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Luís António Sousa Queirós
Uma Visão Futura Após 35 Anos de
História em Neonatologia no Centro
Hospitalar Universitário São João/ A Look
at the Future After 35 Years of the History
of the Neonatology of the Centro
Hospitalar Universitário São João

março, 2019

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Professora Doutora Amélia Assunção Beira Ricon Ferraz

E sob a Coorientação de:

Professora Doutora Maria Hercília Ferreira Guimarães Pereira Areias

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Eu, Louis António Sousa Queirós, abaixo assinado, nº mecanográfico 201102574, estudante do 6º ano do Ciclo de Estudos Integrado em Medicina, na Faculdade de Medicina da Universidade do Porto, declaro ter atuado com absoluta integridade na elaboração deste projeto de opção.

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DESIGNAÇÃO DA ÁREA DO PROJECTO

História da Medicina

TÍTULO ~~DISSERTAÇÃO~~/MONOGRAFIA (riscar o que não interessa)

A look at the future after 35 years of the history of the neonatology of the Centro Hospitalar Universitário São João.

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Dedicatória

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Title

A look at the future after 35 years of the history of the neonatology of the Centro Hospitalar Universitário São João.

Abstract

The authors aim to describe the 35 years of history of the neonatal unit of the São João University Hospital Center (*Centro Hospitalar Universitário São João*), Porto, Portugal, a level III-C hospital, analyzing the evolution of its health care, academic and scientific activities. This article also pays tribute to all the people that were involved in the creation and evolution of the neonatal unit.

Since its opening in 1983 in a context of growth in the neonatology field, both nationally and internationally, many changes occurred. Some of these were the gradual increase in the number of admissions in the Neonatal Intensive Care Unit, a decrease in the mortality rate and in morbidity, a constant modernization and specialization of the professional team and equipment, the general improvement in the health care and a recent adoption of a new philosophy of care, a family-integrated approach. The neonatal unit have an active academic activity in the São João University Hospital Center (*Centro Hospitalar Universitário São João*) and in the Faculty of Medicine of the University of Porto (*Faculdade de Medicina da Universidade do Porto*) and have also an active scientific activity with a progressive increase in the number of published papers in national and international journals.

The authors believe that it's possible to work for a better present and future by looking back at the past. The positive evolution observed over the years is encouraging to continue in the future. The recent creation of the University Medical Center between the Faculty of Medicine of Porto University and the São João University Hospital Center is also a good promise for a more interconnected work between the health care and both the academic and scientific activities in neonatology.

Keywords

History of medicine, neonatal intensive care unit, Faculty of Medicine of the University of Porto, newborn, neonatal healthcare, neonatal research.

Introduction

Since 1959, the São João University Hospital Center (*Centro Hospitalar Universitário São João, CHUSJ*), a level III-C hospital in Porto, a city in the northern region of Portugal, and the Faculty of Medicine of the University of Porto (*Faculdade de Medicina da Universidade do Porto, FMUP*) cohabit in the same building [1, 2].

The neonatal unit of the CHUSJ was created as a neonatal sector in the early 1980s, a decade that have seen a growth in the neonatology field, both internationally and nationally [1, 3].

Internationally, the growth in neonatology in the 1970s was made thanks to the creation of the first Neonatal Intensive Care Units (NICU), the creation of new medical techniques for the newborn as well as an increase and a diversification in health professionals in this field. This growth continued into the next decades [1].

In Portugal, before the recognition of the pediatrics specialty by the Portuguese Medical Association, the neonatal care was under the responsibility of obstetricians. After their recognition in the 1970s, this responsibility was given to pediatricians. In the 1960s and the 1970s, the Portuguese neonatology have seen a growth thanks to the work of some important pioneers like the Primary Health Care Management (*Direção Geral dos Cuidados de Saúde Primários*) and the Portuguese Pediatric Society (*Sociedade Portuguesa de Pediatria*) that worked in the improvement of the following factors: the development of pregnant and neonatal health care, the generalization of physicians careers in the country, the formation of health professionals in pregnant and neonatal care, and the acquisition of reanimation tools for neonates in the Portuguese health facilities. In the 1980s, the firsts neonatal sectors integrated into pediatrics units were created in Portugal [1, 3].

When the CHUSJ was built, there was already a project for a place dedicated to neonatal care, but until the creation of the neonatal sector, this care was given in the newborn nurse of the pediatric unit and pediatric residents had their neonatology training in the phototherapy room and in the neonatal nursery. After some years, the pediatric unit needed the creation of a team specialized for neonatal care and other pediatric specialties, so its director Norberto Teixeira Santos, M.D., Ph.D. (1932-1999) worked for its reorganization. Consequentially, on the year 1982, the pediatric consultation was restructured, and the neonatal consultation was created in this process. On 5 July 1983, the neonatal sector opened thanks to the addition of a partially functioning NICU in the newly remodeled installations of the pediatric unit [1, 3].

The FMUP and the CHUSJ where the neonatal unit is included, being part nowadays of the Maternal Pediatric Center (Centro Materno Pediátrico) have evolved since 1983, and the creation in 2015 of the University Medical Center FMUP-CHUSJ (*Centro Universitário de Medicina FMUP-CHUSJ, CUME*), is one of the examples of this evolution. The aim of the CUME is to strengthen the collaboration between the FMUP and CHUSJ that existed since 1959 with an increase in the synergy between the health care, the scientific and the academic activities of these two entities [4].

The aim of this study is to relate the history of the neonatal unit of the CHUSJ between 1983 and 2018 analyzing its health care, academic and scientific activities. With the analysis of these 35 years of history it will offer a look into the future of its activity.

Methods

The two books “*O Ensino da Pediatria na Escola Médica do Porto*” (The Teaching of Pediatrics in the Physician’s School of Porto) and “*50 Anos da Pediatria do Hospital de São João*” (50 Years of Pediatrics in the Hospital São João) were used primarily for the description of the older events of the neonatal unit.

The authors included some published articles by the neonatal unit between the year 2013 and 2018 when they had relevant information for this work.

Some articles from the websites of some official entities were consulted to find some important dates and information. The authors used the websites of the Portuguese Republic Diary [5], of the Newborn Individualized Developmental Care and Assessment Program® (NIDCAP®)

[6], of the CHUSJ [7], of the FMUP [8], of the FMUP library [9] and of the Portuguese Medical Association [10].

The authors reviewed the annual reports of the neonatal unit of the CHUSJ [7], the data of Nelma Celeste Gonçalves, M.D. (1933) from the Portuguese Medical Association [10] and the *curricula vitae* of Rui Carrapato, M.D, Ph.D. (1946) [9], Hercília Guimarães, M.D., Ph.D. (1953) [7] and Fátima Clemente, M.D. (1964) [7].

Neonatal unit history

The newly created neonatal sector on 5 July 1983 had 8 beds and 3 neonatal ventilators. It functioned with a small team of Pediatricians and one of them, Nelma Celeste Gonçalves, was its first coordinator [1, 3, 10].

The addition of neonatal protocols on 1985 was an important step in the evolution of the neonatal sector. Rui Carrapato, a pediatrician that worked in it at the time implemented these. He received his doctorate in 1987 thanks to his dissertation: “Carnitine metabolism of the newborn” [1, 3, 9].

In 1986 the first two neonatologists of the NICU were appointed [3].

The transport of high-risk neonates in the north of Portugal by the National Institute for Medical Emergency (*Instituto Nacional de Emergência Médica*, INEM) was initiated in 1988. At the time, it was done with the collaboration of some NICUs in which some of their neonatologists and nurses were recruited and received neonatal intensive care training. On September 1988, the CHUSJ made an agreement protocol with the INEM and the transport started on October of the same year. The headquarters of this transport were in the CHUSJ and most of its team members were from its NICU [1-3]. The CHUSJ stopped being the headquarters of the transport of high-risk neonates in the north of Portugal since late 1998. After that, the coordination was scheduled between the hospitals of the region and the CHUSJ was the coordinator in the years 1999, 2004 and 2009 [2, 3]. Since April 2011, the transport of high-risk neonates in the north of Portugal is done by a new team composed by pediatricians and nurses that receives neonatal and pediatric intensive care training. They work in the NICU of the CHUSJ at night and in the Pediatric Intensive Care Unit at day [2].

On 16 May 1991, the Portuguese state allowed 13 neonatologists to be employed in the neonatal sector [11]. It had then the possibility to assure the presence of a team of doctors 24h per day since October 1992 [3].

On 27 March 1996, the pediatric unit was transformed into the pediatric department. Thus, the neonatal sector was transformed into the neonatal unit [1, 3]. Hercília Guimarães was named as the first director and still is to this date. She took an apprenticeship in neonatal intensive care in the Hospital Antoine-Béclère in France between October 1989 and October 1990, is a neonatologist since 1992 and was named Professor of the FMUP in 1993 after she defended her dissertation entitled “Evaluation of new drug therapies by inhaled administration for prevention of bronchopulmonary dysplasia” [1, 3, 7]. From this date until now, the neonatal unit was divided into four sectors: The NICU, the perinatology sector, the neonatal consultation and the delivery room. In 1996, other events contributed to an improvement of the neonatal care of the CHUSJ and gave positive results in infectious rates, sequels and life quality of the neonates. The parenteral nutrition started to be made in the pharmacy of the CHUSJ in a sterile way, the hospital initiated the screening of the retinopathy of prematurity and the ophthalmologic examination in all the neonates, the neonatal unit started doing hearing and development evaluation and finally, the NICU began to give respiratory and motor kinesiotherapy to all the admitted neonates [1, 3].

Recognizing the importance for the neonate’s family to have psychological help, a psychologist was appointed in the NICU in 2000 [3].

In March 2003, the neonatal unit started the highly differentiated and specialized training of four of its professionals into the NIDCAP® program. The NIDCAP® program recognizes the dynamic relationship between the neonate, its parents and the health professionals promoting their development, the reduction of their stress and aims to offer care for both the newborn and the family. It aims to optimize ambient factors that can affect the neonate’s development and includes as much as possible the neonate’s family thanks to a family-integrated approach [3, 12]. In March

2008, Fátima Clemente was the first neonatologist of the CHUSJ to receive the NIDCAP® program certification [3, 7]. On 1st April 2015, the São João NIDCAP® training center was created [13].

Since 2005 the neonatal unit offers transport to the home of the neonate after discharge [7].

Since 2006, there is a project that offers preparation for the discharge of the neonate. It includes a telephone contact with the nurse of the neonate's health center and the possibility of visits from a social worker [7].

On 1st June 2007, the neonatal, obstetrics and otorhinolaryngology units started a collaboration to do an universal hearing screening in all children [3].

Since 2010, the NICU does Extracorporeal Membrane Oxygenation (ECMO) in neonates with severe respiratory and/or cardiac failure after. The first case being treated on September 2010 [14, 15]. In the same year, the neonatal unit started evaluating the feeding competences of the neonates and initiated a project for the treatment of injuries in the context of neonatal care [7].

In October 2011 the NICU introduced the use of hypothermia as a treatment in the perinatal hypoxic-ischemic encephalopathy for neonates that fulfill eligibility criteria [16].

On 11 March 2016, the CHUSJ was recognized as a referral center in the areas of congenital cardiopathies, metabolic diseases and oncologic diseases [17].

Health care activity

The constant work, development and specialization of the professional team of the neonatal unit lead to an improvement in the health care given to the newborns. As described previously, this improvement was made thanks to the addition of new techniques, the participation by the neonatal unit in screenings for the newborn and the recent adoption of the philosophy of care to a family-integrated approach. There is some other evidence that shows the improvement of the care activity.

Being in a level III-C hospital, the neonatal unit receives a high number of neonates with severe pathology and had a gradual increase in the number of patients admitted in the NICU over the years (379 neonates in 2017). However in the same time it managed to gradually lower the mortality rate: the highest recorded was at 23.7% in 1985 and in 2017 it was at 2.1% [3, 7].

After the adoption of new ventilation procedures that lead to a decrease in the use of invasive mechanical ventilation and to an increase in the use of non-invasive mechanical ventilation, the NICU had a decrease in the prevalence of pneumothorax (2.4 % to 0.9%) between 2003 and 2014 and a decrease in the prevalence of bronchopulmonary dysplasia (9.7% in 1996-2005 to 6.1% in 2006-2015) [18, 19].

After the introduction of the use of inhaled nitric oxide in 2003 and ECMO in 2010, there was a decrease in the mortality of newborns with persistent pulmonary hypertension from 52% to 34.2% between 1996 to 2012. This value is higher than in other centers, probably due to the fact that the CHUSJ is a level III-C hospital, and thus receives neonates with severe pathologies [15].

In 2010, there was the implementation of a new nosocomial infection preventive bundle [20, 21]. After this implementation, the density of nosocomial sepsis decreased to a value in accordance with others NICUs (8.6 per 1000 patient days between 2007 and 2010 to 4.8 per 1000 patient days between 2010 and 2013) and the CLABSI rate of the NICU decreased from 14.1/1000 catheter days between 2007 and 2010, to 10.4/1000 catheter days between 2010 and 2013 [21]. Despite the previous decrease, the CLABSI rate increased to 12.4/1000 catheter days between 2014 and 2016 [22], which led to the reinforcement of infection control measures resulting in a decrease of the CLABSI rate to 3.0/1000 catheter days in the first half of 2018 (unpublished data). This is a reminder for all members of the unit to follow rigorously the infection prevention protocols.

The neonatal unit shows good results in other fields. One study found that the survival rate for neonates with gastroschisis was 92.3% between 2002 and 2011, a value that is in accordance with the literature [23]. From 2005 to 2014, the neonates with cardiac arrhythmias had a mortality rate at discharge of 3%, 9% of the others had sequelae and these results were consistent with those of other authors [24].

The field of perinatal palliative care also evolved in the unit in the recent years and is associated with a constant concern with ethics. Therefore, the parents of the neonates in this situation have the possibility to receive psychological and religious support and there is a perinatal palliative care program in the unit, the first implemented in a level III Portuguese NICU, in which they are integrated in the decision-making process [25, 26]. This practice is an integrated part of the newborn and family centered approach, adopted in the NICU [27].

Academic activity

The neonatal unit offers pregraduate formation. Many of its doctors were and are professors of pediatrics in the FMUP and in 2017, all of neonatologists were teachers in the pregraduate formation [3, 8].

The unit provides postgraduate activity since its creation in 1983. It regularly organizes scientific reunions and seminars with the goal to continue the postgraduate training of its members and offers an annual formation in the field of infant health and pediatrics and the field of mother health and obstetrics for nurses of these specialties from 1985 to this date. It provides the possibility to realize doctorates and Rui Carrapato had the first one in 1987. From 1993, the CHUSJ offers neonatology subspecialty training (ciclo de estudos especiais em neonatologia). The neonatal unit provides the possibility to realize master's degrees and Madalena Ramos was the first to obtain it in 2001. Since 2004, some doctors of the unit also participated in juries of doctorate and master's degrees. The unit also receives residents from pediatrics, cardiology, pediatric surgery and anesthesiology. It offers postgraduate neonatal intensive care training for pediatricians and others health professionals from other institutions nationally and internationally. It namely receives residents nutritionists, psychologists, nurses and therapists [3, 7, 8].

The neonatal unit collaborated in the teaching of others faculties over the years [3]. In 2017, there was collaborations in the teaching of the Faculty of Nutrition and Food Science of the University of Porto (*Faculdade de Ciências de Nutrição e Alimentação da Universidade de Porto*), the Nursing School of Porto (*Escola Superior de Enfermagem do Porto*), the Corporation for Polytechnic and University Teaching (*Cooperativa de Ensino Superior Politécnico e Universitário*) and the Catholic University (*Universidade Católica*) [7].

As already shown, the neonatal unit had an active role in the academic activity of the CHUSJ, the FMUP and in the teaching of other entities. Consequentially, the unit will surely continue in its active academic activity in the future.

Scientific activity

The neonatal unit have a varied scientific activity. Its members presented scientific works in national and international conferences and reunions and participated in the organization of some of these [7].

The unit has published in national and international journals, with an improvement in the quantity and quality of its publications over the years [3]. In 2017, 24 studies were published [7].

The neonatal unit participates in networks of databases: the national database of very low birth weight neonates (birth weight <1500g) since January 1993, the database of perinatal deaths since 1996, the national database of congenital malformations since 1997, the database of neonatal meningitis since 2000 and the international Vermont Oxford Network Very Low Birth Weight Database from 2000 to 2013. These give the ability to analyze the care given to neonates, and a mean to compare the neonatal unit of the CHUSJ with other in the world. These analyses are done with the aim to improve maternal and child health indicators [1, 3].

The members of the neonatal unit have assumed some relevant offices. For example, some of its members are revisors of international and national journals, members of the direction of national and European societies and other groups. They also assume important roles in the CHUSJ and FMUP [7, 8].

The unit received research scholarships over the years, the first one being received in 2002 [3].

The neonatal unit and all the team worked to have a varied and relevant scientific activity both nationally and internationally. And because of the participations in the above described databases and in the academic activity, it will certainly continue to produce results that will be analyzed and published in the future.

Conclusion

After 35 years of history, the neonatal unit of the CHUSJ have seen an improvement in the health care given to the newborn and in the academic and scientific activities. The recognition as a referral center in the areas of congenital cardiopathies, metabolic diseases and oncologic diseases is an example of this improvement.

The establishment as a NIDCAP® training center is a footstep in the further development of neonatal care into a family integrated approach as well as the creation of the perinatal palliative care program showing the visionary philosophy of the neonatal unit.

The authors emphasize that the accurate integration of the health care, scientific and academic activities will be an added value for the future.

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ANEXOS

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For paragraph formatting, please use single spacing and full justification.

Do not use boldface or underline character formatting; use italics just for technical terms or not English words. Use quotation marks just for quotations or to underline a particular word meaning.

Do not insert footnotes. Divide the text in **paragraphs** and assign a title to each part.

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For every article, authors should send:

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Abstract and keywords must be in English also for Italian articles.

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Figures (graphs, charts, photographs, and illustrations) and tables should be submitted separately from the text file:

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References

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