_DR_13)

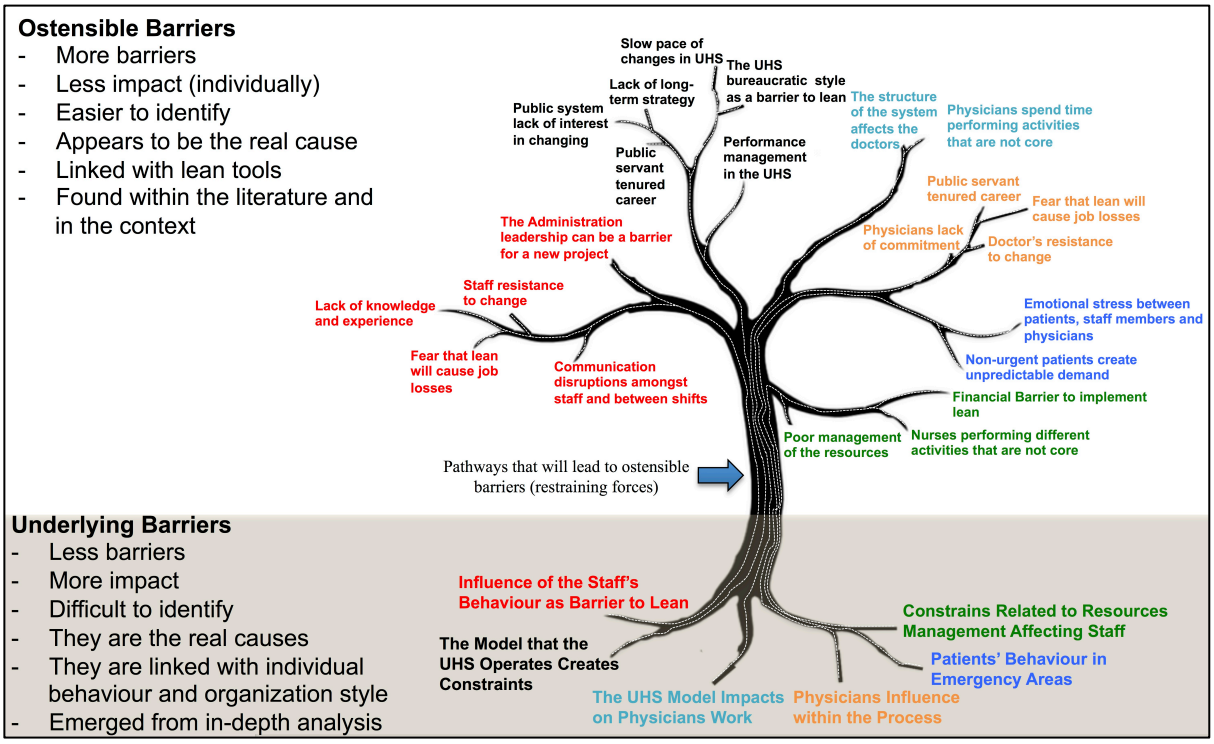
The next section presents a summary of the chapter including an illustration of the ostensible and underlying barriers.

5.4. Chapter Summary

This chapter presented the findings from data analysis, which can be separated into two main findings: ostensible barriers and underlying barriers. Figure 27 illustrates these two categories of barriers. It shows a silhouette of a tree that has several lean ostensible barriers in place of the leaves and underlying barriers in place of roots.

The ostensible barriers have some interesting characteristics. For example, '*less impact individually*', because it is only one barrier, it becomes easier to tackle, the immediate solution sometimes will rely on basic lean tools, for instance lack of communication can be solved in morning rounds before starting the shifts. Another interesting characteristic of an ostensible barrier is that it is '*easier to identify*', most of the time it appears immediately during the lean project implementation, for instance it can be lack of financial resources, which is easy to identify as financial constraints will constrain the lean project. Another strong characteristic is that ostensible barriers appear to be the real cause, however the real causes might be deeper, resistance to change for example can be an ostensible barrier with an underlying cause in the organizational style. Various ostensible barriers can also be found in the literature, as a great number of studies have been carried out in this field.

Figure 27 – Ostensible and Underlying Barriers Tree



The roots of the tree represent the underlying barriers or the causes that lead to ostensible barriers. There are fewer underlying barriers, however they are strong inhibitors in lean implementation and are linked with people's behaviour and organization's style. In contrast with the ostensible barriers these underlying barriers do not come from the literature, but they emerged from field investigation, after consideration of the causes of ostensible barriers.

A total of six underlying barriers were mapped during the data analysis, as follows: (1) Physicians' influence within the process; (2) Patients' behaviour in emergency areas; (3) Constraints related to resource management affecting staff; (4) The UHS model's impact on physicians' work; (5) The model that the UHS operates create constraints; (6) Influence of staff behaviour on lean. Each of these barriers are important for the content lean implementation; they are related to stakeholders and the healthcare public system, which will be explained in the following chapter. To illustrate how ostensible and underlying barriers are connected a dotted line was drawn, linking one to another. These can be called pathways that will lead to ostensible barriers.

The next chapter will discuss the underlying barriers and current literature about lean barriers, moreover, additional literature to support findings will be presented. Finally the discussion chapter will address the research aim and questions of this study.

6. Chapter 6 - Discussion

6.1. Introduction

This chapter aims to provide a discussion about the interplay between ostensible barriers, underlying barriers and restraining forces. The current lean barriers literature will be summarized and linked with the ostensible barriers found during the data analysis.

In the data analysis chapter, a new category of barriers called underlying emerged, thus these barriers will be discussed addressing their relationship with stakeholders and the Brazilian public healthcare system (UHS). Furthermore, additional literature from force field analysis (Lewin, 1951) and co-production (Edvardsson and Olson, 1996, Osborne *et al.,* 2012) will be used to support the understanding of these new findings and help to build the contribution of this research as well as a set of four propositions. Finally, the research question and sub-questions will be addressed together with their answers.

6.2. Current literature about lean barriers

The barriers to implement the lean philosophy have been studied by different researchers in diverse areas, such as manufacturing, public services, healthcare, construction and education. Analyzing outcomes from this research, it is possible to find a common trend in generating lists of similar lean barriers (Hilton and Sohal 2012; Mostafa *et al.,* 2013). The literature review (Chapter 2) discussed the lean barriers in-depth. Some examples of these barriers are lack of lean experience and training, low availability of resources, poor communication, lack of leadership, team involvement and resistance to change, among others (Bateman and Rich, 2003; Bhasin, 2012c; Radnor *et al.,* 2006; Hilton and Sohal 2012; Marodin and Saurin, 2015).

These barriers have been researched for a few decades, generating similar results in terms of impact in the lean implementation and sustainability. Table 31 displays a list of the main barriers found during the literature review chapter; the procedures followed to build this table and carry out the systematic literature review were explained in section 2.7 of the literature review chapter. These barriers were searched using a lean context, however, there are similar barriers from other change initiatives, for instance, resources are always a challenge during attempts to implement a new project. For instance, Morrow et al. (2014) found leadership as a barrier when implementing productive award programme.

Table 31 – Main Barriers to Implementing Lean Philosophy

Categories	Barriers	Sources
Behaviour and Culture	- People and lack of attitude and commitment to change the process	Deloitte and Touche (2002); Kinder and Burgoyne (2013); Poksinska (2010) Radnor *et al.* (2006)
	- Lack of ownership; insufficient understanding of the potential benefits.	Andersen *et al.* (2014); Bhasin (2011); Kumar and Kumar (2012); Marodin and Saurin (2015a); Radnor *et al.* (2006); Roslin and Shahadat (2014); Worley and Doolen (2006)
	- Resistance to change to something new/scepticism, including leaders' resistance.	Albliwi *et al.* (2014); Bhasin (2011); Brandao de Souza and Pidd (2011); Deloitte and Touche (2002); Jadhav *et al.* (2014a); Lean Enterprise Institute (2007); Malmbrandt and Ahlstrom (2013); Roslin and Shahadat (2014); Sim and Rogers (2009)
	- Fear of job losses; lean becomes a threat	Antoni (1996); Carter *et al.* (2013); Conti *et al.* (2006); Fine *et al.* (2009); Jadhav *et al.* (2014a); Kinnie *et al.* (1998) Kim *et al.* (2006); Sim and Rogers (2009)
	- Personal and organizational cultural issues	Bhasin (2011); Deloitte and Touche (2002); Kundu and Manohar (2012); Radnor *et al.,* (2006)
Organisation and Management Issues	- Poor communication	Bollback (2012); Čiarnienė and Vienažindienė (2013); Grove *et al.* (2010; Kundu and Manohar (2012); Marhani (2013) Marodin and Saurin (2015a); Radnor *et al.* (2006); Scherrer-Rathje *et al.* (2009)
	- Leadership failure/misunderstanding and lack of commitment and support	Bateman and Rich (2003); Brandao de Souza and Pidd (2011); Bhasin (2011); Drotz and Poksinska (2014); Emiliani and Stec (2005); Massey and Williams (2005); Radnor *et al.* (2006)
	- Weak link between improvement programmes and the organisational strategic level.	Bhamu and Sangwan (2014); Canadian Manufactures and exporters (2006); Hilton and Sohal (2012); Hines *et al.* (2004); Pakdil and Leonard (2015); Radnor *et al.,* (2006)
	- Organizational momentum and pace	Brandao de Souza and Pidd (2011); Crute *et al.,* (2003); Marodin and Saurin (2015a); Radnor *et al.* (2006)
	- Measurement framework; performance management;	Bhasin (2012c); Brandao de Souza and Pidd (2011); Deloitte and Touche (2002); Hilton and Sohal (2012); Kundu and Manohar (2012); Mostafa *et al.* (2013)

Categories	Barriers	Sources
Organisation and Management Issues	- A need to convince shareholders/board	Bhasin (2011); Deloitte and Touche (2002); Poksinska (2010)
	- Lack of understanding of the potential benefits	Bhasin (2012a); Deloitte and Touche (2002); Marodin and Saurin (2015a); Roslin and Shahadat (2014); Worley and Doolen (2006)
	- Viewed as a fad	Fine *et al.* (2009); Lean Enterprise Institute (2007); McIntosh and Cookson (2012); Roslin and Shahadat (2014)
	- Lack of long-term strategy	D'Andreamatteo *et al.* (2015); Emiliani and Stec (2005); Kumar and Kumar (2015); Marodin and Saurin (2015a); Rymaszewska (2014); Scherrer-Rathje *et al.* (2009)
	- Failure of past lean projects	Canadian Manufactures and exporters (2006); Lean Enterprise Institute (2007); Kumar and Kumar (2012); Lucey *et al.* (2005); Roslin and Shahadat (2014)
Training	- Terminology; something new among the employees	Abdullah *et al.,* (2009); Albliwi *et al.* (2014); Brandao de Souza and Pidd (2011); Lean Enterprise Institute (2007); Proudlove *et al.* (2008)
	- Lack of understanding of the approach in different organization levels/lack of lean knowledge	Aij *et al.,* (2013); Bhasin (2011); Brandao de Souza and Pidd (2011); Bollback (2012); Deloitte and Touche (2002); Zimmermann and Bollbach (2015); Wendel and Abdulhalim (2014)
	- Personal/professional skills of healthcare professionals; lack of know-how.	Alinaitwe (2009); Bhasin (2012a); Brandao de Souza and Pidd (2011); Lean Enterprise Institute (2007)
	- Training and Skill Building	Bhasin (2013); Hilton and Sohal (2012); Kundu and Manohar (2012); Malmbrandt and Ahlstrom (2013)
Resources	- Lack of investment (intern and extern)	Bhasin (2013); Deloitte and Touche (2002); Jadhav et al. (2014b); Mostafa *et al.* (2013); Radnor (2010a); Roslin and Shahadat (2014)
	- Lack of resources and budget constraints	Albliwi *et al.* (2014); Bateman and Rich (2003); Kundu and Manohar (2012); Lean Enterprise Institute (2007); Marodin and Saurin (2015a); Radnor *et al.* (2006)
	- Financial value not recognized	Fullerton and Wempe (2008); Kumar and Kumar (2012); Lean Enterprise Institute (2007); Marodin and Saurin (2015a); Mehta *et al*. (2012)

During the investigation within the emergency areas of the Brazilian public healthcare system (UHS), many of these barriers were identified as 'ostensible', with underlying deeper causes not fully discussed within the literature emerging from this study. A total of 20 ostensible barriers were found; a list of these barriers is available in the previous chapter, but will also be discussed further in this chapter.

The deeper causes of these ostensible barriers are called underlying barriers and they have a strong influence from the organisational management style of the public healthcare system and individual behaviour of the patients, physicians and staff members (stakeholders), which affect the service delivered (as outlined in the chapter 5). Thus, it is relevant to present an in-depth discussion of the relationship between these underlying barriers, stakeholders and the public healthcare system, in order to understand what is happening in this setting and how these underlying barriers influence lean implementation and sustainability.

6.2.1. Contemporary Issues in healthcare

There are some social issues related to healthcare and lean that emerge from literature as well as empirical data from research findings. The issues that emerged during this research are professional boundaries (professionalism), healthcare fidelity and need for evidence-based. Thus, it is regarded as important to provide some additional discussion about these issues, as this can be related to future research.

6.2.1.1. Professional boundaries (professionalism)

Professional boundaries is also known as professionalism, it is a common phenomenon found during the lean implementation (Brandao de Sousa and Pidd, 2011; Stanton et al., 2014,). It involves the power and influence of staff members (physicians and nurses) that work in a fragmented structure in a hospital (Fillingham, 2008; Waring and Bishop, 2010). Power and culture are two strong elements in the healthcare structure, that usually emerge as a barrier to the lean in implementation in terms of professional and functional silos developed within the fragmented structure of the healthcare (Radnor et al., 2006; Brandao de Sousa and Pidd, 2011).

When working in silos healthcare practitioners are separated in professional groups, this has a great impact in communication, interaction and protectionism of areas in healthcare (Brandao de Sousa and Pidd, 2011), therefore working against lean practices, such as teamwork and decentralization of power (Drotz and Poksinska (2014). Some of these problems related to professionalism were identified during lean implementation in healthcare

institutions, such as ThedaCare, Royal Bolton and Flinders Medical Centre (Ben-Tovim et al., 2008; Radnor, 2010b; Toussaint, 2009; Womack et al., 2005). Thus, this is a relevant issue that might be considered by future research and lean initiatives.

6.2.1.1.1. Professionalism within the Brazilian healthcare

During the research within the emergency areas of the UHS, it was possible to identify similar tensions between physicians and nurses, these issues are similar to the ones depicted in the literature discussed in the previous section about professionalism. The research findings (Sections 4.4.4.1 and 4.6.4.1) address the physicians' lack of commitment, and it is possible to draw a parallel with professionalism issues. For instance, a lean management consultant underscored the new role of the physicians in the healthcare, arguing that physicians have to recognize that they are not the most important person of the assistance anymore, and they do need other professionals help as well as engage in teamwork.

Conflicts between physicians and nurses were also identified in the section 4.6.4.16 that underscores the issue related to tenured career and the impact of this 'job for life' in the healthcare process. The research findings show that the tenured career stimulates troublesome behaviour, where workers stay for decades in the institution and start to ignore rules and procedures in favour of their own interests, which was a common complaint from nurses against physicians. This situation is similar to what is discussed by Fillingham (2008) who describes the group of senior and very often old physicians as 'feudal baronies' within the healthcare institutions. These 'baronies' in the Brazilian healthcare system were also identified by physicians towards nurses, they argue that there are nurses working for more than 20 years in the same workplace, and these nurses just do not see the necessity to improve the current process, which was also highlighted as a lack of commitment (Section 4.6.4.16).

The professionalism issues that emerged, raise important implications for lean implementation and sustainability in the UHS. First, the tensions related to difficulties that the physicians have to understand that they are not the main focus of the process. According to Womack and Jones (1996), one of the lean principles is to provide value at the right time to the final customer, which in this case will be the user of the system who is the patient. Thus, the physicians have to understand that they are there to support improvements that will benefit the patient and consequently the entire healthcare process. Second, those who act as 'baronies' within the healthcare system have to be identified in order to avoid troublesome behaviour that will work as restraining forces constraining the lean journey in the UHS.

Overall, this section has shown that professionalism issues impact on lean implementation, however, this subject has received limited attention when analysed within the lean healthcare context, with only a few research published. Thus, it paves the way for future research in this area, which is one of the suggestions for the further research of this study in section 7.6

6.2.1.2. Healthcare Fidelity and the Need for Evidence-based Research

Implementing techniques adapted from manufacturing plants to improve quality and safety in healthcare settings has been a challenge; as a consequence the results are superficial, with no meaningful changes, low rates of success and are difficult to replicate (Davidoff *et al.*, 2014; Dixon-Woods *et al.*, 2013). According to Glouberman and Zimmerman (2002) some of the difficulties to sustain change in healthcare, emerge from the complexity of this setting, which includes their challenging technical, social, institutional and political context. The challenge is not only related to transferring from manufacturing to healthcare, the constraint also happens during attempts to replicate quality and safe improvement initiatives from healthcare to healthcare settings. Dixon-Woods (2013), argue that this often brings some disconcerting effects, such as failure to outperform the secular trend and the decline effect when intervention does not deliver equality successful results during replication in the new context.

This lack of success in implementing quality improvement programmes from manufacturing to healthcare or replicating from healthcare to healthcare is addressed by Dixon-Woods *et al.* (2011) who argue that in new contexts, not having a well-explicated programme theories from process improvements might risk the sustainability and lead to failure. Thus, this leads to the issue of variable fidelity in the application of methodology that will provide improvements in healthcare. To address this issue of infidelity in the healthcare setting, Dixon-Woods and Martin (2016) propose four key elements that might ease this situation: 1) Act like a sector; 2) Stop looking for 'magic bullets', focus on organisational strengthening and learn from positive deviance; 3) Build capacity for designing and testing solutions, and plan for replication and scaling from the start; 4) Think programmes and resources, not projects. This will help to identify the issues and responsible for solving problems within the system.

This discussion about lean replication, leads to another contemporary healthcare issue that has been discussed is the need for evidence of the benefits of the lean approach, specially a conflict from qualitative and quantitative studies contradicting each other (Andersen *et al.,* 2013). Most of the studies in lean healthcare present positive results, however they have

limitations, such as single case studies, weak design and methodology, which affects the validity and generalizations of results (Alexander and Hearld, 2009; Mazzocato *et al.,* 2010; Young and McClean, 2008).

The key problem according to Andersen *et al.* (2013) is the replication of study designs with limited adaptations, which do not account for contingency factors that are needed to translate the findings from one setting to another. This is a common issue found within the lean and other quality improvement literature that state that lean is unique and to be adopted successfully it must consider that lean is context dependent, where pure replication will not be sustained (Bateman *et al.,* 2014; Bhasin, 2012; Kaplan *et al.,* 2010; Radnor and Osborne, 2012).

Overall, it is important to consider fidelity and need for evidence during implementations of quality and safety programmes in healthcare, undertaking methodologies that will consider all the elements involved in study design and the context, rather than simple replication of a method from one setting to another.

6.3. Underlying barriers, stakeholders and UHS relationship

The six underlying barriers that emerged from the data analysis process are: *'(1) Physicians' influence within the process; (2) Patients' behaviour in emergency areas; (3) Constraints related to resource management affecting staff; (4) The UHS model impacts on physicians' work; (5) The model that the UHS operates creates constraints; (6) Influence of staff behaviour as a barrier to lean'.* These underlying barriers are proposed as the root causes of the ostensible barriers in the healthcare system, and they have a strong influence on the organisational management style of the UHS, and individual behaviour of the stakeholders involved in the service delivery process in emergency areas.

The settings in which these underlying barriers were found have some specific characteristics, as emergency areas of the UHS similar to other countries are 'open door' areas, where someone who is seeking healthcare assistance does not need an appointment to see a physician, which creates high demand from patients and a strong process of 'simultaneous consumption and co-production' (Edvardsson and Olson, 1996, Osborne *et al.,* 2012). Another characteristic of the emergency area is the high interaction amongst stakeholders represented by patients, physicians and staff members; moreover, this process also has a high influence of the UHS, which is the provider of the service. These stakeholders and the UHS can act to inhibit improvements in the service delivery process. In order to

explore the impact of each stakeholder and the UHS and explain their interactions during lean implementation they will be individually discussed together with their underlying barriers later in this chapter.

The data analysis has shown that these stakeholders and the UHS, most of the time, act in the opposite direction of the service delivered; for instance, a non-urgent patient can create unexpected demand and bottlenecks across the process, which affects the capacity. Or in another example, the UHS can constrain the operation every time that resources are not available to provide the right care, which directly affects staff performance and ability to keep the process stable.

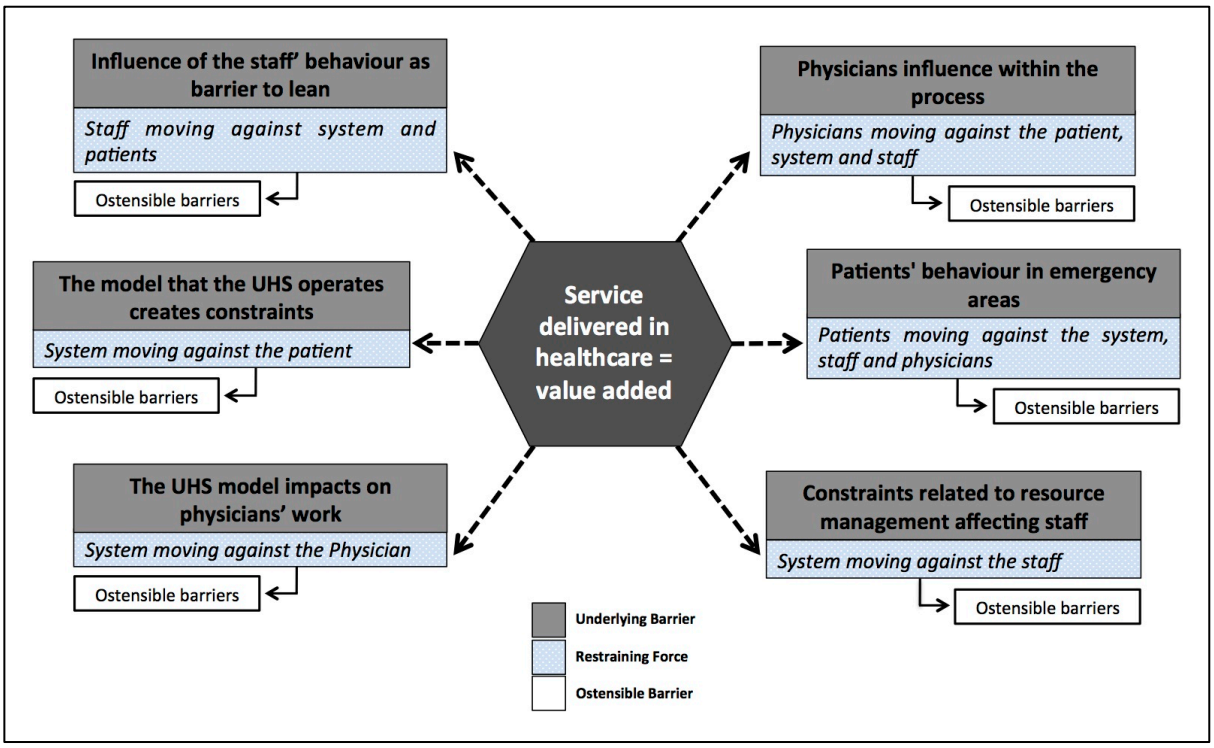
Delivering the proper, timely 'care' to the patient in the healthcare setting and especially in emergency areas is expected to be value adding from the patient's point of view. It is important to highlight that patients are not passive elements in this process, but they participate actively during the process of co-production and creation of value; in fact, they are the ones that form impressions that will affect the outcome of the service delivered or value added (Edvardsson and Olson, 1996).

Thus, to understand and provide support for discussion about the relationship between stakeholders, the UHS and underlying barriers, it is important to understand the concept of services in this context. The healthcare system is a service with high co-production and simultaneous consumption processes. In services different to manufacturing, production and consumption occurs simultaneously (Normann, 1991). This means the patient is actively participating during the service delivery process or as advocated by Edvardsson and Olson (1996) assessing the value added.

In the healthcare setting, influence in the service delivery process and co-production goes beyond patient participation and is also influenced by other professionals in healthcare, such as physicians who deliver the valued added and staff members who provide support across the patients' pathway. For instance, Osborne and Strokosch (2013) argue that while a given surgical procedure is influenced merely as much by the individual pathology of a patient as by the skills of the physician. At a fundamental level, therefore, co-production is not an 'add-on' to services but a core feature of them. The same concept also applies to nurses and other healthcare staff delivering procedures during the co-production and consumption process. However, as the main provider of the services, the UHS has a strong influence in the co-production process, as the system controls the resources and rules in this context. It cannot be disassociated from the rest of the co-production process, as the service offered is part of the public healthcare system.

This strong influence of other stakeholders and the public healthcare system in the co-production process has also emerged during the data analysis, and it is illustrated by underlying barriers to implement lean. Each of the barriers represents an influence from either a stakeholder or the public healthcare system (UHS); Figure 28 illustrates that when moving in opposite directions from the value added, stakeholders and the UHS create a negative influence or force in the expected value added and generate ostensible barriers. The value added is one of the principles of the lean philosophy (Womack and Jones, 2003), therefore when stakeholders and the UHS move against the value added they inhibit attempts to improve the process across the patients' pathway.

Figure 28 – Field of forces to influence healthcare value added



These findings raise the need to introduce another study to understand what is occurring in this setting and support the discussion about the influence of stakeholders and the UHS on the service delivery process. Thus, Force Field Analysis (Lewin, 1951) will be used to support the understanding of this field of forces in the UHS.

6.4. Lewin's Force Field Analysis

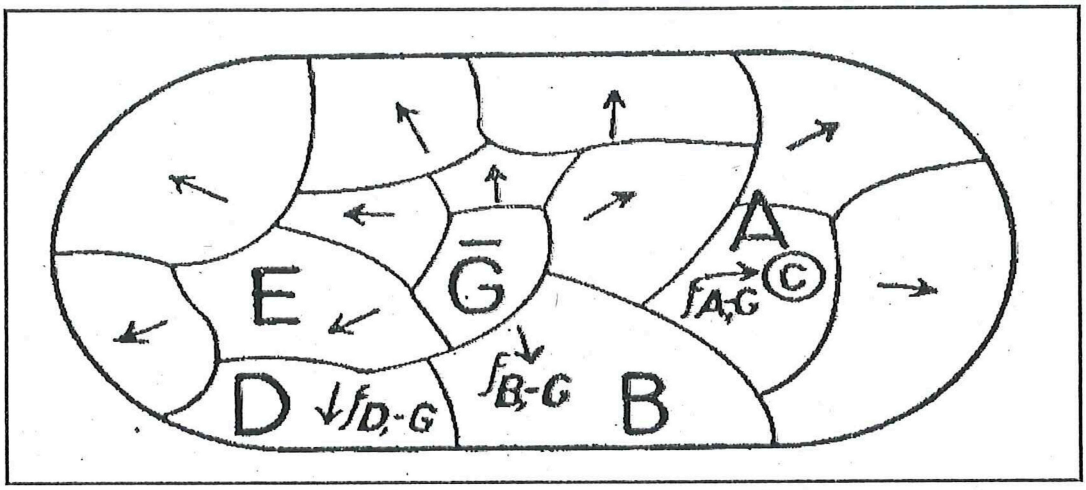
To understand the forces acting in the service delivery process in the emergency area of the UHS, it is necessary to recall Lewin's study from 1951, which addresses the Force Field

Analysis and its impact on encouragement and discouragement of behaviour of individuals and organisations.

Lewin (1951), an American social psychologist with an interest in organisational behaviour and its adaptation to change, advocates that the behaviour of individuals and organisations are motivated by forces moving towards or against a social situation. To illustrate this behaviour he used an example of a child: this behaviour's influence can be observed in the early days of a child when there are movements towards or away from the breast during feeding. This can be related to an individual or an organisation moving towards or away from a given situation; this will be defined as forces that influence this behaviour.

To understand these influences in behaviour suggested by Lewin, it is necessary to visit his model of Force Field Analysis (Figure 29). This behavioural model for individuals and organisations shows that there is a field which represents the environment (field), and an objective or a reward (central field) that a given person or organisation wants to achieve. In this field there are variable forces acting independently in a positive (driving forces) or negative (restraining forces) way towards or against the central field. Restraining forces are considered forces resisting change, such as social obstacles and a person's own needs; they can be emotional, illogical and unconscious. However, driving forces are forces for change; they are movements towards a goal or reward that a given person or organisation is aiming for. The field is considered as the environment that one is involved in; it can be an organisational situation, or an area of research that a person or organisation is acting within. The central field will be the reward or aim; for instance, it can be a negotiation of a deal, a job offer, a change in the working environment, and others.

Figure 29 – Force Field Analysis: Negative central field



Source: Lewin (1951)

Figure 29 illustrates the model of force field analysis with a negative central field (G) that will have restraining forces repulsing this central field. A model with a positive central field (G) will show the opposite, as it will have driving forces moving towards the central field.

According to Lewin's (1951) force field analysis, in order to implement change it is necessary to have actions from driving and restraining forces, increasing driving forces and decreasing restraining forces in a given situation. However, if there is equilibrium between restraining and driving forces acting in the same field, there is no change. Thus, for change to occur in this field it will be necessary for driving forces to surpass the restraining forces (Endrejat et al., 2017; Lewin, 1951).

6.4.1. Lewin's theory relevance

Since its conception in 1951, Lewin's theory has been widely used by many scholars; it is still a systematic approach used in academia to explain behaviour and change. Burnes (2004), who carried out research in a local government context, advocates that Lewin's contribution to explain individual and group behaviour during the change process is still relevant. Burnes and Bargal (2017) organised a special issue of the journal of change management providing evidence that Lewin's work is still alive, effective and contributing to different areas, including applications by practitioners and academics in different settings.

To illustrate this relevance of Lewin's approach, Table 32 shows a sample of research conducted in the last decade that used Lewin's theory in both healthcare and lean. These studies were conducted in diverse areas of management, different countries and combining different approaches. For instance, Lewin's theory is a common approach used by nurses across specialty areas when carrying out several quality improvement projects (Shirley 2013; Vines *et al.,* 2014; Wojciechowski *et al.,* 2016). His approach was also used jointly with lean and Six Sigma approaches in hospitals and SMEs (Rosenkjaer *et al.,* 2016; Wojciechowski *et al.,* 2016; Pinedo-Cuenca *et al.,* 2012).

Table 32 – Lewin's theory contributions

Order	Contribution using Lewin's theory	Sources
1	Organised a special issue of the journal of change management dedicated to evaluate the continuing influence of Lewin's theories.	Burnes and Bargal (2017)
2	Used Lewin's theory combined with other approaches, also used force field analysis as a qualitative approach. Finally, they advocate that Lewin's ideas can still be used to tackle current issues.	Endrejat *et al.* (2017)
3	Analysed the integration of lean and Lewin's theory to lead and sustain change in hospital.	Wojciechowski *et al.* (2016)
4	Investigated executives' attitudes during a changing process involving Lean Management in a hospital in Iceland.	Rosenkjaer *et al.* (2016)
5	Investigated change management in the city councils in Australia.	Hossan (2015)
6	Used Lewin's theory as a strategy for developing and implementing bedside reports in hospital.	Vines *et al.* (2014)
7	Evidence-based practices (EBPs) in clinical settings using collaborative evaluation.	Manchester *et al.* (2014)
8	Analysed the relationship between Six Sigma's critical success factors and the antecedents of successful organisational change.	Pinedo-Cuenca *et al.* (2012)
9	Explored the use of the Lewin's theory as a strategic resource to mobilize the people (nurses) side of change.	Shirley (2013)
10	Applied Lewin's theory as a changing method in a German university hospital.	Prokosch and Ganslandt (2009)
11	Conducted research in local government that showed that Lewin's approach is still relevant to the modern world.	Burnes (2004)
12	Promoted understanding about how health professions' behaviours become accepted and sustained in clinical settings.	Holter and Schwartz-Barcott, 1993; Lee, 2006; Walters and Eley, 2011)

Lewin's approach was also undertaken in different countries such as Germany, Iceland, Australia, the USA and the UK, and others (Hossan 2015; Pinedo-Cuenca *et al.,* 2012; Prokosch and Ganslandt, 2009; Rosenkjaer *et al.,* 2016; Shirley, 2013).

The combination of Lewin's application in different settings, approaches and countries, shows a resilient approach that can support and explain behaviour in different

environments, which is exactly the aim of this research in understanding the barriers to implement lean in the Brazilian public healthcare system. However, this research is not going to address the whole theory developed by Lewin as it is not the aim; instead, it will use force field analysis to explain what is happening in the UHS, mainly because this is about the behaviour of individual and organisations. Thus, force field analysis will support the new findings of underlying barriers that have influence from stakeholders and UHS behaviour.

6.5. Force Field Analysis in relation to the barriers to implement lean in the UHS

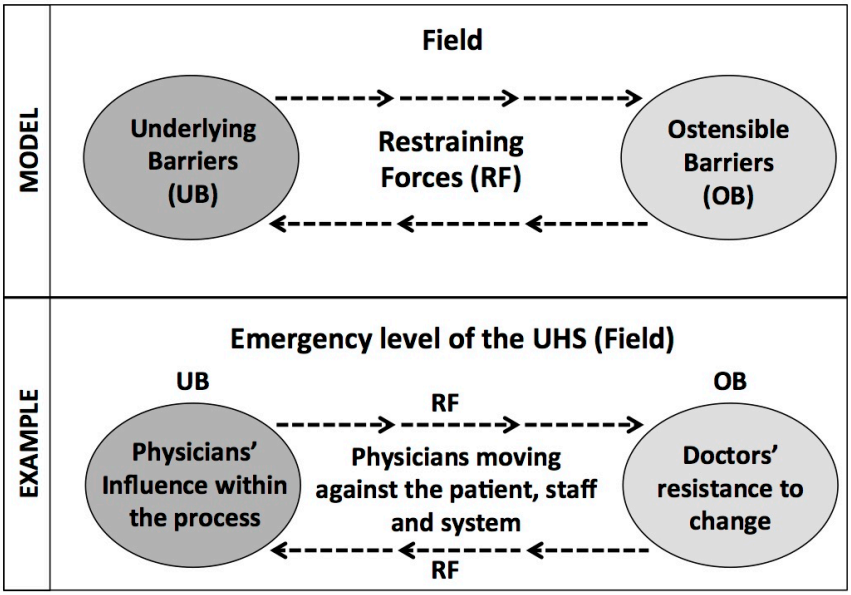
This explanation of force field analysis can be related to the research outcomes found in emergency areas of the UHS. In this study, based on the codes and themes that emerged from the data analysis and previously illustrated in Figure 28, most of the time the researcher has found that stakeholders and the UHS, which is managed by the public administration (which will be referred to only as 'system' to exemplify the restraining force), have a negative influence (restraining forces, represented by the dotted arrows) in the process of lean implementation in the emergency areas of the UHS, repulsing the central field which is the service delivered or value added in healthcare.

In this process, stakeholders and the UHS are interdependent during the co-production process, although when creating disruptions across the operations, they work as independent and restraining forces, driving the service delivered towards their own interests. Therefore they act independently in a negative way, not showing concerns about possible effects across the service delivery process. This situation might create barriers and inhibit lean implementation.

In this case an analogy to Lewin's theory can be drawn as the restraining forces (stakeholders and UHS) in this field (healthcare emergency areas) are repulsing the central field (value added in healthcare), moving in the opposite direction of the value added (Figure 28). The process of lean ostensible barriers creation in the emergency level of the UHS under the restraining forces influence is illustrated by Figure 30. In this example, the physicians' influence within the process acts as an underlying barrier, with physicians' behaviour working against the patient, staff and system in the form of restraining force resisting the change (the arrows represent the movement of the restraining forces). In this case the physician's resistance to change will constrain the lean implementation across the process, acting as an ostensible barrier to process improvement. As explained in the previous chapters, the physician has an important role in the service delivery process, thus his involvement in

the new process suggested by the lean approach is vital for the success and sustainability of the change.

Figure 30 – Creation of ostensible barriers



It is important to highlight that the use of Lewin's model of force field analysis aims to illustrate the current situation in the context of this research and provide support for a better understanding of the new findings. This approach has been applied in different contexts (Rosenkjaer *et al.,* 2016; Shirley, 2013; Wojciechowski *et al.,* 2016), it brings a different perspective about the co-production process in emergency areas of the Brazilian public healthcare system, and shows that the behaviour of stakeholders and the UHS management style act as restraining forces, therefore generating ostensible barriers that work against the service delivered and valued added, constraining lean attempts to improve the process.

Together, the theories co-production in services (Edvardsson and Olson, 1996) and force field analysis of the behaviour (Lewin, 1951) presented in this chapter support the understanding of new findings about the underlying barriers, providing support about the relationship between these barriers, stakeholders and the public healthcare system. The co-production theory explains the service delivery process in the UHS and the interaction of the stakeholders and the UHS. Lewin's approach explains how these stakeholders and the UHS act as restraining forces inhibiting process improvements.

It is important to highlight that the nature of this study is exploratory as well as inductive, when interviewees were asked about possible barriers to implement lean in the emergency level of the UHS, the ostensible and underlying barriers emerged as main constraints. Moreover, restraining forces from Lewin's model explain the individual

behaviour of the stakeholders and the UHS, which influence the creation of ostensible barriers.

The next section explains the relationship between these elements (underlying barriers, restraining forces and ostensible barriers) involved in the co-production process of the public healthcare system, and how they might affect attempts to implement lean.

6.5.1. Underlying Barrier 1: Physicians' influence within the process

Physicians have a high influence in the co-production process, as they deliver much of the value added to patients. The restraining force related to this stakeholder shows that it can move against patients, staff members and the public healthcare system.

According to the data analysis (Chapter five), every time that the physician avoids a new process that can bring improvements for the patient's journey, he moves against the stakeholders and system, as he will keep performing the old process that creates problems, such as waiting times, which is one of the main problems faced by patients in the UHS (Azevedo and Costa 2010; Piola *et al*., 2009; Solla and Chioro, 2008). In the same way, when not showing commitment to the process or collaboration with staff members, physicians will be moving against the staff and system, therefore generating constraints in the form of ostensible barriers, as described in Table 33.

The physicians' influence within the process raises important implications for lean implementation and sustainability, as it generates ostensible barriers, which will be discussed in the following section.

6.5.1.1. Implications for lean

The physicians' influence in the lean journey will generate several ostensible barriers that will constrain lean implementation and sustainability; this was revealed during the data analysis (Chapter five). Table 33 shows the restraining force, underlying and ostensible barriers related to physicians' influence within the process..

Table 33 – Physicians influence within the process

Underlying Barrier	Physicians' influence within the process
Restraining Force	Physicians moving against the patient, system and staff
Ostensible Barriers	Physicians' lack of commitment
	Physicians' resistance to change
	Public servant tenured career (physicians and staff)
	Fear that lean will cause job losses

The lean literature reviews some of these ostensible barriers, however, when literature was not explicitly found, then the findings and data analysis chapter explained these barriers based on evidence from data collection and context.

The literature explains briefly the lack of commitment from physicians. This issue was addressed by Donaldson (1994) who carried out research in the NHS. It was found that amongst seven main problems, the lack of commitment to duties was the second most common problem related to physicians. When exploring the literature about lack of commitment from people in general and not just the physician, it appears to be a common issue during lean implementation in manufacturing, the public sector and healthcare (Deloitte and Touche, 2002; Kinder and Burgoyne, 2013; Poksinska, 2010; Radnor *et al.,* 2006).

This barrier was also highlighted during the findings as one of the problems in the UHS; for instance, section 4.4.4.1 depicts physicians' lack of commitment to patients as well as with other physicians in the UHS. A lean management consultant (PRA_3) in section 4.6.4.1 explains that it is still difficult for the physician to understand that he is not the most important person in the healthcare process and that he needs to work and interact with other professionals. This ostensible barrier presents an important implication for lean, as people's commitment and understanding is a strong enabler of the lean journey in manufacturing and service areas (Bhasin, 2012c; Malmbrandt and Ahlstrom, 2013).

Another important ostensible barrier that emerged during the findings related to physicians' influence is physicians' resistance to change. Lean management consultants and staff from lean private hospitals have highlighted the resistance to change from physicians in sections 4.6.4.12 and 4.7.5.9. They discussed the influence that physicians have in the healthcare process (especially when related to a new approach such as lean) and that their resistance will only be overcome if they are involved in the change process. Otherwise, even if they accept the initial change, there is a chance that they will slide back to the old style.

This ostensible barrier resistance to change is addressed within the lean literature by different scholars (Bhasin, 2011; Brandao de Souza and Pidd, 2011; Deloitte and Touche,

2002; Lean Enterprise Institute, 2007; Roslin and Shahadat, 2014). In one study carried out by Albliwi *et al.* (2014), it was revealed that resistance to change is one of the critical failure factors that influence lean and Six Sigma. Therefore, resistance to change during the lean journey represents an important implication for lean, as once again it falls into the category of people's involvement in the new project.

There are also barriers that the literature does not address and only research findings will inform these types of ostensible barriers; this is the case with the public servant tenured career (physicians and staff). This ostensible barrier emerged from the context of the data collection, as this tenured career is a specific situation in the UHS. During the case study finding in the UHS Site 1 – ECU, this emerged as a situation related to physicians and staff members.

The tenured career is a normal situation for public servants in Brazil; it creates a process where the employee has a permanent job for life, and does not see any reason to improve, creating 'laid back' behaviour. In section 4.4.4.16, physicians and nurses discuss this tenured career issue and its implications for lean. The situation varies between people who do not have the skills to perform the job, or people who have been performing the same activity for 20 years without any prospect of improvement and/or career progression. Public servants with this tenured career also tend not to get involved in the process and only perform what they want, when they want and in the way that they want, as explained by a nurse in section 4.4.16 of the case study findings.

Implementing lean in this environment, where people do not follow the procedures or tend to avoid the 'rules' can be a challenge, as people's engagement and involvement, which is one of the bases for lean success (Malmbrandt and Ahlstrom, 2013), will be difficult to achieve.

A common barrier found both in the literature and findings is the fear that lean will cause job losses (Fine *et al.,* 2009; Sim and Rogers, 2009). As there is also a group of physicians that are not tenured but work with fixed contracts, the fear of job losses emerged amongst this group. This was found in the UHS as well as external sources from management consultants and lean private hospitals (Table 28). Sim and Rogers (2009) carried out research about implementing lean production systems, and found out that companies fail 'badly' in the perception of job security when implementing lean, as they cannot convince workers that the process will not create redundancies; then they start to lose support during lean implementation.

In section 4.4.4.2 of the findings chapter, a similar situation was discussed. A physician reported that based on past experiences they are discouraged to improve the process, as the group of physicians suffered redundancies even when the demand did not change: *'So if you see 100 patients, if you do your best, you get discouraged… they'll fire one person and the group will get smaller, they keep firing people till the limit'* (ECU_S_DR_13). This has direct implications for lean; as organisations fail to show that lean will not create redundancies, employees do not get involved in the project or even create resistance rejecting the new approach.

These ostensible barriers that emerged from either the literature or the research findings raise discussion about the physicians' influence within the process, and show how as an underlying barrier it can influence the creation of different hurdles across the lean journey. Therefore, physicians are key stakeholders in the healthcare service delivery process, have them involved in the process of change is an enabler that can support the lean implementation and sustainability. This can avoid the restraining force where physicians will move against patients, system and staff.

This discussion about the physicians' influence during lean implementation as an underlying barrier that motivates several other ostensible barriers, leads to a significant proposition:

Proposition 1: Physicians play an important role in lean implementation and sustainability; they are the ones who deliver substantial valued added to patients, therefore it is important to have them engaged in the lean project.

The next section addresses the impact of the patients' behaviour as an underlying barrier during lean implementation.

6.5.2. Underlying Barrier 2: Patients' behaviour in emergency areas

Patients are stakeholders who participate in the co-production process, thus they also actively affect the service delivered (Edvardsson and Olson, 1996). Thus, this active involvement in the co-production process, associated with difficulties to predict their behaviour in emergency areas might generate hurdles for lean implementation that will emerge in the form of ostensible barriers.

However, the restraining force related to this stakeholder shows that the patient will act against the public healthcare system, staff members and physicians, constraining lean implementation with unexpected demand and stress generation between other stakeholders. The patients' behaviour in emergency areas of the UHS raises significant implications for the lean journey in this setting, as it generates ostensible barriers which will be discussed in the section 6.5.2.1.

6.5.2.1. Implications for lean

Patients' behaviour in emergency areas generates a variety of demands that most of the time are not part of the daily routine, as it might constrain a new process such as lean. Table 34 displays the restraining force, underlying and ostensible barriers related to patients.

Table 34 – Patients' behaviour in emergency areas

Underlying Barrier	Patients' behaviour in emergency areas
Restraining Force	Patients moving against the system, staff and physicians
Ostensible Barriers	Non-urgent patients create unpredictable demand
	Emotional stress between patients, staff members and physicians

The underlying barrier patients' behaviour in emergency areas influences the following ostensible barriers: non-urgent patients create unpredictable demand and emotional stress between patients, staff members and physicians. In the literature review chapter (Section 2.4.2.3 and 2.5) the problem related to non-urgent patients in the UHS was raised (Azevedo and Costa, 2010; Bulletin of the World Health Organisation, 2010; Lega and Mengoni, 2008; Tsai *et al*., 2010). The literature that addresses this problem as a barrier to lean is still scarce, therefore this ostensible barrier can be well explained using the research findings.

In section 4.5.4.1 of the findings, the discussion around this barrier emerges in terms of the impact that this substantial demand of non-urgent patients creates in the quality of the service. There is also a discussion about patients' lack of information related to the UHS levels of care and how this impacts on the creation of this unexpected demand. There are implications for lean when comes to non-urgent patients' presence in emergency areas; it creates difficulties to predict the demand and provide a service with quality, as non-urgent patients create disruption across the normal process. This situation impacts the lean

implementation, as new processes with more standardised activities will have difficulties to be implemented and sustained.

The use of the term ‘unpredictable demand’ can be considered outdated, as scholars such as McCarthy *et al.* (2008) and Chambers and Johnson (1986) have already discussed models to predict demand in accident and emergency services. However, in the context of this research, the term means that these emergency areas in the UHS do not use any tool or technique to predict this demand from non-urgent patients.

The ostensible barrier termed emotional stress between patients, staff members and physicians, is a contextual barrier that only emerged from the data and was not found in the literature. Section 4.4.4.4 addresses this issue that comes with unnecessary requests from patients; for instance, one of the most frequent requests and perhaps the one that creates the most problems is the sick note to justify absence to work. When the requests are denied, patients then become aggressive (verbal violence) and sometimes the physicians and staff feel threatened by patients. During lean implementation where new processes will be implemented and standardized, it might be difficult to gain patients’ support, which generates a constraint for the lean journey.

Patients’ behaviour within the process can cause different constraints, increasing demand, usage of the incorrect level of care, unnecessary requests to name but a few. All of these problems will constrain a system with limited resources. This is especially true in emergency areas that will affect the waiting time of patients, including those with ‘real’ needs. Moreover, this will affect the staff members and physicians, especially those working on front line services; for instance, one of the main ‘codes’ that emerged from interviews was about the stress (and aggression) created between patient and staff members.

To sum up, the underlying barrier patients’ behaviour in emergency areas brings significant implications for lean, especially with this ‘unpredictable’ behaviour, their lack of understanding about the services and the great demand of non-urgent patients; it might affect standardized processes and create difficulties to sustain lean changes. As the restraining force shows, the patients’ behaviour will move against the system, staff and physicians.

Narrowing this discussion to the construction of a proposition, the ostensible barriers related to patients’ behaviour together with the ostensible barrier public servant tenured career (physicians and staff) previously addressed in section 6.5.2, lead to a proposition related to contextual and cultural aspects that impact on lean implementation.

Proposition 2: The contextual and cultural aspects in which lean is implemented influence the creation of inhibitors.

To illustrate the propositions, non-urgent patients come to emergency areas only because they need to justify their absence from work, creating disruptions across the healthcare process; or public servants that have their tenured career and do not engage easily in new process of change because they do not see the need for it.

The section 6.5.3 tackles the underlying barrier related to resource management affecting staff during lean implementation.

6.5.3. Underlying Barrier 3: Constraints related to resource management affecting staff

The public healthcare system has emerged as a strong influence within the co-production process. It has generated three different underlying barriers, that will be discussed in the sections 6.5.4 and 6.5.5. In this section, the underlying barrier addressed is related to resource management affecting staff members. This stakeholder represented by staff members operates in the front-line of the co-production process, providing all necessary support to the patients during their journey. Therefore, every time the system creates a constraint, especially related to resources, it impacts directly on staff performance and how they undertake their activities (specifically towards the patients). The restraining force shows the system moving against the staff, and it happens in different ways, but mainly when ostensible barriers related to lack of, or poor management of resources emerge across lean implementation. These ostensible barriers will be addressed in the following section.

6.5.3.1. Implications for lean

This situation affects the lean journey and creates resistance that naturally affects the sustainability of the approach. Table 35 illustrates the restraining force, underlying and ostensible barriers related to this relationship between public healthcare system and staff.

Table 35 – Constraints related to resource management affecting staff

Underlying Barrier	Constraints related to resource management affecting staff
Restraining Force	System moving against the staff
Ostensible Barriers	Financial barrier to implement lean
	Nurses performing different activities that are not core
	Poor management of the resources

This underlying barrier related to resources management that affects staff raises three ostensible barriers: the financial barrier to implement lean, nurses performing different activities that are not core, and poor management of resources.

The financial barrier to implement lean or lack of resources has important implications during the lean journey. For instance, Radnor *et al.* (2006), when analysing why change occurred to a greater and lesser extent in the public sector organisations, found that lack of resources to implement changes is one of the inhibitors. Similarly, when implementing lean, scholars from different areas underscored the financial barrier as one of the inhibitors to implement lean (Bateman and Rich, 2003; Jadhav *et al.,* 2014b; Marodin and Saurin, 2015a; Roslin and Shahadat, 2014).

In the case study findings chapter, this ostensible barrier emerged in the UHS (section 4.4.4.5). The current situation in the UHS shows that it is difficult to spend money on basic things that they need in the UHS, according to staff members it would be even more difficult to find a budget to support the lean project. This brings a significant implication for lean, as budget constraints can inhibit attempts to improve the process when investments or expenditure are necessary.

In contrast to the ostensible barrier above that raises the situation about the financial constraints which is already well established in the literature, there are ostensible barriers related to resource management that only emerged from the data collected. For instance, nurses performing different activities that are not core and poor management of resources.

The ostensible barrier related to nurses performing different activities emerged from the sources in the UHS during analysis (sections 4.4.4.6 and 4.5.4.3) and can be considered contextual barrier, however it is also found in the literature, for instance, Morrow *et al.* (2012) reports the difficulties during implementation of productive ward, where staff were not performing core activities.. According to the interviewees in the UHS, this situation happens as nurses do not spend time performing their core activities, which is looking after the patients and providing care. Instead, they spend the majority of their time trying to find

physicians, providing a variety of random information, going after medication, materials or equipment that it is not available in their workplace.

This ostensible barrier has implications in the lean implementation and sustainability, as nurses are important stakeholders that support the patient's journey across the healthcare process. When they cannot perform their core activities adding value to the patient, it creates frustration; as a consequence there is no engagement in the new process, which in the lean context means it becomes difficult to keep a standardised process in healthcare.

The poor management of resources is a barrier that was found in all four sources of the data collection (Sections 4.4.4.7, 4.5.4.4, 4.6.4.3 and 4.7.5.3). In contrast to the financial barrier, resource is available, however it is poorly managed. In the UHS this barrier emerged as a problem, where people (staff members) do not manage the resources available and just use as much as they want, even when it is not necessary, creating waste of material. Another situation is related to the quality of the material available. As the public bid to acquire healthcare materials is based on low cost rather than quality, at the end of the procedure the staff members use several quantities of the same material to perform one procedure due the poor quality of this material (Section 4.4.4.7).

Lean practitioners and staff members from lean private hospitals address the lack of management and control which is highlighted by a staff member from a private hospital: '*I don't believe that there is lack of resources, but poor management of resources, they do not control anything, there is not control'* (STAFF_PRIV_3). This ostensible barrier raises important implications for lean. For instance, low quality of material creates waste across the process and might generate disruption in standardised lean processes.

Overall constraints related to resource management will affect staff during the lean journey, this can be in terms of lack of resources to perform a given activity, or difficulties to perform a quality procedure. Moreover, human and financial resources should be available to sustain the stability of the new lean process.

6.5.4. Underlying Barrier 4: The UHS model impacts on physicians' work

The next underlying barrier related to the public healthcare system addresses its impact on physicians' work. As previously explained, physicians deliver substantial value added to patients in the co-production process, thus influence from this stakeholder might directly reflect in disruptions of the service delivered across the patient's journey. The restraining force related to this underlying barrier is the system moving against the physicians, where the structure of the system will move against the physicians with bureaucratic processes, as well

as when they have to spend time with non-core activities that do not add value. Table 36 displays the restraining force, underlying and ostensible barriers related to this relationship between the public healthcare system and physicians.

The UHS model impacts on physicians' work raises important implications for lean implementation and sustainability in this setting, generating ostensible barriers, which will be discussed in the following section.

6.5.4.1. Implications for lean

During the lean journey, when ostensible barriers emerge from the influence of the structure of the public healthcare system, this starts to impact on physicians' work, or even creates situations where physicians have to spend time on activities that are not core or they have to deal with a bureaucratic process.

Table 36 – The UHS model impacts on physicians' work

Underlying Barrier	**The UHS model impacts on physicians' work**
Restraining Force	System moving against the physician
Ostensible Barriers	The structure of the system affects the physicians
	Physicians spend time performing activities that are not core

The UHS impacts on physicians' work, and as a consequence this generates ostensible barriers that will constrain lean implementation. These barriers are not fully discussed within the lean literature, therefore they will be discussed using data that emerged from the research findings.

In the literature review chapter (Section 2) some problems that affect physicians and have origins in the UHS were underscored by some scholars (Heimann *et al.,* 2006; Kligerman, 2000; Menucci, 2009). However, it was during the data analysis that problems related to the structure of the system and physicians spending time with activities that are not core emerged. In section 4.4.4.8 of the case study findings chapter, physicians discussed the UHS regulations and how this affects their work. For instance, there is a regulation that states that a physician cannot see more than four patients per hour, which means that even when there is capacity available they should only see this number of patients.

There is also the UHS bureaucracy that creates hurdles for physicians, as they have to follow a considerable number of 'administrative' procedures to perform basic activities, such as discharging a patient. It is important to mention that regulations and bureaucracy that

affect physicians' performance will have great implications in lean transformations, as changes in the process might face these kind of hurdles that are already part of the UHS.

Similar to the issue discussed in the previous section, where nurses perform non-core activities, this was also an issue raised amongst physicians. During the interview process this situation was highlighted by sources in the UHS as well as by staff members in the lean private hospital (Table 28). Physicians perform a key activity in the healthcare process: they can determine the time spent with patients, resources that will be used in a given treatment and how many procedures a patient will need until the discharging process. Thus, when these professionals have to spend time with activities that are not core, which means delivering care to the patient, they will be reducing the capacity of seeing more patients as discussed in the case study findings (Section 4.4.4.9).

This situation raises important implications for lean, for instance, lean focus on identification of value and non-value added activities (Womack *et al.,* 1990), and physicians are the ones that deliver substantial value added in healthcare. However, without a stable process physicians cannot deliver their activities, and as a consequence it will be difficult to sustain the standardised changes that lean will bring in.

To sum up the UHS influence on physicians' work, it is important to bring this to the lean context; the ostensible barriers above have great impact on physicians' productivity, performance as well as the capacity available for patients. This represents a decrease of focus on value added activities and an increase in waste. Consequently, this will bring disruptions across the process. Finally, this situation illustrates how the system can work against the physicians as a restraining force influencing the generation of ostensible barriers.

6.5.5. Underlying Barrier 5: The model that the UHS operates creates constraints

This remaining underlying barrier related to the public healthcare system tackles its influence on patients. The UHS is the service provider and the patients seek and receive the service. Therefore, lean improvements in the UHS will directly benefit patients, as it can ease the common problems that they face across their journey in the UHS.

There are several ostensible barriers that emerged from this underlying barrier, such as the management style of the UHS acting as a barrier, the lack or slow pace of changes in the UHS and the high political influence in this environment, among others. Table 37 summarises the restraining force, underlying and ostensible barriers. When the system influences the process improvements negatively creating constraints, it acts as a restraining

force against the patient, who is the one who will receive most of the benefits from a more stable healthcare process.

The underlying barrier the model that the UHS operates create constraints raises important implications for the public healthcare system, showing that the UHS is a relevant element during lean implementation that can affect patients generating ostensible barriers. These barriers, together with related literature and research findings, will be discussed in the section 6.5.5.1.

6.5.5.1. Implications for lean

In this case, ostensible barriers that constrain the lean journey have an effect on patients, as the system constraint attempts to improve the service, keeping the poor level of service and affecting the quality.

Table 37 – The model that the UHS operates creates constraints

Underlying Barrier	**The model that the UHS operates creates constraints**
Restraining Force	System moving against the patient
Ostensible Barriers	The UHS bureaucratic style as a barrier to lean
	Slow pace of changes in the UHS
	Performance management in the UHS
	Public system lack of interest/motivation in changing
	Lack of long-term strategy
	Public servant tenured career (physicians and staff)

This underlying barrier related to the UHS is the one that creates the greatest number of ostensible barriers, and it comes from both literature and data analysis. These barriers will be discussed raising the lean implications together with evidence from either literature or empirical findings.

The bureaucracy in the UHS was highlighted during the literature review. For instance, Wilson and Purushothaman (2006) advocate that government affects the growth and efficiency of the economy in the country. In the case study findings chapter (Section 4.4.4.10 and 4.6.4.5) the UHS bureaucratic style emerged as a barrier to lean, and it was acknowledged by UHS site 1- ECU and lean management consultants. This ostensible barrier brings the issues related to difficulties that the organisational structure creates when there are attempts to improve the process. For instance, it can be in terms of approval of the changes in the project that will take a long time. One of the lean management consultants explained that

this bureaucratic style is part of the UHS's roots: '*the problem is the fact that the structure of system has waste inside its roots, waste that exists because of the way the model was created, the model/style is very prone to generate waste'* (PRA_1).

The UHS bureaucratic style raises important implications for the lean journey. As a system that has a strong bureaucratic process: first, it might create difficulties to implement a new culture that will make the processes less bureaucratic; and second, it is about the lean implementation itself that it is a process of change which requests some timely efforts to provide transformations, therefore a bureaucratic process can delay this; finally, the sustainability of the lean project might be a challenge in a rigid environment like this. This paves the way for the next ostensible barrier that emerged which is slow pace of change in the UHS.

This ostensible barrier related to slow pace of change has been previously addressed within the lean literature (Brandao de Souza and Pidd, 2011; Marodin and Saurin, 2015a; Radnor *et al.,* 2006). It is not only the slow pace of change that appears as a hurdle for lean implementation; for instance, Marodin and Saurin (2015a) discuss the difficulties to keep the pace of the lean process improvement activities. When bringing this situation to the research context it was found in the case study findings (Sections 4.4.4.11, 4.5.4.5 and 4.6.4.6) that the pace of change in the UHS might influence future lean implementations, as people in charge are not committed to provide timely changes. Some lean management consultants (PRA_1 and PRA_2) agree that changes and specially a project such as, lean will take time in the UHS. Therefore, this raises a significant implications for the lean implementation and sustainability, as the organisational pace in the UHS might delay or reduce the speed of a lean project in this setting.

Another ostensible barrier that it is influenced by the model the UHS operates is related to performance management and it was found within the literature (Brandao de Souza and Pidd, 2011; Deloitte and Touche, 2002; Kundu and Manohar, 2012) as well as in the research findings. The case study findings will depict aspects of this barrier (Sections 4.6.4.7 and 4.7.5.5). Performance management is considered a more advanced barrier; it was found in the UHS, but with stronger emphasis from lean management consultants and staff members from lean private hospitals. For instance, the comments highlighted by these sources of interviews, and which makes performance management a barrier for lean in the UHS, were related to poor service, high cost, lack of management and control of the P&L.

In the UHS sources of interviews, the differences between management in the public and private healthcare systems were addressed (Section 4.4.4.12). According to interviewees,

in the public healthcare system there is no obligation to show results, which contrasts with the private system where they are oriented to results. This lack of performance management brings implications for the lean journey, as this type of situation might focus only on visible problems and does not tackle the causes the problem, especially because, as informed by interviewees in the UHS, there is no control and focus on key performance indicators.

Another ostensible barrier that emerged was related to the lack of interest in change within the public system. The process of change is one of the first steps related to the lean journey in the organisation (Mirzaei, 2011). For instance, Andersen *et al.* (2014) addresses enablers that will support change in lean hospitals; these enablers are linked with vision, management and organisation structure, which relates to the ability to manage the change. During the data analysis, the lack of interest in changing from the public system emerged as a constraint to lean (Sections 4.4.4.13, 4.5.4.6 and 4.6.4.8). However, this was not specifically found within the lean literature, which only relates generic situation relate to change, such as cultural change, resistance to change and change strategies (Čiarnienė and Vienažindienė, 2013; Crute *et al.*, 2003; Zhou, 2012), but does not mention the specific issue related to the lack of organisational interest in changing.

In the findings chapter, the public system lack of interest/motivation in changing emerged raising situations related to the lack of ownership in the system, or staff behaviour where people start to think that it is normal to have a disorganised process. However was the political influence in the system that emerged as a strong influence from this ostensible barrier, it was confirmed by both UHS and lean management consultants sources. For instance, a lean management consultant (PRA_2) argued that this lack of interest in providing change is related to the political environment from the government that manages the UHS; basically the politicians' lack interest in providing change because they are not concerned with the value to the citizens.

Overall, this situation will bring important implications for lean, as this lack of interest in change might become a hurdle to start a project that will bring a new approach based on long-term vision, performance management and organisation structure (Andersen *et al.,* 2014).

The lack of long-term strategy emerged as an ostensible barrier during the data collection in the UHS. This is a common barrier during lean implementation. Several scholars carried out research related to this topic, addressing the challenges of long-term orientation, difficulties to sustain improvements in the long-term, lack of mechanisms to ensure the long-

term sustainability of lean projects, and others (D'Andreamatteo *et al.,* 2015; Emiliani and Stec, 2005; Marodin and Saurin, 2015a; Rymaszewska, 2014; Scherrer-Rathje *et al.,* 2009).

During the case study findings, this ostensible barrier also emerged as a lean inhibitor that was discussed by lean management consultants and staff from lean private hospitals (Sections 4.6.4.13 and 4.7.5.10). The discussion that motivated this barrier was related to short-term planning by the politicians that manage the UHS. There is also mind-set that things can be changed in the short-term and results will be shown immediately, which works against a long-term culture such as lean.

This ostensible barrier brings implications for lean related to long-term vision, Baker and Rolfes (2015) and Jacobs (2014) advocate that lean is a long-term strategy, thus when bringing this to the context of this research, the UHS is managed by the government, which means that the long-term vision is challenged in a political environment that changes every four years. Therefore, the sustainability of a long-term project, such as lean, might be a challenge in the UHS.

This section discussed the implications for lean related to the ostensible barriers created by the underlying barrier that addresses the model that the UHS operates creating constraints. It shows how the organisational management style might influence lean in different ways, and as a consequence the UHS works as a restraining force affecting the patient, who is the user of the public healthcare system.

6.5.6. Underlying Barrier 6: Influence of the staff behaviour as a barrier to lean

During the lean journey, staff involvement is vital for the success of the project. This was an enabler explained by different management consultants in the case study findings chapter (Section 4.6), highlighting that people are key elements during lean implementation. Thus, when acting as an underlying barrier, staff behaviour can be a hurdle to lean, generating ostensible barriers that will constrain lean implementation and sustainability. This shows the staff moving against the system and patient as a restraining force that inhibits attempts to improve the process. Table 38 shows that ostensible barriers are related to resistance to change, fear that lean will cause job losses (already discussed in section 6.5.1.1 as it is a common barrier to physicians' influence within the process), lack of lean knowledge, communication disruptions and leadership issues (Bateman and Rich, 2003; Brandao de Souza and Pidd, 2011; Bollback, 2012; Malmbrandt and Ahlstrom, 2013).

This influence of staff behaviour raises important implications for lean implementation and sustainability, generating ostensible barriers, which will be discussed in the following section.

6.5.6.1. Implications for lean

The lean project needs the involvement of people to succeed (Bortolotti *et al.,* 2014; Radnor and Walley, 2008), therefore when staff members start to be resistant or behave in a manner that will not support improvements, they move against the system constraining lean implementation. If the staff members do not adhere to lean implementation they also affect the patients, as improvements will not reach the most important person in the consumption process. Table 38 depicts the underlying and ostensible barriers, and restraining force related to this relationship between staff, public healthcare system and patients.

Table 38 – Influence of staff behaviour as a barrier to lean

Underlying Barrier	**Influence of staff behaviour as a barrier to lean**
Restraining Force	Staff moving against the system and patients
Ostensible Barriers	Staff resistance to change
	Fear that lean will cause job losses
	Lack of lean knowledge and experience
	Communication disruptions amongst staff and between shifts
	The administration or leadership can be a barrier for a new project

Resistance to change is a common ostensible barrier that previously emerged amongst physicians, however it is also an issue that was raised amongst staff members in the UHS.

In the lean literature, resistance to change from staff members is a common subject (Albliwi *et al.,* 2014; Brandao de Souza and Pidd, 2011; Sim and Rogers, 2009). For instance, Radnor *et al.* (2006) and Jadhav *et al.* (2014a) address the issue related to resistance to change from staff and management during lean implementation and sustainability. This barrier is not only related to staff members from shop floor positions, but it is a common problem created by middle management and supervisors (Roslin and Shahadat, 2014).

In the case study findings, this ostensible barrier emerged from the four sources of data collection (Table 28). This shows the importance and strength of this barrier, as a unanimous finding in the entire data collection sources happened with the ostensible barrier related to poor management of resources (Section 6.5.3).

The interviewees in the UHS (Sections 4.4.4.14 and 4.5.4.7) showed that people have resistance to change against things that they do not know, thus this works as a means of protection. Also, public servants who are working in the same place for a long time, some of them for decades, tend to be resistant to new approaches that will change the way that things have been done.

The sources that come from lean management consultants and staff from lean private hospitals (Sections 4.7.5.6 and 4.6.4.9) also addressed this resistance to change from staff. They raised political nomination or sponsorship as one of the main problems that generate resistance to change in the UHS. According to these sources' point of view, people who have political nomination are not committed with the process in the long term because of the changes in the government leadership, therefore they will follow only personal interests to keep their jobs rather than organisational interests. Staff resistance to change emerged as a strong ostensible barrier and this raises an important implication for lean implementation, as the key enabler that provides transformation in the lean journey, and especially in the service areas, is people (Andersen *et al.,* 2014).

The previous barrier 'paved the way' for the discussion about people and organisations' lack of lean knowledge, which is a well discussed barrier within the lean literature (Bhasin, 2011; Deloitte and Touche, 2002; Wendel and Abdulhalim, 2014). The lack of lean knowledge was raised by Aij *et al.,* (2013); but, in the manufacturing setting Zimmermann and Bollbach (2015) identified the lack of lean knowledge as one of the barriers to transferring lean production to China.

In the case study findings, this was a barrier that emerged with great emphasis from lean consultants and staff from lean hospitals (Sections 4.6.4.10 and 4.7.5.7). This barrier of lack of knowledge was linked with the previous barrier, people do not understand lean and create resistance. The lack of understanding of the potential lean benefits (Bhasin, 2011) was also an issue raised by a staff member from a lean private hospital. This lack of lean knowledge and experience raises critical implications for lean. People and organisations have a limited view of lean and the benefits that this approach can bring to the organisation; as a consequence this creates a barrier that will inhibit the lean journey.

The communication amongst staff and from the organisational structure was also highlighted as one of the inhibitors of the lean journey that emerged from the case study findings and lean literature (Čiarnienė and Vienažindienė, 2013; Kundu and Manohar, 2012; Radnor *et al.,* 2006). The issues related to organisational communication during lean implementation were raised by Marodin and Saurin (2015a) and Scherrer-Rathje *et al.*

(2009). Specifically, in the healthcare area, this is addressed as an inhibitor that constrains the communication amongst the stakeholders in healthcare (Grove *et al.,* 2010; Marhani, 2013).

The case study findings also identified communication disruption as an ostensible barrier that might inhibit lean implementation in the UHS (Sections 4.4.4.17 and 4.5.4.8). The interviews informed lack of communication between the organisation (UHS) and employees; it was found that staff members do not know what is happening in the organisation and changes are not discussed or communicated beforehand. Amongst the staff members there is also communication disruption; it was reported that the transition from one shift to another is not standardized with 'rounds' which makes it difficult to understand what is happening in the emergency care unit. As already explained in the literature, this ostensible barrier raises implications for lean, as attempts to implement lean will face difficulties in terms of sharing the new project across the organisation and different levels.

The administration or leadership also emerged from both lean literature and research findings as a strong hurdle during lean implementation. Bateman and Rich (2003) carried out research about inhibitors and enablers for process improvement activities; they found a major category that emphasises the importance of senior business management support for improvements (which includes active involvement in the projects). The lack of personal participation in improvement activities sends the message that lean implementation is the job of lower-level workers, and that senior managers do not have to get involved (Emiliani and Stec, 2005).

Narrowing the literature to healthcare settings, Drotz and Poksinska (2014) advocate that one of the challenges is the role of healthcare leaders, who often have limited experience and limited interest in applying coaching and supporting the leadership style, which will become an inhibitor of the lean journey in this setting. In a study about implementing change in the NHS, Massey and Williams (2005), adapting research from Hoag *et al.,* (2002), found that poor leadership, weak management and culture are the key inhibitors to effective organisational change. They highlight some factors related to these inhibitors, such as lack of vision, failure to gain support for change, powerlessness, political behaviour, and others.

In the case study findings, the administration and leadership also emerged as a strong ostensible barrier, with special emphasis given by the lean management consultants and staff from lean private hospitals (Sections 4.6.4.11 and 4.7.5.8). Support from decisions makers was underlined as one of the strong points during lean implementation; it is important to show the entire organisation that there is alignment between leadership and the lean implementation. This is evident in the following quote from a lean management consultant:

'*the CEO has to think lean, this guy has to show to the entire institution that he will support it*' (PRA_4). As a barrier to the lean project, there is also the situation in the UHS where the leader is a person who lacks technical skills to perform the job, but is someone who has political connexions, and who is in a leadership position due to political nominations or sponsorship (a similar situation to that discussed previously in section 6.5.6).

This ostensible barrier related to leadership raises important implications for lean, as it has been highlighted both in the literature and in the research findings as one of the key inhibitors during lean implementation. Based on the discussion of this section, it is important to mention that the top-down support in the UHS during lean implementation is crucial for the success of the project.

To sum up, this kind of behaviour from staff members illustrated by the ostensible barriers discussed above will lead to a restraining force that moves against the system and patient inhibiting attempts to improve the process in healthcare. People in general (nurses, physicians, receptionists, assistants) are key elements of lean implementation, for instance, Andersen *et al.* (2014) carried out a study that identified 23 factors that enable a successful lean intervention in hospitals, and commitment, engagement and empowerment by staff participation was underscored as one of the key enablers. Thus, the information about staff behaviour as a barrier to lean together with the literature leads to an important proposition:

Proposition 3: Staff members* play an important role during lean implementation and sustainability, therefore if actions to prevent a negative influence are not taken, the lean journey will not be sustained.

*As previously explained in section 4.4.4.1 physicians are not considered to be staff members in this context. Moreover, a specific proposition related to physicians' role during lean implementation was raised in section 6.5.1.1.

6.5.7. Summary of the implications for lean

Section 6.5 discussed the underlying barriers together with restraining forces and ostensible barriers that raise significant implications for lean as summarised in this section. The discussion was based on the literature available as well as findings from the research case study.

The underlying barrier 'Physicians' influence within the process', showed how the physicians' behaviour in the UHS can create ostensible barriers that inhibit the improvement

of the processes, creating different ostensible barriers that will affect the patients, system and staff. Physicians have strong influence in the co-production process, as they are the ones who deliver substantial value added to patients. Therefore, physicians can act as a restraining force affecting patients, staff and system, every time that they avoid process improvement across the patient's journey. It is important to consider physicians' participation during the lean journey and use them as enablers, otherwise physicians can influence the creation of ostensible barriers that will inhibit lean implementation and sustainability.

The underlying barrier 'Patients' behaviour in emergency areas' explained how patients as users of the system could create constraints in the process that will act as hurdles for the lean journey in the UHS. This stakeholder actively participates and affects the service delivered in healthcare and it is partially motivated by dysfunctional healthcare system; his behaviour across the system acts as a restraining force against the system, staff and physicians, mainly increasing unstable demand and creating emotional stress against physicians and staff members. When bringing it to the lean context, the patients might create hurdles for the implementation, creating difficulties to focus on value added activities, standardizing the process and sustaining the changes.

The underlying barrier 'Constraints related to resource management affecting staff' addressed issues related to resources in the UHS, addressing the impact of either the lack of resources or poor management of the resources available. When staff members, especially the ones in the front-line of the co-production process, do not have access to the right resources, it starts to impact on their performance, consequently affecting the patients. Therefore the system that is the provider of the healthcare services acts as a restraining force against the staff. The implications for lean emerged in the form of ostensible barriers; they were discussed based on the literature available which underscores the importance of the resources available for the lean implementation. Together these ostensible barriers will inhibit attempts to invest in improvements in the process.

The underlying barrier 'The UHS model impacts on physicians' work' is another barrier influenced by the UHS. It shows how the system acting as a restraining force brings legislations and bureaucratic process to the physicians' daily activities, making them spend time with bureaucratic activities (non-core) rather than seeing the patients. The implications for lean will be related to less focus on value added activities and generation of waste across the healthcare process.

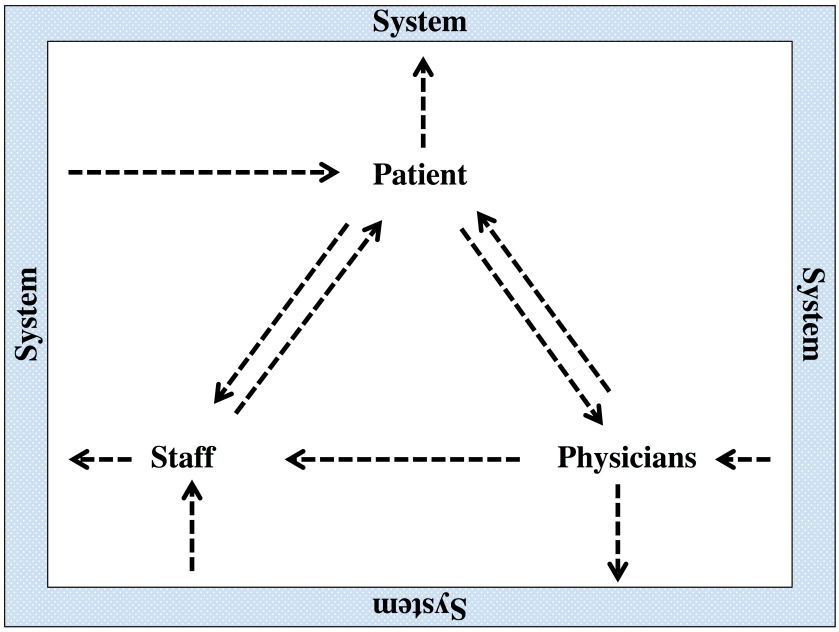
The underlying barrier 'The model that the UHS operates constraints' addresses the influence of the UHS on patients. When attempts to implement lean fail because of the UHS

issues, the patient will not perceive the improvements, thus the system will act as a restraining force against the patient, who will have to cope with the current poor quality of the service. Some hurdles to implement lean in the UHS that emerged from this underlying barrier are related to the bureaucratic style of the UHS, lack of interest in changing as well as lack of long-term strategy. To sum up, these situations raise important implications for lean, especially because lean is a long-term strategy (Bhasin and Burcher, 2006; Liker, 2004) and requires a level of interest in change. When this cannot be found in the setting, then a barrier arises.

The underlying barrier 'Influence of staff behaviour as a barrier to lean' raised invaluable information about people's influence within the healthcare process. The literature and data from the research findings tackled this ostensible barrier, showing inhibitors related to staff behaviour such as resistance to change, communication disruptions, lack of lean knowledge, and others. This illustrates that staff can act against the system and patient as a restraining force that inhibits attempts to improve the process. Therefore, this raises relevant implications for lean implementation, as people are the key enablers for lean project sustainability; it is important to overcome the negative impact of staff behaviour during the lean journey.

To summarise, this section (6.5), based on literature and research findings, addressed the relationship between the six underlying barriers, restraining forces and ostensible barriers during the lean journey. It showed that underlying barriers generate ostensible barriers, and this process is influenced by stakeholders and the public healthcare system which act as restraining forces affecting the service delivered and valued added (Womack and Jones, 2003). As one of the main lean principles is the specification of the value added to customers, this situation which affects the valued added will consequently constrain lean implementation and sustainability.

Figure 31 – Interplay between restraining forces, stakeholders and system



Finally, it is important to highlight the influence of the system in this consumption process. Figure 31 illustrates the interplay between restraining forces (dotted arrows), stakeholders and system in the healthcare setting, how they influence each other, as follows: physicians moving against the patient, system and staff; system moving against the staff; system moving against the physician; system moving against the patient; staff moving against system and patients. It is possible to state that the system has strong influence in this context, as all these stakeholders are within the system. This influence is due to the system being the provider of the services, or in other words, the one that manages the resources available. Therefore, attempts to implement lean in this setting will firstly face difficulties from the system.

The stakeholders and public healthcare system are interdependent elements of the co-production process. Thus, it is possible to state that in different stages of the consumption process these elements have different impacts; however, they are dependent on each other to deliver the service. Therefore, when acting as constraining forces they will act influencing the creation of ostensible barriers. This leads to an important proposition related to the underlying barriers:

Proposition 4: In order to increase the chances of success in lean implementation in healthcare settings, lean practitioners and managers should initially consider the underlying barriers, which might avoid or ease the development of the ostensible barriers that constrain the lean journey.

The next section will address and discuss the research questions and their answers.

6.6. Addressing the research aim and questions

This study was motivated based on research aims and questions (Sections 2.8.1 and 3.6), this led the researcher to embark on a journey of data collection within the emergency level of the Brazilian healthcare system, as well as data analysis aiming to bring answers for the research questions raised in the beginning of this study. Thus, this section aims to raise and discuss the answers for the following research questions:

- Main research questions: '*How to understand the barriers to implement lean in the emergency level of Brazilian public healthcare system (UHS*)'?

In order to provide answers for this main research question, two sub-questions were developed:

a) What are the main barriers to implement lean in the emergency level of the UHS?

b) How can the Brazilian public administration model impact the lean implementation in the emergency level of the UHS?

Each of the sub-research questions will be discussed together with their answers, which are based on triangulation of the data analysed from 43 interviews with staff members, physicians and patients at the emergency level of the UHS, lean management consultants and staff members in lean private hospitals. Moreover, observations of the patients' pathway were also carried out to access the patient experience within the ECU and ED when seeking healthcare assistance.

6.6.1. Sub-question A: 'What are the main barriers to implement lean in the emergency level of the UHS?'

Research sub-question A aims to understand the barriers that a possible implementation of lean in the UHS would face. The data analysis and case study findings have shown that there are distinct types of barriers, ostensible (found within the literature, UHS context and practitioners' knowledge) and underlying (emerged from this research). These barriers found in the emergency level of the UHS that might inhibit the lean implementation and approach will be summarized in this section:

Ostensible Lean Barriers in the UHS

Most of the ostensible barriers are related to barriers that are common within the lean literature. They are commonly related to a set of hurdles, such as financial constraints to implement lean, or people's behaviour that resist lean implementation (Albliwi *et al.,* 2014; Bateman and Rich, 2003; Malmbrandt and Ahlstrom, 2013; Marodin and Saurin, 2015a; Radnor *et al.,* 2006), and others, therefore the whole set of barriers are displayed below (Table 39):

Table 39 – Categories of lean ostensible barriers – Presented in the other that emerged

Lean Ostensible Barriers	A Literature	B UHS Context	C Practitioners' Knowledge
Physicians' lack of commitment	X	X	X
Lack of lean knowledge and experience	X	X	X
Poor management of resources	X	X	X
Fear that lean will cause job losses	X	X	X
Non-urgent patients create unpredictable demand in emergency areas	X	X	X
The administration or leadership can be a barrier for a new project	X	X	X
Staff resistance to change	X	X	X
Financial barrier to implement lean (lack of resources)	X	X	
Communication disruptions amongst staff and between shifts	X	X	
Physicians' resistance to change	X		X
Lack of long-term strategy	X		X
The structure of the system affects the physicians		X	X
Physicians spend time performing activities that are not core		X	X
The UHS bureaucratic style as a barrier to lean		X	X
Slow pace of changes in the UHS		X	X
Performance management in the UHS		X	X
Public system lack of interest/motivation in changing		X	X
Nurses performing different activities that are not core		X	
Emotional stress between patients, staff members and physicians		X	
Public servant tenured career (physicians and staff)		X	

Amongst these 20 ostensible barriers it is possible to separate these into three categories. It does not mean a strict categorization where one barrier cannot be part of another category, but the idea is to provide a summary that there are different categories with concentration of barriers in areas, such as literature, UHS context and practitioners' knowledge, where a category will have a stronger focus on one area than another (Table 39).

The first category (Column A) is related to ordinary barriers that are well known within the literature and frequently found in lean projects, such as lack of resources, leadership involvement and communications disruptions, among others (Bhasin 2011; Brandao de Souza and Pidd, 2011; Radnor *et al.,* 2006); these barriers will be also found in Table 31 which shows the lean barriers within the literature.

The second category of barriers (Column B) are related to the context of the UHS. These are specific barriers that emerged based on situations found in the Brazilian public healthcare system, such as the UHS bureaucratic style as a barrier to lean, slow pace of change in the UHS and public servant tenured career.

The third category of barriers (Column C) is based on advanced lean knowledge that comes from lean management consultants and staff from a lean private hospital. This category is named practitioners' knowledge and presents barriers such as lack of long-term strategy, lack of lean knowledge and experience and performance management in the UHS.

Finally, this list of ostensible barriers found in the UHS shows that it is possible to observe a level of interplay between ostensible barriers. For instance, non-urgent patients creating unpredictable demand will also affect the ostensible barrier emotional stress between staff members and physicians. This interplay happens because non-urgent patients increase the volume of people waiting to see a physician; as a consequence the place become overcrowded, therefore increasing the emotional stress between patients, staff members and physicians (Sections 4.4.4.4 and 5.3.2 give examples of this situations).

Underlying Lean Barriers in the UHS

It is relevant to understand the ostensible barriers, however it is also important to recognise the causes of these barriers, because as stated in the fourth proposition (Section 6.5.7), tackling these causes might ease the constraints during the lean journey. During the data analysis chapter (Section 5.3) these causes were identified as underlying barriers. The process of identification of these underlying barriers were based on clusters of similar codes around one main theme, which raised six underlying lean barriers.

Underlying barriers when compared to ostensible barriers bring some differences, such as: underlying barriers do not come from the literature, but they emerged from field investigation; there are fewer underlying barriers, however they are strong inhibitors in lean implementation as they influence the creation of other barriers; underlying barriers are linked with people's and organisation behaviour.

During lean implementation and sustainability, underlying barriers might emerge as strong inhibitors being influenced by stakeholders and UHS that act as restraining forces for process improvement. The result of this interaction is the root cause of the ostensible barriers, and this is a perspective that does not exist within the literature of lean barriers, which brings a new perspective for theory and practice. A summary of the barriers in the UHS will be provided, as follows:

I. Physicians' influence within the process: physicians perform a unique and relevant role in the service delivery process in healthcare. They are the ones who have direct contact with patients and also the ones who are expected to deliver the value added. However, as part of the stakeholders, the physicians also negatively influence the process, affecting patients, staff and system. As a consequence, this might create constraints for improvements. This influence might emerge in terms of lack of commitment, resistance to change, tenured career impact and fear of job losses created by a project, such as lean.

II. Patients' behaviour in emergency areas: patients are the most important element in the service delivery process in healthcare. They are the ones who receive the care or the valued added in the process. What is new about this stakeholder participation in the process is the ability to negatively influence lean implementation as a restraining force that works against the system, staff and physicians. These restraining forces might be observed in the lean journey as non-urgent patients creating unpredictable demand, or emotional stress between patients, staff members and physicians.

III. Constraints related to resources management affecting staff: in the context of this study the resources that affect staff are related to financial resources, human resources, materials and equipment availability. Thus, this underlying barrier produces two types of constraints related to resources, first the lack of resources and second, the poor management of resources. The UHS is the restraining force that works affecting staff members and creates lean ostensible barriers, such as constraints of financial resources, staff members not performing their core activity or poor management of the resources available. Consequently, these constraints related to resources will affect the lean journey and sustainability as resources will be needed to start and maintain such projects.

IV. The UHS model impacts on physicians' work: this underlying barrier is an interaction between the UHS that provides the healthcare services to the patients and the physicians who perform the service that will benefit those patients. The UHS works as a restraining force against the physician, generating lean ostensible barriers that will emerge in terms of lack of structure to perform the activities, or physicians will have to perform activities that are not related to their core activity. As a consequence, this creates disruptions in the physician's routine, leading to a demotivated professional. Therefore, in this scenario, lean might face difficulties to be implemented, especially because as explained before, physicians are the ones who deliver the service value added to patients.

V. The model that the UHS operates creates constraints: the UHS once again emerges as a strong underlying barrier constraining lean implementation. The UHS as the provider of the healthcare services can influence the attempt to improve the process when lean ostensible barriers emerge in terms of the UHS bureaucratic style, pace of the changes, lack of long-term strategy, and others. This will be acting inhibiting improvements across the patients' pathway, and, as a consequence the patients are the ones affected, as the quality of the service cannot be improved, therefore the system acts as a restraining force against the patients.

VI. Influence of staff behaviour on lean: during the data analysis, this underlying barrier emerged as a strong theme with the majority of the frequency from codes and sub-themes. The staff members were identified as part of the stakeholders that might act as a restraining force that works against the system and patients, influencing the creation of ostensible barriers. Those barriers emerged in terms of resistance to change, lack of lean knowledge, communication disruption, and others. The influence of staff behaviour has a great impact on lean implementation as the ostensible barriers created by this underlying barrier will inhibit lean implementation and sustainability in the UHS.

This section answered the first research sub-question, which is: *'What are the main barriers to implement lean in the emergency level of the UHS?'* To summarise the answer, it is possible to state that the emergency level of the UHS will face two types of barriers to implement and sustain lean initiatives. First, a set of 20 common barriers that comes from the lean literature, practitioners' knowledge and the UHS context; which in this research are named 'ostensible barriers'. Second, a group of six barriers that emerged from data analysis,

are considered the root cause of the underlying barriers; these barriers are influenced by stakeholders and UHS behaviour, and are called 'underlying barriers'.

6.6.2. Sub-question B: 'How can the Brazilian public administration model impact the lean implementation in the emergency level of the UHS'?

Brazilian public administration is responsible for funding and managing the UHS and is considered the provider of public healthcare in Brazil. Thus, it is important to acknowledge the influence of this provider in lean implementation.

This research has focused on understanding the barriers that lean philosophy could face in future implementation in the emergency level of the UHS. The data analysis has shown that the UHS is one of the strongest barriers for the implementation in this setting. It has emerged as three underlying barriers related to the UHS influence: 'The model that the UHS operates creates constraints'; 'The UHS model impacts on physicians' work'; 'Constraints related to resource management affecting staff'.

Analysing the field force model in healthcare (Figure 28) it is possible to understand the impact of Brazilian public administration on lean implementation. It shows that three out of six underlying barriers have their roots in the UHS, which acts as a restraining force against the stakeholders represented by patients, physicians and staff members.

There are also some important points to be discussed about the leadership involvement and lack of long-term strategy view in Brazilian public administration. The topic related to leadership involvement and its relevance in the lean journey is also discussed within the lean literature. It can be in terms of senior and mid-level managers' support, top management support and commitment and resistance from managers, among others (Bateman and Rich 2003; Lean Enterprise Institute, 2007); Massey and Williams, 2005; Radnor *et al.,* 2006). This was also found during the data collection and was raised by participants who understand leadership involvement as a challenge for lean in the UHS. This might be justified because several topics are motivated based on political interests in this setting. For instance, most of the time, the leader is not a person who has experience in healthcare, but instead someone who has political associations with the current government.

In section 6.5.7, the influence of the public system was addressed using Figure 32 to illustrate the interplay between restraining forces, stakeholders and system in the healthcare setting. As previously explained, the stakeholders are within the system and the system is the provider of the healthcare, which means that it manages the resources available. Therefore,

attempts to implement lean in this setting will face a strong influence of the system, which leads again to the importance of the system for lean.

The lack of long-term strategy in the UHS is also an issue raised that might constrain lean implementation. It is an issue that the lean literature depicts in terms of lack of understanding lean as a direction, clarity of vision, scope and lack of strategic perspective, lack of awareness of strategic direction, and others (Bhasin 2013; Hines *et al.,* 2004; Karlsson and Åhlström, 1996; Radnor and Walley (2008). This also emerged during the interviews as a strong subject amongst lean management consultants and lean teams from private hospitals. One of the reasons for the concern about this barrier might be related to the fact that every four years there is change in the government, and as a consequence, the entire leadership team changes. This situation creates difficulties maintaining sustainability of the project as lean is a long-term philosophy (Bhasin and Burcher, 2006; Hines *et al.,* 2004; Lean Enterprise Institute, 2007; Liker, 2004).

To summarise, the answer to this research question: 'How can the Brazilian public administration model impact the lean implementation in the emergency level of the UHS'? The public administration model is acknowledged as a strong inhibitor of the lean journey in the UHS; this is due the strong influence of the three main underlying barriers related to the UHS. These barriers are also related to the influence of the restraining forces that work against the stakeholders represented by patients, staff members and physicians. Moreover, specific subjects (leadership and lack of long-term strategy) related to lean sustainability have emerged, which also influence the lean journey in the emergency level of the UHS.

6.7. Chapter Summary

The first section of this chapter discussed the interplay between underlying barriers, restraining forces and ostensible barriers, using the lean literature available and the data from research findings. An additional study from Lewin (1951) was used to explain that stakeholders and the UHS act as restraining forces that repulse the service delivered/valued added, therefore inhibiting improvements across the process. Force field analysis in healthcare shows the underlying barriers to implement lean in the UHS and their influence in the creation of ostensible barriers (Figure 28). Furthermore, the underlying barriers and the implications for lean were discussed showing the impact of the barriers in lean implementation.

The last section of this chapter focused on answering the research sub-questions. The first research sub-question addressed the lean ostensible and underlying barriers in the UHS.

The second research sub-question addressed the impact of the Brazilian public administration model in lean implementation, and showed that the UHS as the provider of healthcare services has emerged as a relevant inhibitor of lean implementation in the emergency level of the UHS. All these outcomes together fulfill the aim of this research, which is '*to understand the barriers to implement lean in the emergency level of the Brazilian public healthcare system (UHS)*'.

This chapter also addressed four propositions that emerged from the discussion of the literature and data analysis. The next chapter provides a summary of the entire thesis, discussing the research contributions, providing the research limitations and suggesting future research.

7. Chapter 7 – Conclusions

7.1. Introduction

This chapter presents the conclusion of the thesis. It provides an in-depth discussion of the research contribution, which includes the discussion about its implications for knowledge and practice; a brief discussion of the research aim and questions; an explanation of the research contribution and propositions; a summary of the research limitations, suggestions for future research and the research summary.

7.2. Research Contribution

The aim of this academic research is to bring original contribution; the outcomes can be separated as contribution to knowledge and contribution to practice. Contribution to knowledge will bring a new body of literature to this area of lean barriers; but, contribution to practice might bring outcomes that can help lean practitioners to understand what is happening in this area and this can be used to support managers in future lean applications in the healthcare setting. Before moving to the outcomes that present the contribution, it is important to understand the motivations of this research and where it is positioned in the current literature.

An analysis within the literature of the barriers to implement lean across different areas has shown lists of common barriers identified for different scholars. Examples of these barriers are lack of lean experience and training, low availability of resources, poor communication, lack of leadership, team involvement and resistance to change, among others (Bateman and Rich, 2003; Bhasin, 2012c; Radnor *et al.,* 2006; Hilton and Sohal 2012; Marodin and Saurin, 2015).

These barriers have been researched over a considerable period of time generating similar results in terms of impact in lean implementation and sustainability. However, during an investigation within the Brazilian public healthcare system, these barriers were identified as ‘ostensible’, as deeper causes not fully discussed within the literature have emerged from this study. This became an opportunity to carry out original research in an uncharted setting about the real causes and how stakeholders and the UHS might influence the creation of these barriers. Thus, this research contribution goes beyond ostensible barriers that constrain lean implementation, bringing a new understating about what is causing these barriers.

The next section addresses the contribution to knowledge and practice.

7.2.1. Contribution to the knowledge

The new body of knowledge that this thesis brings can be separated into three main theoretical contributions: underlying barriers, contextual contribution, and field of forces in healthcare. Therefore, the following sub-section will explain and provide evidence about the new body of knowledge that this research delivers:

a) Underlying barriers: the main contribution of this research lies in a new understanding about the relationship between the six underlying barriers, restraining forces and ostensible barriers during the lean journey (in the UHS). Qualitative evidence shows that underlying barriers generate ostensible barriers, and this process is influenced by the behaviour of stakeholders and the Brazilian public healthcare system that act as restraining forces affecting the service delivered and value added in the emergency level of the UHS. To sum up, underlying barriers emerged from data analysis, they raise a new understanding about the real causes that generate other common barriers found in the literature and in the context in which lean is implemented.

b) Contextual contribution: lean is unique and it is imprudent to replicate another organisations model, thus, to be adopted successfully, lean must be adapted to its context. It is vital to understand that lean is context dependent (Bateman *et al.,* 2014; Bhasin, 2012; Radnor and Osborne, 2012). Introducing this discussion about the context in which lean is implemented, the research establishes a triangulation between literature, research findings and contribution related to the context. Sometimes the context of the research also matters in terms of contribution; for instance, this research was carried out in an uncharted field for lean. Regardless of all structural and operational problems identified across the UHS, it has not received attention in terms of the lean approach and research, as confirmed by Brandao de Souza (2009) during an in-depth literature review carried out about lean healthcare.

Thus, the outcomes of this thesis also bring a contextual contribution about lean applications in the Brazilian public healthcare system; these outcomes have shown several barriers that are considered contextual as it relates to the UHS only. Moreover, as presented in the literature review, lean research has been particularly concentrated in developed countries (Australia, United States and United Kingdom (Ben-Tovim *et al.,* 2008; Brandao de Souza, 2009; Womack *et al.,* 2005)) where social, economic and cultural elements are more stable. Therefore a contextual

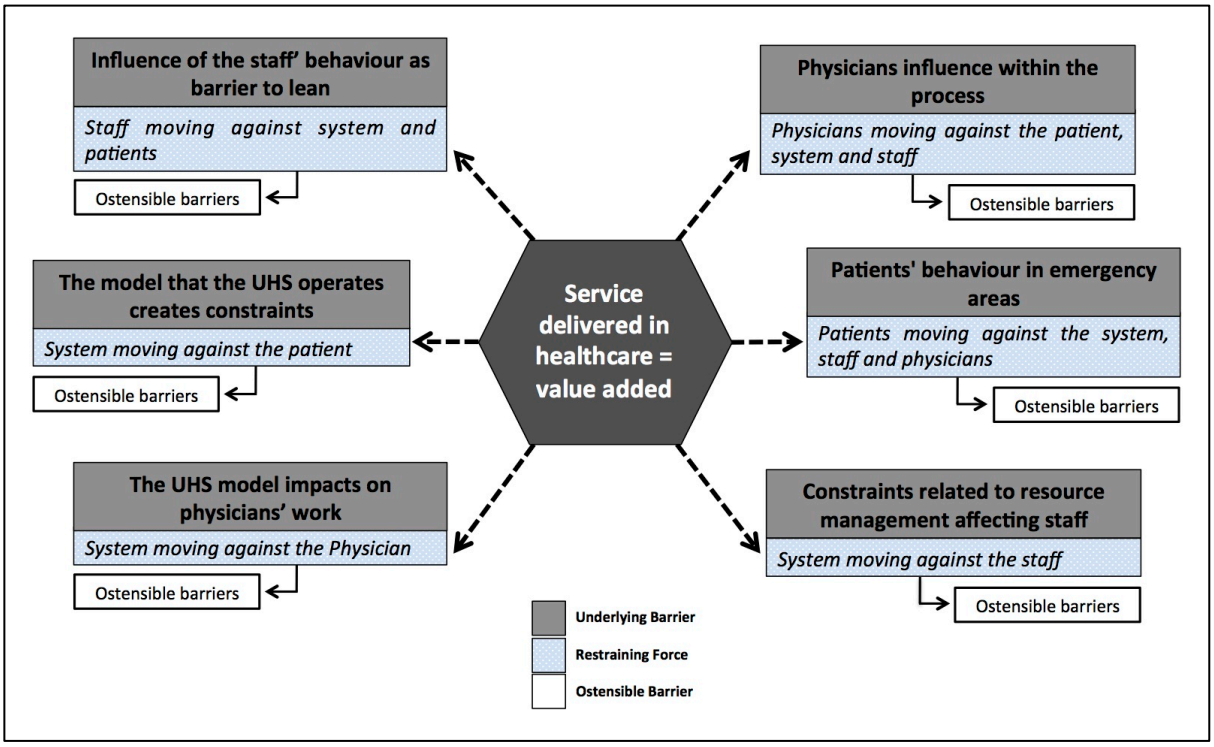
contribution in a diverse setting brings a different perspective about what is happening in this country and sheds understanding on contextual influences in the lean jouney.

Finally, as explained in the research justification section within the methodological chapter (Section 3.7), this study represents a new understanding and contribution to the knowledge for future research in terms of transferring lean philosophy into the public healthcare system in a developing country. Moreover, the results of this research might be adapted for other developed countries, such as BRICS in future research.

c) Field of forces in healthcare: A field of forces in healthcare (Figure 32) was developed using Lewin's force field analysis (Lewin, 1951) as background to understand the interplay between underlying barriers, restraining forces from stakeholders and the UHS, and the creation of the ostensible barriers. Thus, this research contributes by bringing a theoretical framework that might be used to find underlying barriers in other contexts or in other areas of the hospitals.

This framework can be adapted using different variables according to the setting under investigation. In this research, the variables that emerged and were used are stakeholders represented by physicians, staff members and patients, and the UHS. Moreover, in a different context, an additional analysis of the underlying and ostensible barriers will be necessary to complete the cycle of the theoretical framework.

Figure 32 – Field of Forces in Healthcare



To sum up, this field of forces in healthcare might shed understanding on underlying barriers, restraining forces and ostensible barriers that emerge during the lean journey in a different setting. This starts to bring the practitioners close to the practical contributions of this research which will be discussed in the next section. Appendix VII shows a comprehensive version of the field of forces in healthcare including all the ostensible barriers.

7.2.2. Contribution to practice and police makers

The contribution to practice and police makers is an attempt to bring information and advice that can be used by managers, healthcare management consultants and police makers in the public management setting. This research has identified two contributions to the practice: the first is related to the impact of the public administration model in lean implementation; the second is related to the impact of the underlying barriers.

a) Impact of the Brazilian public administration model in the lean journey: this contribution to practice is related to the third research question, which is '*How can the Brazilian public administration model impact the lean implementation in the emergency level of the UHS?*'. The research has shown that Brazilian public administration as the provider of the healthcare system has a great influence on the process. During the data analysis, three main themes related to the UHS that might constrain lean implementation emerged, therefore attempts to implement lean should

consider the previous analysis of the public administration influence in the physicians' work, resource management affecting staff and the model that the UHS operates creates constraints. These elements might affect the lean journey, therefore initiatives that aimed to previously address these issues might reduce the chances of failure and increase the chances of success.

Problems raised in the UHS come from either structural or Operational problems. Structural problems are related to decisions in the management of the UHS, such as privatizations and lack of resources, among others. These structural problems cannot be addressed by lean as it depends on political decisions. However, the operational problems related to waiting times, layout and flow constraints and staff and physicians' lack of focus on core activities, which can be addressed by lean, provide positive results (Eller, 2009; Mazzocato *et al.,* 2012; Naik *et al.*, 2011; Ryan *et al.,* 2013).

Nevertheless, to address the operational problems using the lean approach, it is important to overcome the barriers that were identified in this study as inhibitors of the lean journey in the emergency level of the UHS. Thus, the police makers need to be aware of these challenges to improve the healthcare and provide new direction to polices that will support future process improvement initiatives in this context.

b) Impact of underlying barriers: this contribution might help healthcare practitioners and lean management consultants to avoid the creation of inhibitors during the lean journey in the healthcare setting. The underlying barriers have been underscored as main causes of common barriers that emerge during lean implementation, thus addressing each of the underlying barriers in healthcare might support the lean implementation and sustainability reducing the impact of restraining forces that come from stakeholders and the UHS.

7.2.3. Expanding the research contribution to other areas

Similar to what was found in the UHS, it is not unusual to find processes with problems in different areas; what is more common is the lack of investigation about the root causes of these problems, as people normally tend to tackle the visible symptoms (ostensible causes) rather than the origins that are more difficult to see. When the process of problem investigation starts to look beyond the ostensible causes, it is the underlying roots that become relevant to understand. At the same time, there are forces that restrain the process and stimulate the creation of ostensible barriers and also need to be investigated.

This process involves the application of the force field analysis framework (Figure 28 and 32) that brings together underlying barriers, restraining forces and ostensible barriers, which is a new theoretical approach developed in this research that might contribute to other areas within and outside the healthcare context.

This study was carried out within the emergency level of the Brazilian public healthcare system. However, the healthcare system (public and private) is an enormous organisation with different areas, which sometimes are considered small organisations within the organisation, for instance, pharmacy, logistics and materials, billing, hospitality, and others. Thus, further research investigating other areas within or outside healthcare could benefit from this new body of literature. It can also be used to investigate relations between professional bodies and how they protect each other. Another opportunity is to understand the causes of disruption across the patient journey in different levels of the healthcare (preventive and specialized), investigating the restraining forces and underlying barriers that influence such issues.

Lean is also about working closely with partners or suppliers; in this case the approach that this research brings could be used to investigate the causes of disruptions between suppliers and healthcare systems.

Overall, the practical contribution will bring a method to analyse barriers that are not visible but influence the creation of other inhibitors. Similar to the 'lean iceberg model' (Hines *et al.,* 2004), this model investigates not only what is on the surface and visible, but also what is underwater and not visible, however it has a great impact on the lean journey. In contrast to Hines's research which does not tackle the roots of the lean inhibitors, this research uses a three that illustrates the underlying barriers as roots of the ostensible barriers (Figure 27).

To sum up, as long as there is a process, then there are several opportunities to apply this new literature, especially when considering co-production processes in services, with particular focus on those that have strong influence on customer behaviour and organisational management style, which is not limited to healthcare settings but also other areas within the services context.

7.2.4. Contribution summary

The contribution of this research lies in providing a new body of knowledge about the understanding of the ostensible barriers that are under the influence of restraining forces from

stakeholders and the UHS. They have their routes in underlying barriers and constrain the lean journey in the emergency level of healthcare in the UHS.

Thus, one of the questions that can be raised about this new contribution is why this is happening in healthcare and why it was never discussed in traditional lean settings such as manufacturing. To understand this discussion, it is important to compare the settings where this is happening, in manufacturing differently than services there is more focus on the value stream map, and absence of the co-production process (Normann, 1991) which brings no influence of stakeholders on the process. Furthermore, manufacturing companies are not part of a large public health system that is highly politicized. Finally, the majority of implementations carried out in healthcare have been done in a piecemeal way and not in an overarching model (Brandao de Souza, 2009; Radnor; 2010; Radnor *et al.,* 2012), thus this creates a different scenario for lean implementation.

To summarise, it is possible to establish a slight comparison between the lean iceberg model (Hines *et al.,* 2004) and underlying barriers found in this research, as both address issues that are not visible to the organisation during the lean journey (Figure 27).

The next section provides a summary of the research question and the answers.

7.3. Main Research Aim and Questions

The aim of this research is to understand the barriers to implement lean in the emergency level of the UHS. In order to support the understanding of this aim, a literature review was carried out. From this literature, results such as problems in the UHS and barriers to implement lean emerged, and the main research question and sub-questions were identified, as explained below:

- Main research question: How to understand the barriers to implement lean in the emergency level of the Brazilian public healthcare system (UHS)?

The answer to this main research question is not based on a single answer, but an overarching explanation that is based on answers from the two research sub-questions. The sub-questions, which underpin the main question, are:

a) What are the main barriers to implement lean in the emergency level of the UHS?

b) How can the Brazilian public administration model impact the lean implementation in the emergency level of the UHS?

A summary of the answers found for these research sub-questions and the methodological approach that supports the research outcomes will be provided below.

In order to reach the outcomes that support these research sub-questions' answers, a single case study in the emergency level of Brazilian healthcare was carried out. To access the data, interviews and observations were undertaken with four distinct sources. Two internal sources related to the UHS (staff members, physicians and patients from ECU and ED), and two external sources related to lean knowledge (lean management consultants and staff members, part of the lean team in a private hospital). The triangulation of these data, supported by thematic analysis, brought together the outcomes that support the answers for these research sub-questions.

The barriers to implement lean in the emergency level of the UHS were identified as ostensible and underlying barriers. The ostensible barriers are based on a list of 20 common barriers that come from the literature, the UHS context and practitioners' knowledge. A total of six underlying barriers emerged from the data analysis and they were identified as the real causes of the ostensible barriers. The underlying barriers are: (1) Physicians' influence within the process; (2) Patients' behaviour in emergency areas; (3) Constraints related to resource management affecting staff; (4) The UHS model impacts on physicians' work; (5) The model that the UHS operates create constraints; (6) Influence of staff behaviour as a barrier to lean.

Identified as the root causes of the ostensible barriers, the underlying barriers have a strong influence on the organisational management style of the UHS, and individual behaviour of the stakeholders (patients, staff members and physicians) involved in the service delivery process in emergency areas.

Finally, Brazilian public administration is the provider of the healthcare service; it is responsible for funding and managing the system. This public administration model has emerged as a great inhibitor of the lean journey in the emergency level of the UHS. Three out of six underlying barriers are linked to the UHS influence, therefore it is important to acknowledge that the Brazilian administration will play an important role in case of lean initiatives.

These research questions and answers motivated a relevant and original research within the emergency level of the Brazilian public healthcare system, drawing together the research contribution that will be summarized in the next section.

7.4. Propositions

This thesis presents a group of propositions based on outcomes that emerged during the development of this study. These propositions might support the development of further research in this field.

The literature together with research findings raised some important discussions about different subjects related to the constraints to implement lean in healthcare, which consequently supported the contribution of this research. For instance, the relationship between underlying barriers, restraining forces and ostensible barriers emerged as one of the main contributions of this study. The stakeholders' behaviour and the UHS management style is one of the fundamental points that show how such elements can influence the lean journey. Furthermore, problems in the UHS emerged from the literature and data analysis as constraints that affect not only the operations, but also the structure of the system.

These findings draw together four propositions that highlight the main reflections of this research:

Proposition 1: Physicians play an important role in lean implementation and sustainability, they are the ones who deliver substantial valued added to patients, therefore it is important to have them engaged in the lean project.

Proposition 2: The contextual and cultural aspects in which lean is implemented influence the creation of inhibitors.

Proposition 3: Staff members play an important role during lean implementation and sustainability, therefore if actions to prevent a negative influence are not taken, the lean journey will not be sustained.

Proposition 4: In order to increase the chances of success in lean implementation in healthcare settings, lean practitioners and managers should initially consider the underlying barriers, which might avoid or ease the development of the ostensible barriers that constrain the lean journey.

7.5. Research Limitations

This section tackles the limitations that this study presents. To access the data, interviews and observations were carried with four different sources that could contribute to data about lean barriers in the emergency level of the UHS.

One of the limitations is about participants in the UHS without in-depth lean knowledge. This was covered in the lean induction (Section 3.6.5) that equipped the interviewees with fundamental lean knowledge in order to participate in the interviews (the results of this induction are available in sections 4.4.3 and 4.5.3). However, it is understood that people in this situation can become either very pessimist or optimistic about lean, therefore the triangulation of the data with other sources was an attempt to control this limitation.

The other limitation is about the UHS context. The UHS is a system compounded by three levels: preventive, emergency and specialized (see section 2.3.2). This research focused only on the emergency level; during the literature review (see section 2.4) it was revealed as an 'open door' area with a concentration of problems. Therefore, it is acknowledged that in a country with a population of over 200 million inhabitants and continental dimensions, it is a limitation to carry out doctoral research that comprehends all the three levels of the UHS.

These two limitations highlighted by the researcher might shed further light for future research.

7.6. Further Research

The research contributions, propositions and limitations draw together topics for future research. Six suggestions for future research emerged:

I. The analysis around the underlying barriers has emerged as a robust method to summarise ostensible barriers; moreover the healthcare area is not the only context in which this can be applied. Thus, future research in other areas using the same approach identifying underlying barriers, restraining forces and ostensible barriers is encouraged.
II. An in-depth investigation of each element (stakeholders and UHS) that constrains the service delivered in the emergency level of the UHS will provide additional understanding about how to prevent underlying and ostensible barriers to emerge during the lean journey.
III. This research has focused on barriers to implement lean; as a consequence only the restraining forces were identified, therefore future research should focus on the identification of driving forces (positive forces) in healthcare that support lean implementation. Suggested research question: 'What are the driving forces that will support lean implementation in the UHS?'

IV. Replication (with cultural adaptations) of this research in other developing countries, such as the BRICS bloc (section 2.2), to understand the contextual contribution of the research and if there are differences in the results.

V. As previously explained, the focus on the emergency level of the UHS is a limitation of the research. Thus, an investigation of the underlying and ostensible barriers at the other two levels (preventive and specialised) of the UHS is proposed.

VI. Professional boundaries or professionalism issues during lean implementation in healthcare is still a limited area in terms of research (Section 6.2.1.1). Therefore, an in-depth analysis of the professionalism issues involving physicians and nurses in the UHS during the lean implementation and sustainability is suggested.

7.7. Research Summary

The overarching aim of this research was to understand the barriers to implement lean in the emergency level of the Brazilian public healthcare system. This research has achieved this objective, identifying the underlying and ostensible barriers (research sub-question A). Furthermore, the impact of the Brazilian public administration model was discussed, which has shown that future lean implementations in the UHS will have to overcome a strong group of underlying barriers related to this public administration model (sub-question B).

The research has contributed to the knowledge and practice bringing a new perspective to lean barriers, not only focusing on common barriers from the literature (ostensible), but also understanding the deeper causes that emerged as underlying barriers. This might be a first insight to rethink the way that the value stream map is addressed in public healthcare management, and start to identify underlying barriers that will influence the creation of ostensible barriers. It is expected that outcomes from this research will motivate future applications within and outside the healthcare context, as well as in other contexts, such as the bloc of developing countries termed BRICS.

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Appendix I – Example of Interview Sheet

Interview Sheet	Loughborough University
Venue: ED ( ) ECU ( ) Lean Hospital ( )	
interviewee: Staff ( ) Patient ( ) Practitioner ( ) Academic	
Date: Time Started: Time Ended:	
Researcher: Higor Leite Interviewee Name:	
Research Question:	**A) What are the main barriers to implement Lean in Brazilian public healthcare (UHS)?**
Research Theme: **T1: What kind of barriers do you identify in the UHS in terms of lean implementation?**	
Pick ups: **Resistance to change; Leadership (middle manager and supervisors) resistance, Lack of commitment; Communication (poor of lack of it); Lack of know-how; Cultural issues; Lean viewed as a fad; Training backgroung (focus only in healthcare knowledge); CEO and board don't buy the idea.**	

Appendix II – Example of Observation Sheet

Observation Sheet Loughborough University
Venue: ED ( ) ECU ( ) Lean Hospital ( )
Observation Process:
Date: Time Started: Time Ended:
Researcher: Higor Leite
Research Question: B) How can the issues in the UHS be tackled by Lean?
Research Themes: **T1: What do you perceive as issues in the UHS emergency level?** **T2: How can lean contribute to ease these issues?** **T3: During a lean implementation in the UHS, which practices, tools and approaches must be considered as most important and which are less important? Why?**
Pick ups:

Appendix III –Interview Themes and Respondents

Interview Themes	Interviewees				Observation Needed?	
	Lean Management Consultants	Lean private hospital staff (members of lean team)	Staff in UHS	Patients in UHS	Yes/No	If Yes, what?
RQA_T1: What kind of barriers do you identify in the UHS in terms of lean implementation?	X	X	X		No	
RQA_T2: Is it possible to overcome these barriers in the UHS? If yes, How? If not, please justify.	X	X			No	
RQA_T3: To what extent do you think that lack of knowledge and experience (know-how) can influence the lean implementation in the UHS?	X	X	X		No	
RQB_T1: What do you perceive as issues in the UHS emergency level?	X		X	X	Yes	Patient pathway at UHS emergency level
RQB_T2: In your point of view is it possible to ease these issues with a lean implementation in UHS? If yes or not, please justify.	X	X			No	
RQB_T3: During a possible lean implementation in the UHS, which practices, tools and approaches must be considered as most important and which are less important? Why?	X	X			No	
RQB_T4: Have you ever heard about other initiatives to ease the main problems in the process of the UHS? Do you think that it is possible to implement this type of initiative?	X		X		No	
RQD_T1: How the bureaucratic management style of the Brazilian public healthcare can influence the lean implementation process in UHS?	X	X	X		No	
RQD_T2: The lean philosophy has a strong base on leadership engagement and staff empowerment, how can this be achieved in this public environment in the UHS?	X				No	
RQD_T3: To what extent do you perceive lean philosophy as relevant for the UHS?	X	X	X		No	

Appendix IV –Adult Participant Information Sheet

Project Title

'The barriers and opportunities for Lean Philosophy within the emergency level of Brazilian public healthcare system'

Adult Participant Information Sheet

Main Investigator:
Higor Leite, PhD Student
Loughborough University, Epinal Way, Loughborough, LE11 3TU
Telephone number: 07546 814074
Email address: H.V.Dos-Reis-Leite@lboro.ac.uk

Supervisors:
Dr Nicola Bateman and Professor Zoe Radnor
Loughborough University, Epinal Way, Loughborough, LE11 3TU
Telephone number: +441509223102
Email address: N.A.Bateman@lboro.ac.uk ; Z.J.Radnor@lboro.ac.uk

Considering that the data collection will be carried out in Brazil, the information in this sheet will be translated for Portuguese language.

What is the purpose of the study?
This research aims to investigate the barriers and opportunities to implement a methodology for process improvements called lean philosophy. The results of this research will support future implementation of this methodology and will bring several benefits to the current operation.

Who is doing this research and why?
This study is part of a Brazilian student research project supported by Loughborough University and funded by Brazilian government. The study is supervised by Dr. Nicola Bateman and Professor Zoe Radnor, both with a large experience in this subject. The results of this research can help to improve the hospitals' processes for staffs and patients.

Are there any exclusion criteria?
No there are not. You were selected to participate because you are an employee of the Brazilian public healthcare system and have experience and knowledge in the routine of the hospitals. Your participation is also volunteer.

What will I be asked to do?
Interviews with hospital's staff: as an employee of the Brazilian public healthcare system you have a lot of experiences and also information about the current process of dealing with patients. Our research needs to access information about the problems in the current process. To access this data we are going to make personal interview with you, the questions will be all about your routine, you just need to share what you know and your point of view about the real situation within the hospital.

Interviews with lean practitioners: you can contribute with your own experience in this lean healthcare area, and according to your point of view highlight the main barriers and opportunities for lean in the public healthcare system. In this case personal interview will be applied to collect these data. The questions will be about your knowledge in healthcare and lean area, and your

understanding about how to transfer lean to the public healthcare system considering barriers and opportunities in this process.

Once I take part, can I change my mind?

Yes! After you have read this information and asked any questions you may have we will ask you to complete an Informed Consent Form, however if at any time, before, during or after the sessions you wish to withdraw from the study please just contact the main investigator. You can withdraw at any time, for any reason and you will not be asked to explain your reasons for withdrawing. However it may not be possible after the data has been aggregated.

Will I be required to attend any sessions and where will these be?

Yes. The interviews are individuals and will be carried out in a separated office within the hospitals.

How long will it take?

The expected time for each process of interview is:

- Lean Practitioners: 90 minutes each interview.
- Hospital's staffs (general such as receptionist, nurses and so on): 45 minutes each interview.
- Hospital's staffs (managers and leaders): 90 minutes each interview.

What personal information will be required from me?

The information required during the interviews is not considered personal. We just need to access your point of view within the hospital's operations according to your own experience. Some examples of the situations or procedures that you have to perform will be asked.

Are their any risks in participating?

None.

Will my taking part in this study be kept confidential?

- It is important to highlight that none of the participants will be identified by name during the researching process, it includes no identification of the lean practitioners, staffs, patients and also institutions. They will be identified only by generic codes. All personal information will be encoded or anonymised. Only the researchers will have access to data collected.

I have some more questions; who should I contact?

You can in anytime contact the main investigator or any of the supervisors.

What will happen to the results of the study?

The results will be part of the main research conducted by the investigators at Loughborough University. It will be part of the doctoral thesis and also academic papers.

What if I am not happy with how the research was conducted?

If you are not happy with how the research was conducted, please contact Mrs Jacqueline Green, the Secretary for the University's Ethics Approvals (Human Participants) Sub-Committee:

Mrs J Green, Research Office, Rutland Building, Loughborough University, Epinal Way, Loughborough, LE11 3TU. Tel: 01509 222423. Email: J.A.Green@lboro.ac.uk

The University also has a policy relating to Research Misconduct and Whistle Blowing which is available online at http://www.lboro.ac.uk/admin/committees/ethical/Whistleblowing(2).htm.

Appendix V – Informed Consent Form

Loughborough University

'The barriers and opportunities for Lean Philosophy within the emergency level of Brazilian public healthcare system'

INFORMED CONSENT FORM
(to be completed after Participant Information Sheet has been read)

The purpose and details of this study have been explained to me. I understand that this study is designed to further scientific knowledge and that all procedures have been approved by the Loughborough University Ethics Approvals (Human Participants) Sub-Committee.	Yes ☐	No ☐
I have read and understood the information sheet and this consent form.	Yes ☐	No ☐
I have had an opportunity to ask questions about my participation.	Yes ☐	No ☐
I understand that I am under no obligation to take part in the study.	Yes ☐	No ☐
I understand that I have the right to withdraw from this study at any stage for any reason, and that I will not be required to explain my reasons for withdrawing.	Yes ☐	No ☐
I understand that all the information I provide will be treated in strict confidence and will be kept anonymous and confidential to the researchers unless (under the statutory obligations of the agencies which the researchers are working with), it is judged that confidentiality will have to be breached for the safety of the participant or others.	Yes ☐	No ☐
I agree to participate in this study.	Yes ☐	No ☐
I agree that the bodily samples taken during this study can be stored for future research.	Yes ☐	No ☐
If No to above, I confirm that the bodily samples taken during this study can **only be** used for this study and should be disposed of upon completion of the research [insert date].	Yes ☐	No ☐

Your name _____

Your signature _____

Signature of investigator _____

Date _____

Appendix VI – Observation Notice

Loughborough University

Observation Notice

Dear Patients,

We would like to inform that due the current efforts to improve the process within the public healthcare system, this area is under observation for data collection. This is an in-depth analysis of the whole process, carried out by researchers from Loughborough University.

All information collected is confidential, you will not be asked or identified during this process.

If you need more information about this research, as well as if you don't want to make part of this research, please contact a member of the staff or directly the researchers, or using the contacts below.

We appreciate your co-operation and thank you for your help.

Researchers' Contacts:

Main Investigator:
Higor Leite, PhD Student
Loughborough University, Epinal Way, Loughborough, LE11 3TU
Telephone number: 07546 814074
Email address: H.V.Dos-Reis-Leite@lboro.ac.uk

Supervisors:
Dr Nicola Bateman and Professor Zoe Radnor
Loughborough University, Epinal Way, Loughborough, LE11 3TU
Telephone number: +441509223102
Email address: N.A.Bateman@lboro.ac.uk ; Z.J.Radnor@lboro.ac.uk

If you are not happy with how the research was conducted, you can contact:
Mrs J Green, Research Office, Rutland Building, Loughborough University, Epinal Way, Loughborough, LE11 3TU.
Tel: 01509 222423.
Email: J.A.Green@lboro.ac.uk

Appendix VI – Formal approval from the Loughborough University's Ethics Approval (Human Participants) Sub-Committee

Research Office
Loughborough University Leicestershire LE11 3TU UK
Switchboard: +44 (0)1509 222222 Department: +44 (0)1509 222451

Loughborough University

Higor Leite
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Direct Line: 01509 222423
Fax: 01509 223953
E-mail: J.A.Green@lboro.ac.uk
http://www.lboro.ac.uk/committees/ethics-approvals-human-participants/

6 November 2014

Dear Higor,

Research Project: R14-P145: The barriers and opportunities for Lean Philosophy within the emergency level of Brazilian public healthcare system

Main Investigator:
Higor Leite, PhD Student
Loughborough University, Epinal Way, Loughborough, LE11 3TU
Telephone number: 07546 814074
Email address: H.V.Dos-Reis-Leite@lboro.ac.uk

Supervisors:
Dr Nicola Bateman and Professor Zoe Radnor
Loughborough University, Epinal Way, Loughborough, LE11 3TU
Telephone number: +441509223102
Email address: N.A.Bateman@lboro.ac.uk; Z.J.Radnor@lboro.ac.uk

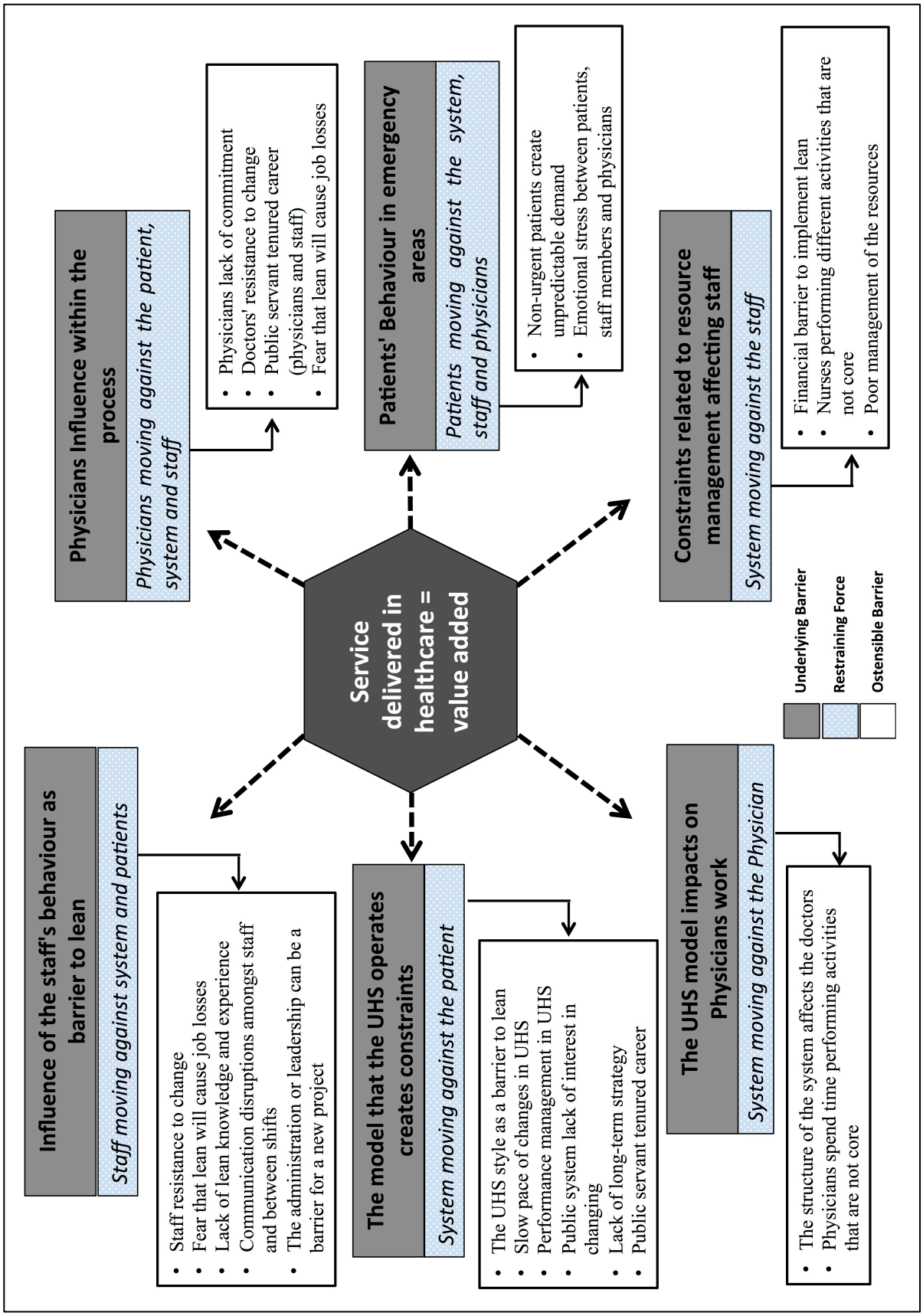
I can confirm that the Loughborough University's Ethics Approvals (Human Participants) Sub-Committee has considered the ethical implications of this research proposal and has confirmed that the research is acceptable. The Sub-Committee has issued clearance to proceed.

Yours sincerely,

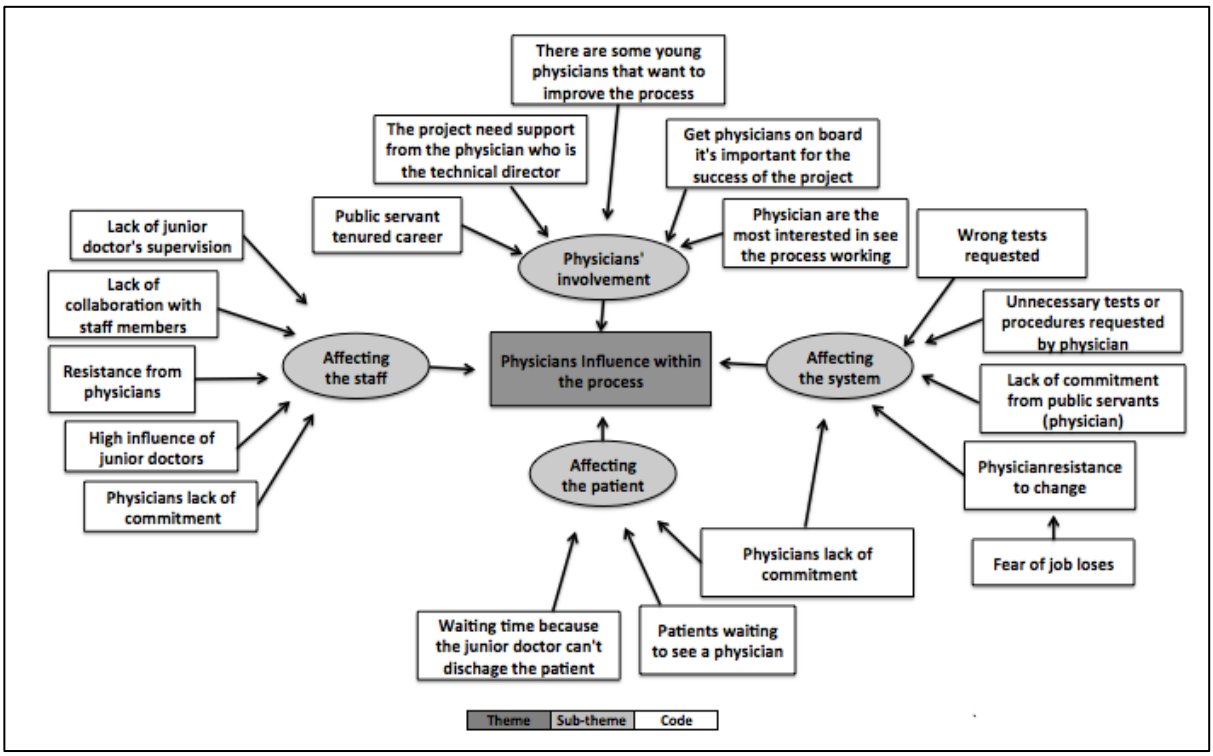
Jacqueline Green
Secretary, Ethical Approvals (Human Participants) Sub-Committee

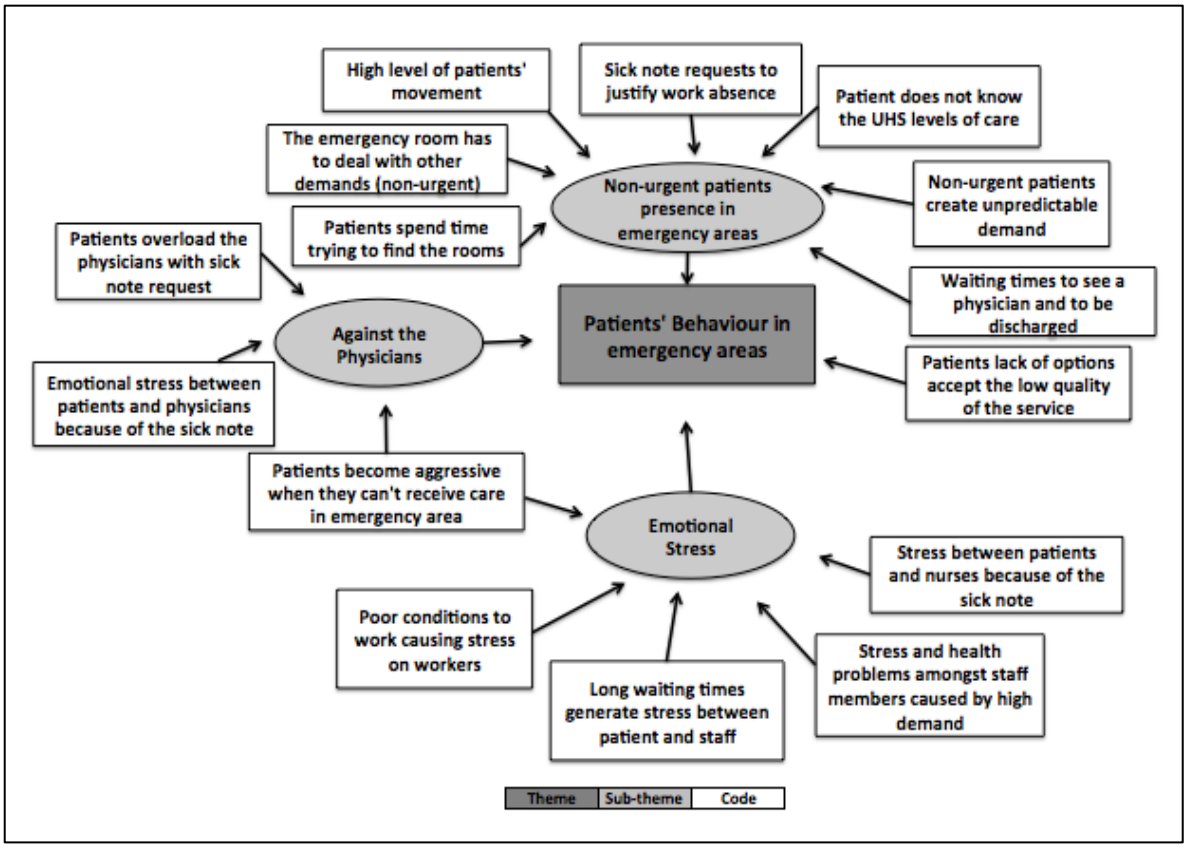
The Queen's Anniversary Prizes
For Higher and Further Education
2013

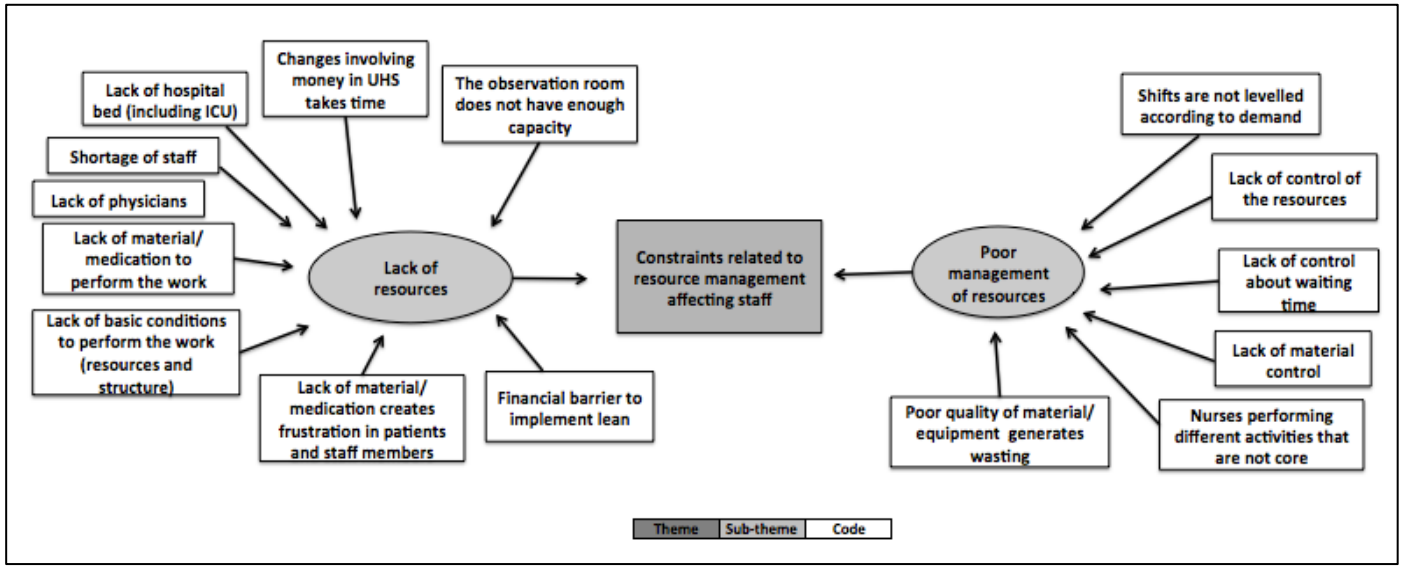
Appendix VII – Field Forces in Healthcare – Comprehensive version

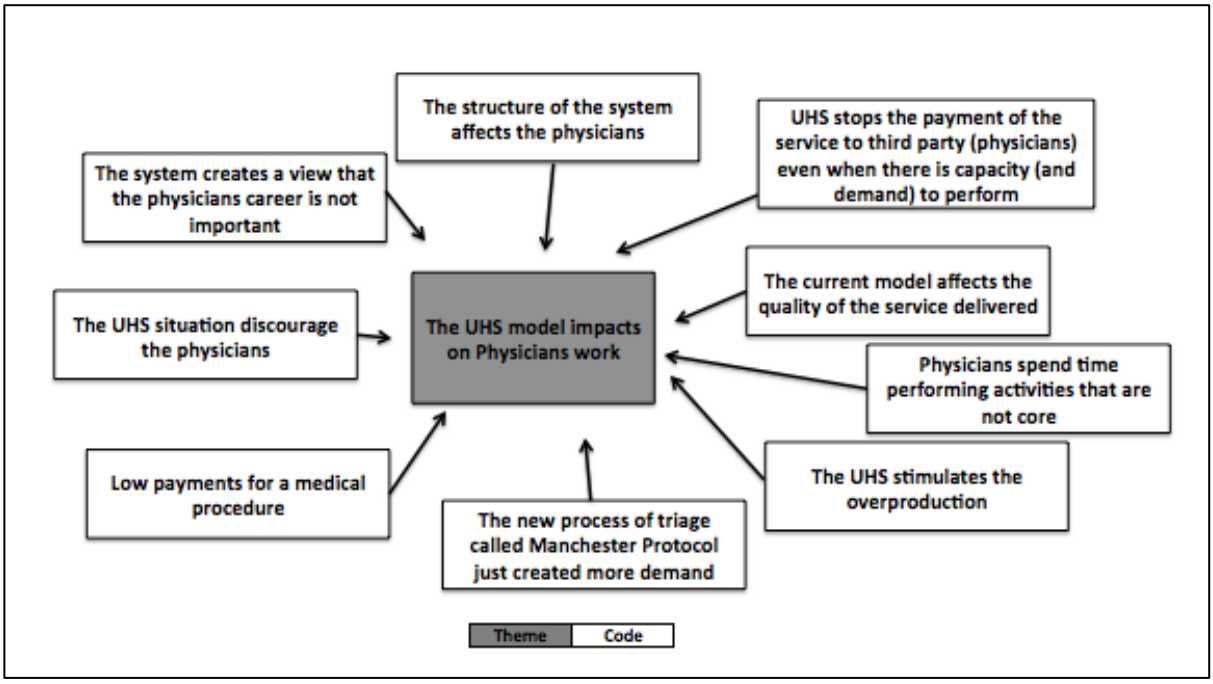


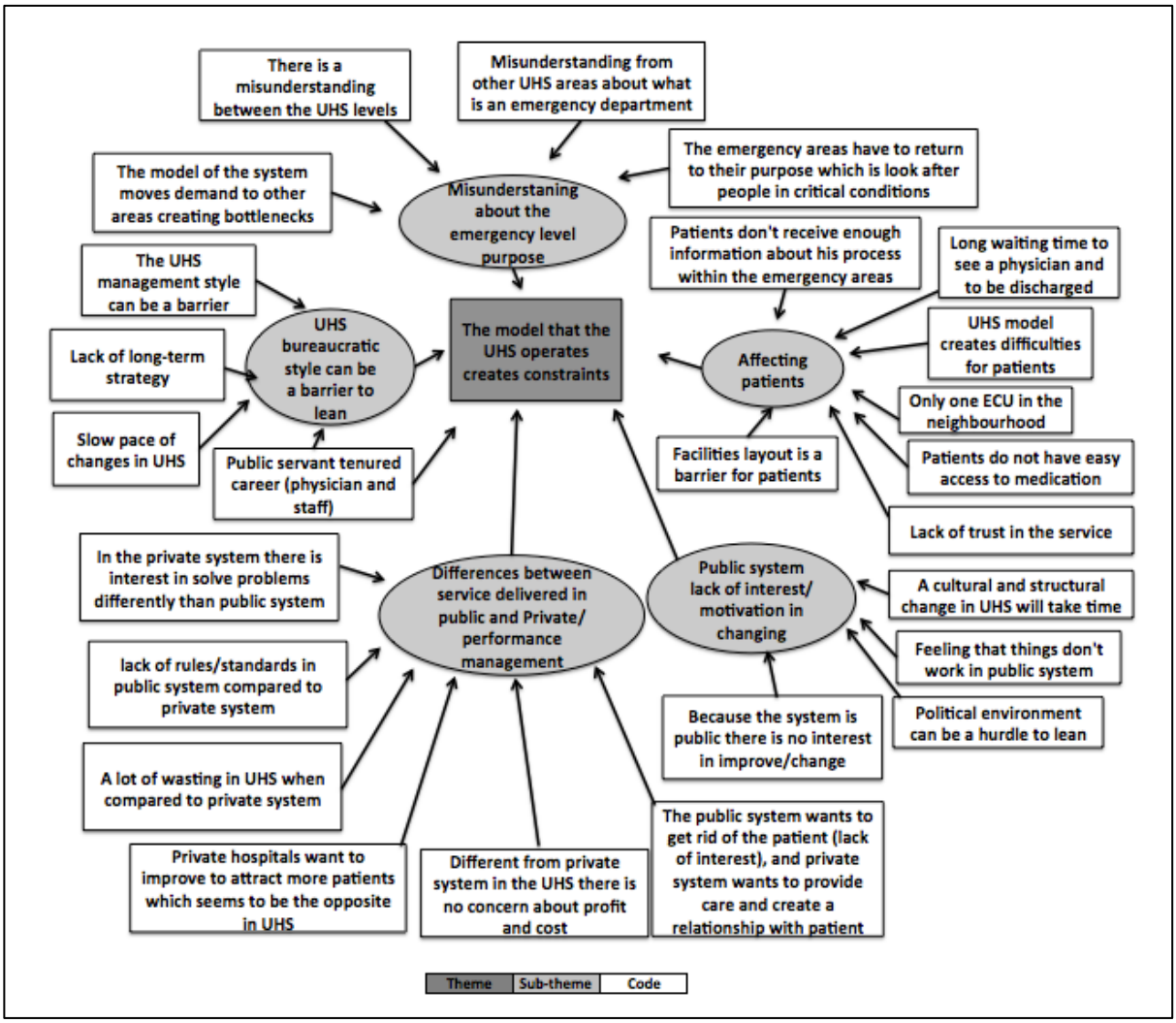
Appendix VIII – Thematic Maps – Larger Sizes

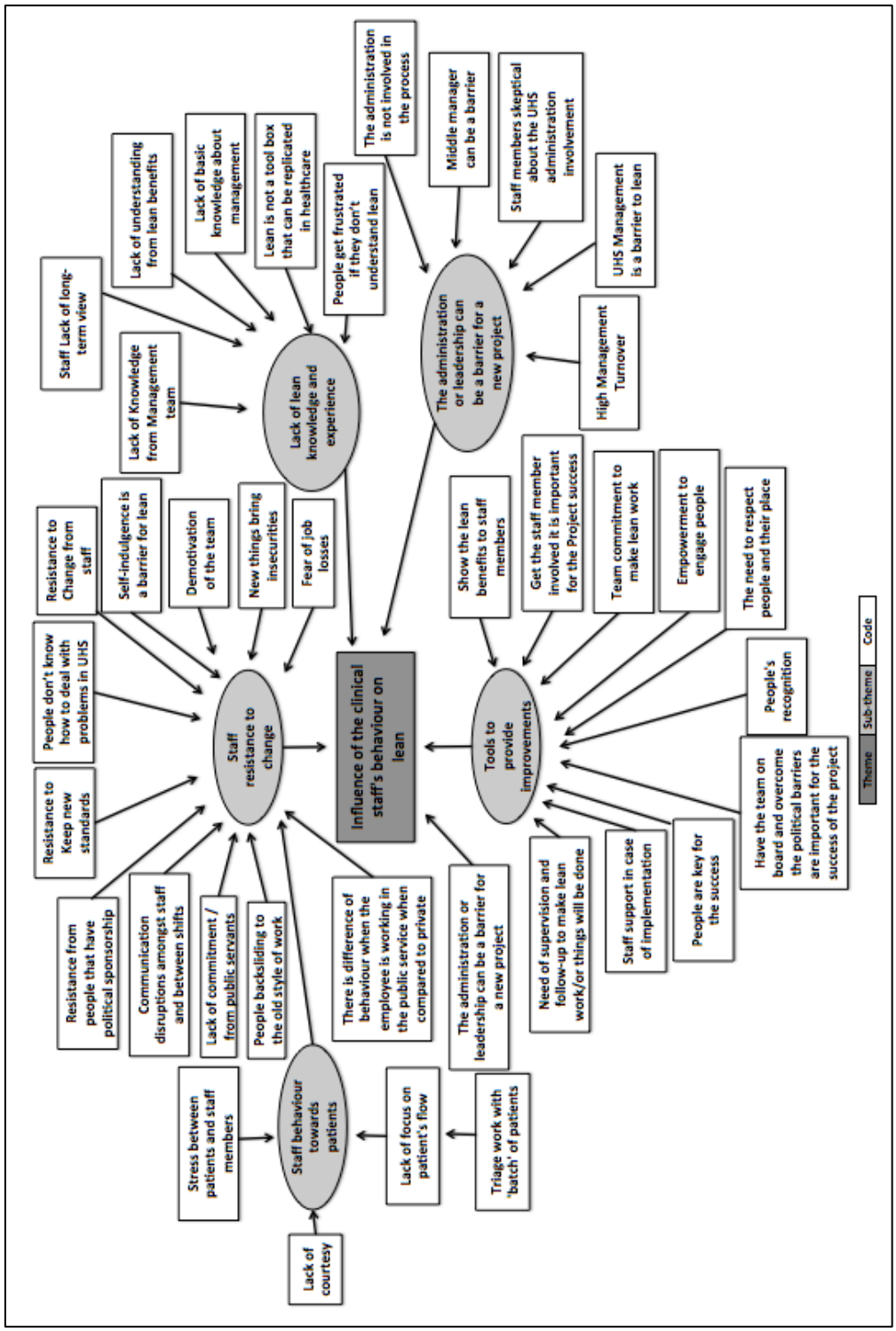





Lack of hospital bed (including ICU)
Changes involving money in UHS takes time
The observation room does not have enough capacity
Shortage of staff
Lack of physicians
Lack of material/ medication to perform the work
Lack of basic conditions to perform the work (resources and structure)
Lack of material/ medication creates frustration in patients and staff members
Financial barrier to implement lean
Lack of resources
Constraints related to resource management affecting staff
Poor management of resources
Shifts are not levelled according to demand
Lack of control of the resources
Lack of control about waiting time
Lack of material control
Nurses performing different activities that are not core
Poor quality of material/ equipment generates wasting
Theme
Sub-theme
Code


The structure of the system affects the physicians
UHS stops the payment of the service to third party (physicians) even when there is capacity (and demand) to perform
The system creates a view that the physicians career is not important
The current model affects the quality of the service delivered
The UHS situation discourage the physicians
The UHS model impacts on Physicians work
Physicians spend time performing activities that are not core
The UHS stimulates the overproduction
Low payments for a medical procedure
The new process of triage called Manchester Protocol just created more demand
Theme
Code


There is a misunderstanding between the UHS levels
Misunderstanding from other UHS areas about what is an emergency department
The emergency areas have to return to their purpose which is look after people in critical conditions
The model of the system moves demand to other areas creating bottlenecks
Misunderstaning about the emergency level purpose
Patients don't receive enough information about his process within the emergency areas
Long waiting time to see a physician and to be discharged
The UHS management style can be a barrier
UHS bureaucratic style can be a barrier to lean
The model that the UHS operates creates constraints
Affecting patients
UHS model creates difficulties for patients
Lack of long-term strategy
Only one ECU in the neighbourhood
Slow pace of changes in UHS
Public servant tenured career (physician and staff)
Facilities layout is a barrier for patients
Patients do not have easy access to medication
Lack of trust in the service
In the private system there is interest in solve problems differently than public system
Differences between service delivered in public and Private/ performance management
Public system lack of interest/ motivation in changing
A cultural and structural change in UHS will take time
Feeling that things don't work in public system
lack of rules/standards in public system compared to private system
Political environment can be a hurdle to lean
Because the system is public there is no interest in improve/change
A lot of wasting in UHS when compared to private system
The public system wants to get rid of the patient (lack of interest), and private system wants to provide care and create a relationship with patient
Private hospitals want to improve to attract more patients which seems to be the opposite in UHS
Different from private system in the UHS there is no concern about profit and cost
Theme
Sub-theme
Code


Influence of the clinical staff's behaviour on lean
Staff resistance to change
Tools to provide improvements
Staff behaviour towards patients
Lack of lean knowledge and experience
The administration or leadership can be a barrier for a new project
Resistance to Change from staff
Self-indulgence is a barrier for lean
Demotivation of the team
New things bring insecurities
Fear of job losses
People don't know how to deal with problems in UHS
Resistance to Keep new standards
Resistance from people that have political sponsorship
Communication disruptions amongst staff and between shifts
Lack of commitment / from public servants
People backsliding to the old style of work
There is difference of behaviour when the employee is working in the public service when compared to private
The administration or leadership can be a barrier for a new project
Need of supervision and follow-up to make lean work/or things will be done
Staff support in case of implementation
People are key for the success
Have the team on board and overcome the political barriers are important for the success of the project
People's recognition
The need to respect people and their place
Empowerment to engage people
Team commitment to make lean work
Get the staff member involved it is important for the Project success
Show the lean benefits to staff members
Staff Lack of long-term view
Lack of understanding from lean benefits
Lack of basic knowledge about management
Lean is not a tool box that can be replicated in healthcare
People get frustrated if they don't understand lean
The administration is not involved in the process
Lack of Knowledge from Management team
Middle manager can be a barrier
Staff members skeptical about the UHS administration involvement
UHS Management is a barrier to lean
High Management Turnover
Stress between patients and staff members
Lack of courtesy
Lack of focus on patient's flow
Triage work with 'batch' of patients
Theme
Sub-theme
Code