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Decision Makers and Criteria for Patient Discharge - A Qualitative Study

Isabella Eigner, Andreas Hamper, Nilmini Wickramasinghe & Freimut Bodendorf

Abstract The decision to discharge a patient involves multiple stakeholders and criteria that need to be considered during this process. This paper aims at identifying the issues, behaviours, and needs for patient discharge with regards to the risk of readmission and the available information in that process using a qualitative approach. For this purpose, focus groups are conducted at an Australian not-for-profit tertiary hospital group and analysed according to three main areas: Decision makers and factors influencing the time of patient discharge, the risk of unplanned readmission and available information. The results of the focus groups indicate the complexity of admission and initial diagnosis as influencing factors and consequences of the time of patient discharge and suggest requirements on how to include this knowledge into future decision making using data analytics.

Keywords: • Patient discharge • length of stay • risk of readmission • focus group • decision support • data analytics •

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1   Introduction

The decision whether or not to discharge a patient is one of the most frequent and complex decisions of clinicians (Harun, Salek, Piguet, & Finlay, 2014). It involves a multidisciplinary team and careful evaluation of several medical and non-medical factors to determine the best time to send a patient home. According to Armitage (1981), "the discharge of medical patients consists often not of a single event but of a lengthy process of negotiation involving professional staff, patients and their relatives" (Armitage, 1981). Thus, a variety of stakeholders and influencing factors are to be considered in this decision. While the implications and requirements of effective discharge planning have been analysed in various studies (Armitage & Kavanagh, 1998; Augustinsson & Petersson, 2015; Chadwick & Russell, 1989; Goncalves-Bradley, Lannin, Clemson, Cameron, & Shepperd, 2016; Mukotekwa & Carson, 2007), the specific time of patient discharge that leads to the best outcome has not yet been considered in detail (Matis, Farris, McAllister, Dunavan, & Snider, 2015). Finding the optimal time of discharge can lead to fewer unnecessary readmissions, enable cost reductions and therefore allow for a better allocation of resources within the hospital. Therefore, this study focuses on the influencing factors that can determine the optimal time of patient discharge, both from a qualitative and cost perspective. For this purpose, involved stakeholders, as well as medical and non-medical criteria that are considered in the discharge decision, have to be identified. To specify the best outcome from a qualitative view, readmission rates are used as a comparative value. From a cost perspective, we utilize, patient length of stay (LOS) as the comparative indicator for the time of patient discharge, as this represents a common cost factor over time.

Hospital reimbursements are based on case rates, according to so-called diagnosis-related groups (DRG). For each DRG, a cost weight is set by the Department of Health that determines the reimbursement rate for the hospital for each episode within that DRG. To allow for different types of stay and moderate financial risk, the case mix model has been adapted to include cost weights for shorter or extended hospital stays. In Victoria, a "Weighted Inlier Equivalent Separation (WIES)" is used, where the DRG cost weight is adjusted for time spent in the hospital. Thus, the length of stay highly influences a hospital's reimbursement rates (State Government of Victoria, Department of Health).

Figure 1 displays the development of costs and reimbursements over time. The cost curve includes all costs incurred for procedures, accommodation and maintenance costs. We assume that the curve flattens with increasing time, as cost-intensive procedures occur in the beginning and accommodation costs in the later stages of the stay. A balance of revenues and costs, i.e. the Break-Even-Point (BEP), for a DRG is assumed at the determined average length of stay for a single DRG. As a result, the shading to the left represents the profit zone (cf. Figure 1). For each additional day, the patient is hospitalized in the hospital, the hospital suffers losses. The actual cost curve is hospital-individual and can, therefore, deviate for each episode.

For a hospital, it would, therefore, seem most profitable to discharge a patient as soon as possible within the inlier range. However, if the patient is readmitted to the hospital for a related cause of the preceding episode, reimbursements can be suspended for the readmitted episode or other penalties might occur (Center for Medicare & Medicaid Services, 2016). Studies have shown that the length of stay has a potential impact on the quality of care and thus the potential risk of readmission of a patient (Baker, Einstadter, Husak, & Cebul, 2004; Heggestad, 2002). While some argue a longer length of stay to be beneficial (Bartel, Chan, & Kim, 2014), other studies show a negative effect with a longer length of stay on outcomes (Saczynski et al., 2010) and risk of readmission (Chopra, Wilkins, & Sambamoorthi, 2016) or even suggest lower readmission rates with a shorter length of stay (Kaboli et al., 2012). Thus, it is vital to determine the point of patient discharge that also considers the lowest risk of readmission. To reach this goal, the process of patient discharge and the involved stakeholders have to be known.
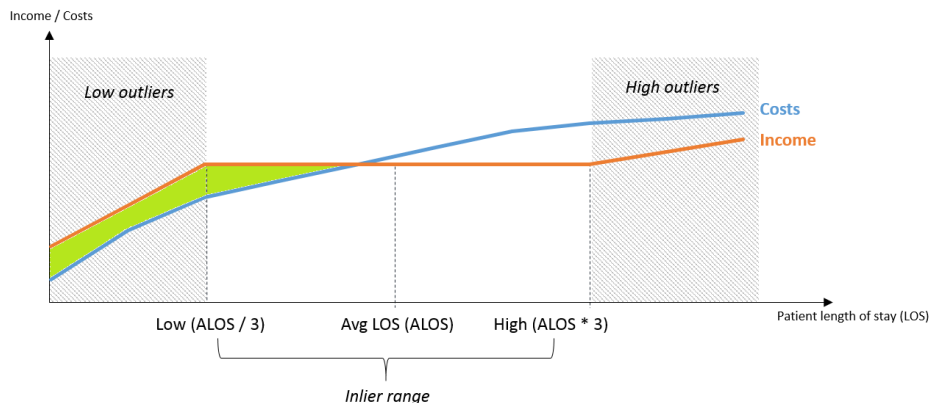

Figure 1: Correlation between patient length of stay and costs

The purpose of this study is to determine the decision makers and criteria that are relevant in the patient discharge process. For this purpose, focus group interviews are held in an Australian hospital group in Victoria. Based on the results of these interviews, propositions about the patient discharge decision and its implications are derived from the qualitative results. In a subsequent study, these results will be further developed into hypotheses and tested with episode data collected at the respective hospital group. This paper is structured as follows. The related work section briefly describes relevant stakeholders and decision criteria that have been previously identified for the patient discharge process. While a lot of studies suggest qualitative approaches to determine these criteria, we propose a mixed-methods approach to quantify the influences on patient length of stay and the patient discharge respectively. Section three afterwards describes our proposed method and the research design. Subsequently we present the results of the qualitative study and based on that, derive propositions on factors influencing patient length of stay. Finally, the limitations of this study as well as future research opportunities are discussed.

2 Related Work

The following section describes the results of our literature analysis concerning decision makers and decision criteria in the patient discharge process. The results form the basis for our qualitative analysis by supporting the selection of our focus group participants as well informing the development of our semi-structured interview guidelines.

2.1 Decision makers

While the final decision to discharge a patient resides with the primary physician, other groups have been shown to influence the time of discharge from the hospital. According to Armitage (1981), relatives play a vital part in the discharge negotiation, where both a shorter or a longer stay than necessary could be requested. Depending on their personal situation, their environment after discharge or their general well-being, a patient can also act as an influencer in the discharge decision. From the hospital personnel perspective, nurses tend to give suggestions and actively participate in the evaluation of a patient's well-being. As they are the closest caregiver to the patient in the hospital setting, they can sometimes better determine a patient's status and have a deeper understanding of a patient's personal situation than the treating physician (Hofmeyer & Clare, 2014). Finally, the treating physician, as well as other consulting doctors primarily, evaluate the clinical factors. They provide the final discharge decision with respect to the input of other stakeholders, clinical guidelines or other underlying conditions, such as ethical considerations (Chadwick & Russell, 1989).

2.2 Decision criteria

A literature review conducted by Harun et al. (2014) identified 17 studies analysing the patient discharge process to determine influencing factors in this context. They found several medical and non-medical influences on discharge decision making through either prospective or retrospective studies (cf. Figure 2). Literature shows, that mostly qualitative studies are conducted to identify impacts and behaviours of patient discharge. Thus, the results solely rely on subjective opinions of the interviewees.
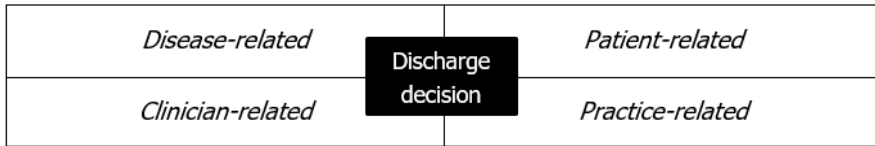
Figure 2: Influencing factors on discharge decision making (Harun et al., 2014)

The factors identified in these studies can be assigned into two major categories: Measurable and non-measurable factors Table 1). While non-measurable items can only be gathered and interpreted through qualitative methods, measurable information can be collected and used to quantitatively test their impact on the patient discharge decision and their outcomes. This way, quantitative factors can be used for decision support to complement qualitative factors, such as ethics and intuition. The decision criteria as suggest in this study form the basis for our focus group interview guideline. We thereby especially focus on the measurable factors to initially derive proposition and testable hypotheses in a next step.

Table 1: Decision criteria for patient discharge

Influencing factors	Characteristics	
	Measurable	*Non-measurable*
Disease-related	- Diagnosis - Severity - Readmission risk	
Clinician-related	- Clinician's experience and expertise - Level of seniority	- Intuition - Personality - Perceptions - Ethics and values
Patient-related	- Quality of life - Socioeconomic and functional status - Ability to self-manage - Insurance	- Behaviour - Patient/Family preferences or expectations
Practice-related	- Practice patterns - Resource constraints - Policies and guidelines - Information availability	- General practitioner or community care support

3 Method

This paper presents the first part of a mixed methods approach (Venkatesh, Brown, & Bala, 2013; Venkatesh, Brown, & Sullivan, 2016) following a qualitative study design. As such, mixed methods research "uses quantitative and qualitative research methods,

either concurrently (i.e., independent of each other) or sequentially (e.g., findings from
one approach inform the other), to understand a phenomenon of interest" (Venkatesh et
al., 2013). This study is conducted sequentially, i.e. the results of the qualitative study in
this paper will be evaluated with a quantitative analysis afterward. The aim of this study
is to derive propositions on the impacts and implications of time of patient discharge.
Thus, in a first step, focus groups are conducted at an Australian hospital group to
determine decision makers and criteria for patient discharge and the relevance of
readmissions in this context. Figure 2 shows the proposed approach as well as the areas
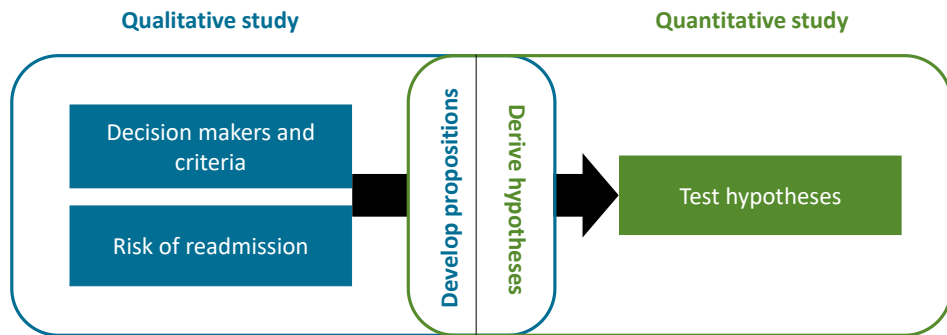under study.

Figure 2: Mixed methods approach

Study population

We held three focus groups with 4 participants each, consisting of 7 men and 5 women,
thus 12 participants in total. Each session was facilitated by a moderator and lasted about
one to two hours. According to Krueger (2015), focus groups should follow five key
criteria. First of all, small groups of people are assembled, usually ranging between five
to eight people. However, so-called mini-focus groups with four to six people, are
becoming increasingly popular as they provide a more comfortable environment for
participants and allow every person to be able to participate. Furthermore, the select
participants should possess certain common characteristics to be suitable for the topic
under discussion. In our study, the homogenous environment of an Australian hospital
group is selected as the main criterion in group member selection. The groups consisted
of medical and non-medical personnel from various departments, such as the ICU,
Research, Clinical Audits, Quality Management and the Emergency Department. The
focus of these focus groups, on the one hand, was the determination of stakeholders and
decision makers as well as their concerns and criteria for the time of patient discharge.
On the other hand, we addressed the topic of the risk of readmission, and how
readmissions are detected and handled in the hospital. Next, the goal of focus groups is
to collect qualitative data to gain different insights and opinions across groups that can
subsequently be compared and contrasted. Finally, this method utilizes a focused
discussion „to get a range of opinions about a something like an issue, behaviour,

practice, policy, program or idea" (Krueger & Casey, 2015). A semi-structured interview guideline was prepared and reviewed to ensure consistency throughout all focus groups, yet allow for some flexibility within the specified topics. For this purpose, focus group questions were developed by the research team according to three main areas:

- Decision makers and factors influencing the time of patient discharge
- Factors influencing the risk of readmissions
- Information availability

The aim of the focus groups was thereby to identify the issues, behaviours and needs for patient discharge with regards to the risk of readmission and the available information in that process.

4   Results

In the following section, we describe the results of our focus group interviews according to our three main areas. We identify decision makers and influencing factors on the patient discharge decision as well as the impact of the risk of readmission. To specify, we utilize the patient length of stay as the comparative indicator for the time of patient discharge.

4.1   Decision makers

The results of the focus group support the results from our literature analysis but give a deeper understanding of the discharge negotiation. Requests from family members and patients to stay longer are taken into consideration in accordance with medical necessity and availability of resources. "Family members or patients often push for a longer stay; […] the requests are taken into consideration, but it requires a conversation about the medical necessity", "Patients and family often ask to stay longer. Since it's a private hospital that can sometimes be arranged, depending on the available beds." According to one interviewee, this especially happens with readmission cases, stating that "if they're nervous, especially if the patient already had multiple readmissions they want to be on the "safe side". Similar to the results from literature, the focus groups agreed that usually "nurses make the suggestions for discharge, when they feel that the patient is well enough", but that in the end "the consulting physician has the final say and makes the decision when the patient is discharged". In case a patient stayed at multiple wards or "saw multiple doctors, they will make a decision together". Depending on the ward a patient is treated at, there can be specific people in charge that lead the decision. In ICU, one interviewee stated that "the decision to discharge […] is made by the intensive care specialist in conjunction with the treatment team, so the physician, surgeon, etc. The physician will determine if the patient has been stable for a certain time, if the blood tests are, if not normal, at least trending in the right direction." In the special case of private hospitals as in the case under study, insurance can also play a role in the sense that "if the patient runs out of insurance, then the patient is transferred to a public hospital".

4.2   Influencing factors on time of patient discharge

Within all groups, the type and severity of the diagnosis were concluded as the most prominent factor. One person stated that „The time of discharge depends on how what they come in with and how frail the patients are and why they needed the medical care in the first place". Similar, others referred to this as "the complexity of admission" or proposed that the best time of patient discharge mainly "depends on what he/she comes in with". Our first proposition that is derived from our interviews, therefore, suggests a significant difference within the durations of patient visits:

> P1: There are significant differences in patient length of stay between different diagnoses.

Going further, not only the type of diagnosis but also the severity of the condition and frailty of the patient were mentioned as relevant factors. Therefore, we further propose to differentiate time of patient discharge and length of stay within diagnoses groups:

> P2: There are significant differences in patient length of stay within diagnoses groups depending on the disease severity.

4.3   Influencing factors on risk of readmission

Next, our interviews show a varying perception of the benefits and threats of a later time of patient discharge. While some participants argued that a shorter length of stay is more beneficial for patients ("There are multiple risks of longer hospital stays: infection, blood clots, pressure sores, etc"; "It's best, to get people out earlier, because an earlier discharge can improve the outcome"), some interviewees propose that they tend to keep critical patients for longer to make sure a patient is healthy enough to leave. One participant stated "The more critical a patient is, the longer the required "period of normality" before they are discharged." Thus, the time of patient discharge shouldn't be both too early or too late, leading to our following proposition:

> P3: The length of stay has a significant impact on the risk of readmission.

Furthermore, the interviews show that this applies even more to certain patient groups, especially for chronic diseases. "Especially patients with chronic diseases are often "frequent flyers" in the hospital, for example, renal failure, Diabetes, Airways disease, Cardiac disease. […] These patients make up 80% of medical activity and cost". We, therefore, conclude the following propositions:

> P4a: There are significant differences in risk of readmission between different diagnoses.

P4b: There are significant differences in risk of readmission between within diagnoses groups depending on the disease severity.

Figure 4 displays the theoretical model of the derived propositions, visualizing the relationships between diagnosis, disease severity, the length of stay and risk of readmission.
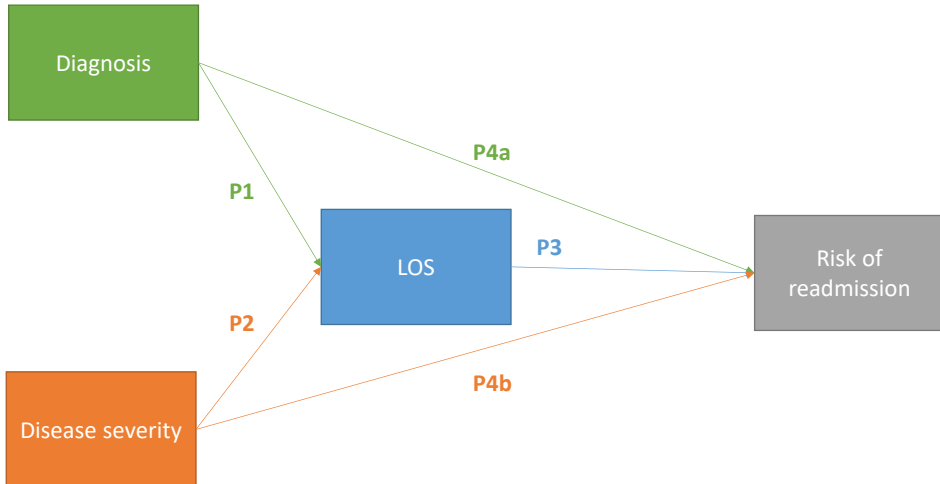

Figure 3: Theoretical model of influencing factors on length of stay and risk of readmission

4.4 Information availability

The third part of the focus group interviews focused on the type and amount of available data that is required in the discharge process. In general, one interviewee stated the discharge decision requires input about "the objective, medical factors as well as subjective factors", i.e. intangible information that cannot be measured. These subjective factors are usually determined by the physiologist.

The availability of information can also negatively impact the length of stay i.e. lead to a delayed time of patient discharge. "[…] Having the data available sooner or digitally may or may not improve the decision of patient discharge, but It could improve the efficiency of discharge because a delayed discharge is bad for the patient and the hospitals." A delayed discharge can increase the risk of hospital infections and can result in penalties for the hospital if the length of stay is continuously too long across multiple episodes.

Besides increasing efficiency through digitized data, the advances of more complex data analysis and visualization were discussed within one of the focus groups. "It wouldn't be enough to digitize the information, but to combine the information and use more complex information to show doctors more sophisticated overviews of risk etc." In that sense,

individual data points might not be critical, but in combination, they might show relevant information to the clinician. As one physician stated: "The complexity [of data] outpaces the availability [of clinicians] to digest the information". Within this discussion, the application of Business Analytics or Machine Learning methods was proposed as helpful to counteract this complexity. An intuitive visualization is thereby key to filter out the relevant information. "It's important to quantify and visualize the results from such analyses, e.g. % likelihood of deterioration". Especially information concerning the potential risk is not yet assessed in detail, even though unnecessary readmissions could be avoided with this knowledge. "The information of risk assessment of a patient is collected, but not really used. If that information was visualized properly (e.g. a different light for a high-risk patient in ED), that would be very helpful."

This information could be both helpful for treatment of individual patients as well as on a more organizational level. For this purpose, aggregated data for each DRG group or specialty could be displayed to improve hospital coordination and management. On an individual level, the risk for each patient could support clinicians to determine the best time of patient discharge.

5   Discussion

In this study, we identify decision makers and influencing factors in the patient discharge process and for risk of readmission and shortly discuss the potential of data analytics and visualization in the healthcare context. As the first part of a mixed method study, we develop semi-structured focus groups interviews that are carried out at a not-for-profit tertiary Australian hospital group. The results of the interviews show similar findings as our initial literature review considering decision makers and criteria in patient discharge, but give a deeper understanding of the discharge negotiation.

The analysis of these focus groups results in five propositions on the influencing factors on length of stay and risk of readmission in private hospitals. Our aim is to further develop these propositions into a testable model and derive hypotheses on the relationships between these influencing factors. For this purpose, we will collect data on patient episodes at the case hospital to further specify our proposed theoretical framework in a follow-up study. By following a mixed methods approach, the qualitative results of the focus group interviews can be further supported by quantitative evidence and therefore strengthen our initial results. Thus, the identified stakeholders involved in the patient discharge decision can be supported during this process by utilizing data-driven insights to find the optimal time of patient discharge. The results of the focus groups also show a high interest and applicability of data analytics in the healthcare context to enable faster and more evidence-based decision making.

This study aims at providing a deeper understanding into the patient discharge process and gives suggestions on how the use of data analytics could support this process in the future. From a research perspective, the quantification of influencing factors on patient

length of stay adds to the current understanding of criteria in patient discharge from qualitative studies. Based on these initial results, future studies could use the identified features to address issues related to patient discharge such as the detection of patients at high risk of readmission. This, in turn, could help practitioners to make more evidence-based decisions in the patient discharge process.

The results of this study have to be considered under certain limitations. First, the participants of the focus group were selected from a single hospital group. To provide generalizable results, further studies have to be conducted at different sites. Second, the propositions developed in this paper are not yet quantitatively evaluated and are based on the authors' interpretation of the qualitative results. This restriction will be approached in a follow-up study using patient episode data at the hospital under study.

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