

Emergent barriers to the lean healthcare journey: baronies, tribalism and scepticism

Abstract

Healthcare systems are essential service organisations for citizens. However, the increasing demand for healthcare provisions and limited resources are challenging the public healthcare system to its limit. To respond to these constraints, healthcare managers and practitioners have worked together to adapt industrial practices of process improvements, such as lean production, to healthcare operations. Although lean has gained some traction in the complex healthcare ecosystem and provided several benefits, its journey has been challenged by contextual barriers not encountered in manufacturing settings. Amongst these barriers, the literature identifies professionalism, implementation fidelity, and the need for evidence-based research as being the most disruptive to lean implementation. These emergent barriers have impacted on the implementation and sustainability of lean in healthcare, and scholars have called for empirical studies to provide an in-depth understanding of these issues to fill this knowledge gap. This study aimed to empirically investigate the impact of these barriers using an exploratory case study in three emergency areas of a public healthcare system. Thirty-seven semi-structured interviews were conducted with nurses, physicians, coordinators, and lean management consultants. Underlying barriers and enablers relating to these three emergent barriers were identified. Research propositions are provided that identify baronies, tribalism and scepticism as being the main elements that constrain the implementation and sustainability of lean in healthcare operations. The concepts of value destruction and balanced centricity were introduced to provide an in-depth understanding of the impact of these emergent barriers.

Keywords: balanced centricity; barriers; lean healthcare; process improvements;
professionalism; value destruction

1. Introduction

The healthcare system is a complex ecosystem that must balance multiple stakeholders' aspirations, the pressure to improve performance and reduce cost add pressure to provide a timely service (Verleye *et al.*, 2017; Williams and Radnor, 2018b). For instance, public healthcare must handle government budget constraints and pressure from taxpayers (Berwick *et al.*, 2008; Radnor and Walley, 2008). In contrast, the private healthcare sector struggles with pressure from investors and stakeholders that expect to maximise the profits in a constrained sector (Briggs, 2009). Healthcare, whether privately or publicly managed, is a system that involves a range of complex processes including: hospital management, pharmacy, catering, management areas (finance, billing, human resources), laundry services, wards, emergency departments, theatres, reception and security (Drotz and Poksinska, 2014; Escuder *et al.*, 2018). Healthcare organisations require an immense effort to provide timely care to patients including the management and coordination of resources, processes and people. In this context, different organisational, behavioural and operational issues emerge, and challenge healthcare managers, practitioners and policymakers alike (De Souza and Pidd, 2011; Burgess and Radnor, 2013). In order to address these issues, and deliver value to patients, healthcare managers and practitioners have turned to implementing quality and process improvement approaches, including those developed by the automotive industry (Womack *et al.*, 1990; Volochtchuk and Leite, 2021). One of these approaches is 'lean thinking' which is inspired by the main elements of the Toyota Production System (TPS) and primarily widely used by manufacturers in the West (Womack and Jones, 1997).

The tenets of the lean approach are anchored on an organisation's continuous process improvements, waste reduction, and a focus on increasing value-added activities. These concepts

were adapted and transferred from their manufacturing origins, into healthcare operations, which later became known as lean healthcare (e.g. Radnor and Osborne, 2013; Leite and Vieira, 2015). Over the years, lean in healthcare has been implemented with positive results, having a significant impact on quality, cost, time, and satisfaction of both staff and patients (Mazzocato *et al.*, 2010; Papadopoulos *et al.*, 2011). However, as the prominence of lean in healthcare increased, the sustainability of its implementation emerged as more challenging, with reports of low rates of success (e.g. Dorval *et al.*, 2019; Leite *et al.*, 2020a).

Healthcare is a complex ecosystem with unique characteristics (Drotz and Poksinska, 2014; Escuder *et al.*, 2018) and interdependency between human action, organisations, processes and a wider system context (Mannion *et al.*, 2009; Fulop and Robert, 2015). In healthcare, the influences come from stakeholders' aspirations (e.g. patients' needs) which have a direct impact in operational processes. As observed by Osborne *et al.* (2012) patients are not passive actors in service consumption, instead they play an important role in service co-production, and therefore, directly influence the process. Fournier and Jobin (2018) shed light upon another stakeholder influence, advocating that physicians have professional dominance over other stakeholders, creating difficulties for staff members engagement and empowerment, leading to the creation of inhibitors that constrain the lean journey in healthcare (De Souza and Pidd, 2011; Walton *et al.*, 2018).

Several challenges towards sustaining the implementation of lean in healthcare have been documented (e.g. Fine *et al.*, 2009; Grove *et al.*, 2010; Costa and Godinho Filho, 2016), with some studies describing a list of common barriers. However, despite these studies, in-depth empirical investigations of contextual inhibitors of improving healthcare operations are limited (Radnor *et al.*, 2012; Akmal *et al.*, 2020; Leite *et al.*, 2020a; Lindsay *et al.*, 2020). One of the

reported contextual barriers (Kim et al., 2006) suggests multiple segments of healthcare often work as autonomous silos. This idea of compartmentalization, or professional and functional silos, where healthcare professionals think narrowly about their unit is a contextual barrier to lean, and is often termed as professionalism or professional boundaries (e.g. De Souza and Pidd, 2011; Isfahani *et al.*, 2019; Akmal *et al.*, 2020; Lindsay *et al.*, 2020).

The fidelity of implementing lean versus the adaptations required, or recognising the difficulties in transferring lean from manufacturing into a healthcare setting is reported to inhibit the implementation of lean (Gao and Gurd, 2019). Related constraints include fear of the unknown, lean terminology, and different characteristics of healthcare (i.e. dealing with people and not products) (e.g. Kim *et al.*, 2006; Reijula and Tommelein, 2012; Savage *et al.*, 2016). The complexity of the clinical setting can also have an impact on fidelity issues, particularly the technical, social, institutional and political context of healthcare (Glouberman and Zimmerman, 2002).

Despite these constraints, lean has been accepted by some healthcare organisations as an approach to improve their services. However, universally it remains an underdeveloped practice in this sector. One of the prominent issues is that the majority of the implementations have been carried out in piecemeal way, raising uncertainties about the effectiveness of lean in healthcare (Brandao de Souza, 2009; Burgess and Radnor, 2013; Portela *et al.*, 2015). This issue is not about the challenges to transfer and use lean in the clinical context (e.g. implementation fidelity), but instead it tackles the underlying difficulties to measure and determine the real impact of the results and benefits that lean brings to healthcare operations. This issue is also influenced by the lack of knowledge, skills and experience of working with lean in healthcare, which leads to underestimating the benefits that lean can bring to the clinical setting. This raises another

contextual barrier in healthcare: the need for evidence-based research to support the implementation of lean in healthcare (e.g. De Souza and Pidd, 2011; Akmal *et al.*, 2020; Leite *et al.*, 2020b). The main challenge to building an evidence base is the replication of study designs (Andersen *et al.*, 2014), which do not allow for the understanding of contextual factors which is needed to translate the findings from one setting to another.

Although we have seen an increasing interest in investigating inhibitors of lean in healthcare, most of this work has focused on addressing more descriptive and ostensible aspects of these barriers (e.g. De Souza and Pidd, 2011; Aij *et al.*, 2013; Escuder *et al.*, 2018). However, in-depth studies about the impact of emergent and contextual barriers to implement lean in healthcare, such as professionalism, implementation fidelity and, the need for evidence-based, have been overlooked within the literature. This study therefore aims to empirically investigate the impact of these contemporary barriers. Collectively, the study provides new understanding of the emergent barriers in the lean healthcare journey and responds to the recent calls for further empirical research on these issues (e.g. Isfahani *et al.*, 2019; Akmal *et al.*, 2020; Leite *et al.*, 2020a, 2000b; Lindsay *et al.*, 2020).

In achieving the paper's aims, the relevant literature is reviewed in relation to contextualising lean in healthcare and barriers to its implementation. Next, the research methodology is presented, along with an illustrative case study on the Brazilian public healthcare system. The empirical results identify the contemporary issues relating to the implementation of lean within the case organisation. Finally, together with the literature, the findings are discussed, and the contributions to knowledge and practice are provided.

2. Lean in Healthcare

The increasing global demand for healthcare services, motivated by emerging factors, such as aging population, pandemics, natural disasters, chronic illnesses, and an influx of patients in emergency departments, has driven healthcare operations to its limit in several countries (Leite, 2020). This situation puts added pressure on policymakers and managers to improve the system, which is constantly constrained by the lack of resources, such as finance, time and workforce (Sisko *et al.*, 2009; Williams and Radnor, 2018b).

In the improvement literature, this increasingly constrained situation in healthcare has been addressed over several decades, with healthcare scholars and practitioners applying different re-engineering methodologies in order to improve healthcare systems (e.g. Radnor and Boaden, 2008; Young and McClean, 2009; Waring and Bishop, 2010). However, the most prominent approach has been lean thinking (Mazzocato *et al.*, 2010; Burgess and Radnor, 2013; Volochtchuk and Leite, 2021). Lean in healthcare has been implemented worldwide, and studies have shown significant results, for example, the exponential growth of lean healthcare initiatives, positive results after implementation in hospitals' operations, development of tools and approaches, as well as new improvement trends in the clinical sector (Brandao de Souza, 2009; Radnor, 2010; Mazzocato *et al.*, 2012). Such results can be seen in the reductions of length of stay, admissions, costs, staff and patient movement, and overtime (e.g. Radnor *et al.*, 2006; Van Lent *et al.*, 2009; L'Hommedieu and Kappeler, 2010; Mazzocato *et al.*, 2010; Cima *et al.*, 2011).

These positive results and benefits have attracted a considerable number of distinguished healthcare companies worldwide towards lean adoption. Some examples of early lean healthcare adopters are Royal Bolton NHS Foundation Trust in the UK (Radnor, 2010), Thedacare Inc in the USA (Toussaint, 2009) and Flinders Medical Centre in Australia (Ben-Tovim *et al.*, 2008).

Despite examples of lean's successful implementation and added benefits in many of these healthcare organisations and others around the world, the literature also shows that the lean journey in healthcare (implementation and sustainability) faces several ostensible and underlying barriers that inhibit the success of the approach (Kim *et al.*, 2006; Poksinska, 2010; De Souza and Pidd, 2011; Leite *et al.*, 2020a).

2.1 Barriers to implementing lean in healthcare

Lean is traditionally acknowledged as a methodology originating from the manufacturing sector, which was adapted and transferred into the service sector, with prominence in healthcare operations (Bowen and Youngdahl, 1998; Ben-Tovim *et al.*, 2008). However, despite positive results, its implementation in healthcare faces several inhibitors that lead to low success rates (De Souza and Pidd, 2011).

Over the years, scholars have conducted empirical studies and literature reviews to understand barriers, enablers, challenges and trends for lean in healthcare (e.g. Bushell and Shelest, 2002, Young *et al.*, 2004, Jimmerson *et al.*, 2005; Kim *et al.*, 2007, Dickson *et al.*, 2008; Costa and Godinho Filho, 2016; Fogliatto *et al.*, 2019, Akmal *et al.*, 2020). Some reviews addressing lean barriers specifically in healthcare emerged in the 2000s. For instance, Poksinska's (2010) review of over 30 studies focused on the current state of lean healthcare implementation. This study provided a new set of barriers that constrained lean in healthcare, such as difficulties to convince staff that lean can work in healthcare (e.g. lack of real-life applications in healthcare). Another barrier was related to training in healthcare settings, because educators and practitioners did not come from a healthcare background it was difficult to reconcile lean manufacturing with lean healthcare. The organisational structure of healthcare also

emerged as a challenge for lean, due to the hierarchical structure of the clinical setting where physician are often the dominant decision-makers. Difficulties associated with this complex environment were also related to cooperation with other departments. These barriers were identified as unique inhibitors in healthcare settings, which were later confirmed by other empirical studies (e.g. Savage *et al.*, 2016; Leite *et al.*, 2020a). For instance, in the case of De Souza and Pidd's (2011) review of lean implementation in the UK's national healthcare service (NHS) they found new barriers that had not been encountered in manufacturing settings. These barriers are related to perception, healthcare professional skills, professional and functional silos and hierarchy.

Further empirical studies have contributed to understanding the emerging barriers specific to healthcare (Radnor *et al.*, 2006; Waring and Bishop De Souza and Pidd, 2011; Dixon-Woods *et al.*, 2013; Portela *et al.*, 2015; Akmal *et al.*, 2020; Lindsay *et al.*, 2020). These emergent barriers are not found in the manufacturing sector, they emerge from the complexity of the healthcare ecosystem, and are related to behavioural and organisational aspects. Thus, raising discussions about the influence of healthcare stakeholders in service delivery and lean implementation (c.f. Leite *et al.*, 2020b). A recent systematic literature review (Akmal *et al.*, 2020) analysed reasons for lean resistance in healthcare; the themes that emerged show medical professionalism logic impacts on lean implementation. The researchers argue that when lean is implemented in healthcare 'it challenges the key assumptions of the dominant logic of medical professionalism' (Akmal *et al.*, 2020, p. 5). Another example is an empirical case study conducted by Lindsay *et al.* (2020) which took place in an NHS organisation with multi-disciplinary team members. The study explored lean implementation through the lens of professionalism. Findings demonstrated that lean implementation is 'limited by medical

professionals' lack of engagement and leadership. Furthermore, the authors advocate that lean encounters challenges due to the complexity of the healthcare environment, and 'this complexity appears in the form of professional status with corresponding power and intra-professional demarcations acting as a barrier to spreading and sustaining lean throughout the organisation' (Lindsay *et al.*, 2020, p.11).

These contextual lean inhibitors have been challenging healthcare managers and practitioners alike. In that sense, scholars have called for an in-depth understanding of the social dimensions of the lean in healthcare, arguing that this could play a role in explaining the divergent results in manufacturing and healthcare contexts (Radnor *et al.*, 2012; Rich and Piercy 2013; Bortolotti *et al.*, 2018, Akmal *et al.*, 2020; Lindsay *et al.*, 2020). This study responds to these calls and advances our understanding of the role of professionalism, implementation fidelity and the need for an evidence-based approach to lean healthcare. Thus, we aim to empirically identify the underlying impact of these emergent healthcare inhibitors on the lean journey. Until now these inhibitors have been identified as being problematic to the implementation of lean but how they manifest in practice is unclear. This empirical study explores these further within the context of emergency care to provide greater clarity to scholars and practitioners alike.

3. Methodology

This research was based on a qualitative approach, undertaking exploratory illustrative case studies within three emergency departments in the Brazilian public healthcare system. The use of case studies is considered by many as a valid empirical approach to investigate a contemporary

phenomenon within a real-life context, as the focus of the study cannot be separated from the context where it occurs (Yin, 2014; Eisenhardt, 1989).

Case studies are also a common practice in operations management (e.g. Karlsson and Åhlström, 1996; Yadav *et al.*, 2018). This methodological approach has been used by researchers investigating lean in healthcare (e.g. Mazzocato *et al.*, 2012; Yadav *et al.*, 2018; Leite *et al.*, 2020a). For example, when analysing lean implementation in an NHS organisation, Lindsay *et al.* (2020) used a case study to understand the impact of professionalism on lean. The complex nature of healthcare (Drotz and Poksinska, 2014) demands a consistent methodological approach, that facilitates and provides access to primary data. The use of a case study allowed us to conduct in-depth, semi-structured interviews with nurses, physicians and coordinators, as well as to observe first-hand challenges and benefits of the lean implementation in the case emergency departments.

3.1 Case Description: Brazilian public healthcare system

The Brazilian public healthcare system, also known as the Unified Healthcare System (UHS), adopts a similar universal coverage model used in other countries, such as Canada (Medicare) and the United Kingdom (National Healthcare System – NHS). Services are based on the needs of the user and are free at the point of care (Paim *et al.*, 2011). The fact that there is no direct payment into the system does not reduce the pressures and critiques from taxpayers, who demand timely healthcare assistance and a reasonable level of service (Berwick *et al.*, 2008; Paim *et al.*, 2011). This situation puts pressure on policymakers and managers to continually improve the system in light of increased demand for services and lack of resources (Sisko *et al.*, 2009; Williams and Radnor, 2018b).

Although lean has already been implemented in several Brazilian hospitals and emergency departments, there are no organisational strategies and directions that currently exist to make lean part of the UHS. Implementations have been segmented in different states of the country, mostly motivated by results from private healthcare experiences, and where public healthcare managers need to improve the performance and service delivery.

This empirical study was conducted with emergency departments that had implemented lean. The decision to collect data from these Brazilian hospitals was based on the willingness and availability of the case sites to participate in the study. In addition, the UHS is a public healthcare system that reflects the similar '*modus operandi*' and problems faced by several public healthcare systems around the world.

3.2 Case Access and Data Collection

Understanding that lean implementation in the UHS provides a suitable field study for our research aim, we asked for access to three emergency units that have implemented lean. In order to avoid disruptions to the units' work, the management team decided to give access to two urgent and emergency departments, and one accident and emergency department (trauma centre). Thirty-two semi-structured interviews were conducted with nurses, physicians and coordinators who have been working with the new lean model (see Table 1).

...insert table 1 about here...

The interview questions largely focused on the challenges to implementing lean. For instance, interviewees were asked to share their main difficulties in implementing and using lean, as well as perceived challenges for the success of implementing lean in the healthcare environment. Furthermore, in order to gain some professional insights about the challenges of implementing

lean, five interviews were conducted with lean specialists from across the country. These specialists are lean management consultants that were selected based on their expertise in the area of lean. For instance, academics, book writers, keynote speakers, and pioneers in lean healthcare in Brazil (see appendix I for detailed profile). These lean management consultants provided an external and comparative view of the challenges to sustain lean implementation in healthcare. Such an approach is encouraged by Saunders (2011) who argues that interviews with practitioners and experts in the field are a sound method to access the data needed.

3.1 Data Analysis

The 37 interviews were audio recorded, transcribed verbatim and translated from Portuguese to English. The data were analysed using a thematic analysis, which is one of the most common methods of qualitative data analysis. It allows an in-depth contact with the data to support the coding and tracking of the data (Braun and Clarke, 2006). The use of a thematic analysis in the operations management field is common practice amongst researchers (Mazzocato *et al.*, 2010; Radnor and O'Mahoney, 2013; Gao and Gurd, 2019).

The procedure to analyse the data followed an adapted model suggested by Braun and Clarke (2006). This model has six main steps of thematic analysis, from initial codes to interpreting the data: first step, familiarizing with data and order; second step, constructing initial codes; third step, reading and searching for themes; fourth step, reviewing themes; fifth step, defining and naming themes; and finally, the sixth step, interpreting the data and producing the report. This standardized model of thematic analysis has been previously used in the operations management field (e.g. Radnor and Johnston, 2013) during the investigation of lean in the UK

government. The initial coding of the data was undertaken by one member of the research team and then checked by two other members of the team.

4. Findings

The thematic analysis of the interview data identified ten themes relating to the barriers that constrain the lean implementation and sustainability in healthcare (Table 2). These themes were then analysed in relation to the three theoretical themes that emerged from the literature; professionalism, implementation fidelity, and the need for evidence-based research. The themes from the empirical data are presented in relation to the three lean barriers emerging from the literature. The interview data provide a greater understanding and granularity to how these three barriers are experienced in practice. Quotes from the interview data are used for illustrative purposes.

...Insert Table 2 About Here...

4.1 Professionalism

Professionalism is an emergent barrier in healthcare operations and in the context of improvement relates to the influence of physician and staff behaviour. From the data analysed, four barriers relating to professionalism emerged; the conflict between physicians and nurses, functional silos, physicians with perceived professional dominance, and professional silos.

The ‘conflict between physicians and nurses’ emerged as a central theme related to professionalism, and the analysis showed that this conflict disrupts the teamwork environment and reduces the levels of cooperation across these two professional groups. In the emergency units, some nurse participants believed physicians were not always performing their activity,

which they equated to creating a lack of commitment and engagement, as one nurse participant from the emergency unit explained (see quote 1):

Quote 1: ‘So, some of the physicians, they behave like they are doing a favour for all of us, you know... as professionals, some of them don’t care if they have a shift to fulfil, they’re here being paid for, but don’t care... I have to deal with problems that are not my responsibility, but physicians’ duties... I have to tell them (physicians), look: ‘I don’t have to explain to the patient, who is complaining about the long waiting time; just because you’re not doing your job’. (NUR_ED_4)

What was observed during the data collection, was a two-way conflict, nurses are unsatisfied with physicians’ behaviour, and vice-versa. These conflicts create and impact on the daily routine, as a physician participant explains (see quote 2):

Quote 2: ‘I know that there are many who work in the emergency room and just don’t care, or simply don’t learn anything different in their routine... I really think that the employees who are here and don’t want to improve anything shouldn’t be here. There are other cases when they (the nurses) make vague complaints about the physicians’ work, and we know it is just lies because they just want to find someone to blame... it’s hard to work like this because, in the end, it affects our job’. (PHY_AE_3)

When carrying out the thematic analysis several codes related to this theme (conflict between physicians and nurses) emerged, such as issues amongst professionals, an inability to cooperate with others, professional behaviour, negative influence of staff behaviour and lack of commitment. Some of these barriers have been highlighted in the literature by Leite *et al.*,

(2020a), the authors observe that these are meaningful inhibitors in the daily routine of healthcare operations, hence, affecting the lean journey in healthcare.

Functional and professional silos are also barriers that affect the stability of the healthcare operation and lean sustainability. 'Functional silos' are related to departmentalisation and cross-departmental issues, where there is little or no cooperation between and amongst departments. In the emergency areas, this was found to affect the focus on patient and the operational flow. As one of the lean management consultant participants explained (see quote 3):

Quote 3: 'People do things just for their own department and don't know the next process the patient is going through, that is, what is the importance in delivering the patient so that they flow in the best possible... 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 and etc. So, these are units that work alone and don't know the impact they're causing on other departments. I think this is a great barrier; we must overcome in order to sustain the improvements. (CONS_2)

Different from functional silos, the 'professional silos' are related to professional overprotection and its impact on healthcare operations. The functional silos represent a challenge to bring teams and groups of employees to work together, rather than in isolation. In the emergency unit, this issue was found as a prominent inhibitor that unites professionals in their functional groups (see quote 4), but does not create collaboration between different working groups:

Quote 4: 'The nursing team is closed in its group, so are the physicians... there is no relationship or help between them, they sometimes try, but it isn't that harmonious... there's an alliance amongst the physicians, amongst the nurses, the technicians and etc. But, can we unite all these groups? I don't think so'. (PHY_ED_5)

Functional and professional silos are common issues in lean healthcare and barriers to the flow of patients, goods and information, and consequently, if improved could improve the levels of collaboration across the entire system. Similarly, ‘physicians with perceived professional dominance’ also emerged as an obstacle relating to professionalism. The traditional ‘medical model’ supports autonomy and professional dominance, which implies hierarchy and may limit cooperation with the other groups. For Currie *et al.* (2009), in order to maintain their professional status and legitimise their positions, healthcare professionals use a range of strategies to defend existing professional boundaries. One of the lean management consultants explained that it was paramount for physicians to understand their (leadership) role within the team in improving the operation and providing support for their team, when requested (see quote 5):

Quote 5: ‘It is difficult for a physician 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’. (CONS_1)

4.2 Implementation Fidelity

Implementation fidelity is another emergent barrier in healthcare, and this represents the difficulties in transferring lean from its origins of manufacturing to healthcare settings. From the data analysed, we found three barriers that underpin this issue: public organisation influence, consideration of the healthcare context, and the politicised context of healthcare. We also found an enabler: adapt and train to meet healthcare needs.

The ‘public organisation influence’ emerged as the main theme related to implementation fidelity. This is a barrier that represents the bureaucracy, pressures from the system, and organisational structure. These prominent issues inhibit attempts to improve processes and

influence the public administration culture. A physician explains the influence of the bureaucratic structures that impede healthcare operations (see quote 6):

Quote 6: 'The bureaucratic style of the 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, things are slow, which makes it difficult to work with'. (PHY_ED_7)

The 'politicised context of healthcare' is a common barrier that constrains the healthcare operations (e.g. Glouberman and Zimmerman, 2002). This theme tackles the political influence on healthcare and the effect on the operations, for instance, the hospital leadership usually is selected based on their political association with the current government, rather than technical abilities. This study also found the politicised context influenced the implementation of lean within the case organisations, unless an influential sponsor was present to support the changes. Without this sponsor it was difficult to sustain the long-term strategy of improvement. One physician from the emergency units explained how the politicised context works (see quote 7):

Quote 7: 'Some of these people are here because they're friends with the politicians... generally, they are there just to be a shill, a protocol, they sometimes have no technical abilities, but politics. It happens all the time here, like 'so if this person understands nothing, what is he doing here? Well it's because they know someone' (PHY_ED_4)

The 'consideration of the healthcare context' was a prominent theme in relation to fidelity of implementing lean. The necessity to avoid transferring the lean manufacturing directly into the healthcare setting is a unanimous agreement amongst the lean management consultants interviewed. They believe the focus should not be in the name (lean), but in a generic approach that will be implemented to support the improvement of healthcare operations (see quote 8).

Quote 8: 'The first time we talked about lean we almost got bitten! You don't need to use the name 'lean', it's all about going to the essentials, the basics, with simple solutions for the healthcare context... You show the benefits of the system that makes sense for their reality, trying not to use the terms of Toyota... The use of the manufacturing language, such as the Toyota System, is a mistake'. (CONS_5)

The importance of context was also observed by Bateman *et al.* (2014) who advocate to be adopted successfully lean must be adapted to its context, and it is vital to understand that lean is context dependent.

The theme 'adapt and train to meet healthcare needs' is also related to implementation fidelity; this is the first theme identified as enabling the implementation of lean in healthcare settings. This theme emphasised the lack of knowledge and experience in lean in healthcare. Due to its manufacturing origins, healthcare professionals often find it challenging to understand the original terminology and how to implement some of the lean tools and techniques. It is unlikely that any of the staff have received formal training in operations management or improvement as part of their clinical or management training. Therefore, organisations introducing lean and other improvement techniques need to develop the capability of their staff (see quote 9).

Quote 9: 'I think that's the first thing, understanding the mapping tools, understanding the idea of continuous flow and the idea of standardized work, and what this has to do with the improvement... then, you start getting in and making Kaizen events and getting results, and this is the fuel of change'. (CONS_4)

4.3 The Need for Evidence-Based Research

The final emergent barrier was the need for evidence-based research. This focuses on the maturity of lean in healthcare and the need to provide appropriate evidence and well-designed studies to test the adaptation and implementation of lean in healthcare settings. From our analysis, two themes emerged relating to this contemporary issue; enablers to support the change and results from similar contexts. Both themes focus on improving our understanding of implementing lean both in terms of theory and practice.

The theme ‘enablers to support the change’ addresses the need to have people involved, to promote the change during the lean journey. For example, top management support, leadership, physician and staff involvement. People are accountable for their workplace processes, and they feel engaged when they are involved and participating in improvement. However, not asking or involving people that work in the process, is likely to create resistance, because they will take it as an instruction or order, rather than suggestion and collaboration, as reports a nurse from the emergency unit (see quote 10):

Quote 10: ‘Since the moment you let the healthcare team know there is something to improve in their service, such as waiting time reduction, wow... then you see them participating. But not like sometimes it happens here, you say ‘it’ll be used from now on because it is an order’. No, we should show them why it is happening. You have to show them that they’re important in this, that it’s only possible because it happens through them’.

(NUR_AE_7)

This behaviour is confirmed by a lean management consultant who described the need to have people engaged and involved (see quote 11), as they know the local context and their work practices, and can therefore provide significant contributions:

Quote 11: 'If you do a project without having people involved, without having the physician, without having the pharmacist, it will create a barrier. They are going to say 'damn, they came here, did the mapping, they said that was the 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' (CONS_3).

In that sense, Andersen *et al.* (2014) argue that organisations should create an environment which encourages people's involvement in the process, enabling a holistic lean approach that embraces a culture of everyday improvement.

The theme 'results from similar context' emphasises the need to use other lean implementation cases in healthcare settings as examples to share with stakeholders during the lean implementation in healthcare. Clearly to share such information cases need to be well-designed and in sufficient detail for others to follow. However, one of the lean management consultants (see quote 12) suggested that that evidence required is already available due to the long history of lean (both in and outside of healthcare) and suggested that the medical staff need to associate this new approach with their reality, and understand that this is something that has already been implemented with positive results in their sector:

Quote 12: 'I think it is all about bringing this (cases in healthcare) and showing the wastes in the area of health so that people can assimilate what is going on... you introduce a new philosophy, such as lean, by saying: look, there are people out there doing this! For example, in the USA, in Canada, and also here in Brazil, we already have several examples'.
(CONS_01)

The call for a stronger evidence base for improvement in healthcare has been previously made (Dixon-woods and Martin, 2016). Interestingly, here the lean consultants are suggesting some of

the evidence is available but there is a need to share the learning more widely with those charged with implementing lean. Clearly, this needs to be in an accessible form to ensure we are limiting the temptation to reinvent the wheel when others have undertaken similar improvements elsewhere.

In this section, we reported the findings from the data analysis, which were represented by ten themes related to the three emergent barriers in lean healthcare. Initially, these themes emerged as barriers to implementing lean. However, as the data analysis progressed, some of the themes also emerged as enablers. These empirical data have provided a greater understanding of the overall impact of these themes on the lean implementation in healthcare.

5. Discussion

Lean implementation in healthcare has received exponential universal attention from academics and practitioners (Mazzocato *et al.*, 2010; Drotz and Poksinska, 2014). Through our research and review of the literature, we identified three prominent contextual barriers in healthcare operations: professionalism, implementation fidelity and the need for evidence-based research. To date, these barriers have received little attention from researchers, particularly in understanding how these manifests within practice. Leading to some academics calling for more in-depth studies (e.g. Leite *et al.*, 2020b; Lindsay *et al.*, 2020). Hence, by reviewing the current knowledge and analysing the data collected in the Brazilian healthcare system, our study aimed to provide an in-depth understanding of these barriers (Table 3). In this section, we discuss these findings and consider the impact of these three contemporary issues on lean implementation and sustainability.

...Insert Table 3 About Here...

5.1 Impact of professionalism on lean

Professionalism is a specific phenomenon found during lean implementation in healthcare and some academics have been trying to find evidence of its impact (e.g. De Souza and Pidd, 2011; Stanton *et al.*, 2014; Akmal *et al.*, 2020; Lindsay *et al.*, 2020). In our research we found four underlying inhibitors associated with professionalism that impact on the lean journey (Table 2). For example, conflicts between professional groups, functional and professional silos, as well as perceived professional dominance. Prominently, power and culture are two active elements in the healthcare structure (Fillingham, 2008; Waring and Bishop, 2010) that emerge as barriers to lean and they are represented by professional and functional silos within the fragmented structures of the healthcare system (Kim *et al.*, 2006; Radnor *et al.*, 2006; De Souza and Pidd, 2011). When working in silos, nurses and physicians are separated into professionally or departmentally isolated groups. This practice leads to significant impact on communication, interaction and, protectionism of professional boundaries (De Souza and Pidd, 2011), all of which are likely to work against lean practices of teamwork and decentralisation of power (Drotz and Poksinska, 2014).

In the emergency departments of the UHS, we identified tensions between physicians and nurses, as well as attributes associated with a traditional ‘medical model’ of healthcare which advocates professional hierarchy and dominance behaviour (e.g. Fournier and Jobin, 2018). For instance, a lean management consultant emphasised the new role of the physicians in healthcare, arguing that physicians need to reflect on their role and contribution within the ‘era’ of multi-professional working. In the literature, these conflicts between physicians and nurses (and possibly other professions), that emerge from professionalism, were initially identified by

Fillingham (2008), who describes the group of seniors professionals as ‘feudal baronies’ within healthcare institutions. These ‘baronies’ in the Brazilian healthcare system were identified by physicians towards nurses, as they argue that often senior nurses have many years of work experience in the same hospital, and therefore, may not see the necessity to improve the current process. ‘Feudal baronies’ are also present amongst the physicians; these physicians are described as being overprotective of their territory and position in healthcare settings, creating resistance to changes in traditional processes.

Overall, professionalism issues discussed in this study raise important implications for those embarking on the lean journey. First, tensions related to challenging the traditional medical hierarchy. According to Womack and Jones (1996) one of the lean principles is to provide timely value to the end customer, which in this case is the patient. Therefore, physicians have to coexist to support improvements that will benefit the patients, and consequently, healthcare processes. Second, and most crucial, professionalism issues motivate the ‘baronies’ behaviour within healthcare; they have to be identified in order to avoid troublesome behaviour that will act as a restraining force, hence, constraining the lean journey in healthcare. From the existing literature and our empirical data, we derive our first proposition, raising awareness of the professionalism impact on lean in healthcare:

Proposition 1 (P1): Professionalism issues in relation to professional boundaries and hierarchy ‘baronies’, can work as restraining forces that inhibit the implementation of lean in healthcare. Thus, to promote sustainable lean improvements healthcare professionals have to coexist with the aim to add value to patients.

5.2 Implementation fidelity impact on lean

Implementation fidelity represents the difficulties in implementing techniques adapted from manufacturing plants, to improve quality, safety and patient care in healthcare settings. This situation has been a challenge for healthcare managers and practitioners, as some lean implementations are superficial, with no sustainable changes, low rates of success, and are usually difficult to replicate (Dixon-Woods *et al.*, 2013; Drotz and Poksinska, 2014; Williams and Radnor, 2018a). For instance, McNicholas *et al.* (2019) report fidelity issues associated with the use of the lean improvement tool, Plan-Do-Study-Act cycle, by frontline staff. They concluded that fidelity in using improvement methods is challenging, and these should be considered as complex sociocultural interventions that also require significant technical skill. Similarly, Glouberman and Zimmerman (2002) outline that some of the difficulties to sustain change in healthcare emerge from the complexity of the setting, which includes challenging technical, social, institutional, and political context. The challenge is not only related to transferring lean from manufacturing to healthcare, but also the attempts to replicate improvement initiatives from healthcare to healthcare settings. Dixon-Woods *et al.* (2013) argue that this challenge often brings some disconcerting effects, such as failure to outperform the secular trend and the decline effect when improvements do not deliver equal, successful results during replication in the new context. Some suggest that evaluating improvement efforts too soon can result in these being unfairly judged as ineffective (Parry *et al.*, 2013).

The literature suggests that some of the challenges emerge because lean is context-dependent, where pure replications might not be sustained (Radnor *et al.*, 2012; Bateman *et al.*, 2014; Leite and Vieira, 2015). Moreover, some scholars argue that lean should not be directly transferred from manufacturing to a clinical context, as it does not take into account contextual

factors and the intense co-production reality of the sector (Andersen *et al.*, 2014; Osborne *et al.*, 2016). In our study of the emergency departments in the UHS, we found three barriers (public organisation influence, consideration of the healthcare context, and politicised context of the healthcare), and one enabler (adapt and train to meet healthcare needs) related to implementation fidelity. These barriers raise the need to understand the limitations that a public organisation and a politicised environment might bring to lean implementation. Issues of implementation fidelity also emphasises the importance of the context in which lean is implemented. De Souza and Pidd (2011) highlight the differences in manufacturing, where the production of the goods is often standard, and with low or controlled variety. Whereas, in healthcare one might conclude every patient is different. Therefore, our research proposes the enabler to ease issues related to fidelity of lean implementation, is the need to avoid directly transferring (adaption rather than adoption) lean concepts into the healthcare setting, and to assume that the context has a relevant influence on the implementation.

Overall, implementation fidelity has an impact on lean implementation and sustainability, and it raises the challenges to implement lean in the healthcare sector. The context must be considered and a ‘one size fits all’ approach needs to be challenged (Reijula and Tommelein, 2012; Williams and Radnor, 2018a). Similarly to this study in the UHS, Guimaraes and Carvalho (2014) advocate that in healthcare, there is a culture of ‘tribalism’ that increases with the public sector constraints of political contradictions, regulatory priorities, and high degrees of organisational complexity that do not seem to make lean healthcare immune to failure. Based on empirical data from emergency departments this study indicates a ‘tribalism’ culture in this environment, we therefore derive our second proposition that tackles the impact of implementation fidelity on lean:

Proposition 2 (P2): Healthcare is a complex setting with various forces that constrain transferring lean into a public service ‘tribal’ politicised environment. To ease lean implementation challenges, managers and practitioners must consider adapting lean into a ‘fit for purpose’ model, specifically in healthcare settings.

5.3 The need for evidence-based research impact on lean

Finally, the third contemporary issue we examined in this study is the need for evidence of the benefits and challenges of implementing the lean approach in this context. In a healthcare environment, professionals are trained to refer to evidence before taking action, and this sometimes leads to tensions and resistance to improving processes and adopting new approaches (Alexander and Hearld, 2009; Joosten *et al.*, 2009; Andersen *et al.*, 2014; Volochtchuk and Leite, 2021). Many of the studies in lean healthcare present positive results. However some also report limitations, such as fragmented implementation, weak design and methodology, affecting the validity and generalizations of results (Young and McClean, 2009; Alexander and Hearld, 2009; Burgess and Radnor, 2013). These limitations lead to challenges to provide evidence that supports lean as a suitable approach for healthcare improvement, hence, raising awareness for the need of well-designed improvement programmes supported by evidence-based research (Dixon-woods and Martin, 2016)

The fundamental problem according to Andersen *et al.*, (2014) is the replication of study designs with limited adaptations, which do not account for contingency factors needed to translate the findings from one setting to another. Radnor (2010) advocates that some lean interventions in traditional settings, such as manufacturing have well understood demand and

workflows, whereas in emergency departments it might be argued that demand is less predictable or unbalanced. Therefore, the results in healthcare will be limited if purely based on lean manufacturing examples. When referring to the lack of evidence of more comprehensive lean implementations Proudlove *et al.* (2008) argue that in hospitals there is still ‘much undergrowth to clear’ and that ‘a deeper appreciation of lean may be necessary’. Similarly, Williams and Radnor (2018a) and Portela *et al.* (2015) raise awareness about the ‘scepticism’ related to lean in a healthcare environment, and the scholars argue that it is still a challenge to outline what, why and when lean works in healthcare. Therefore, from our case studies, we identified two facilitators to tackle and ease this lack of evidence in healthcare: enablers to support the change, and results from a similar context.

The enablers to support the change are based on the involvement of people, especially in a clinical environment where many are accustomed to using diagnostics and rational thinking, requiring evidence to support decision-making. People engage and promote change when they are part of the process and make suggestions to improve their areas (Timmons *et al.*, 2014; Fournier and Jobin, 2018), and healthcare professionals need to be able to identify where lean can be successfully deployed (Williams and Radnor, 2018a). Our study found that a multi-professional working environment is vital to encourage change, because it supports a more holistic view of the process. The second enabler is related to the use of results from previous well-designed studies in the same or similar contexts to demonstrate lean is a suitable approach for a healthcare environment. Regardless of the ‘scepticism’, challenges and barriers towards the implementation of lean in healthcare, the literature provides examples with positive results demonstrating that lean has been successfully implemented (e.g. Ben-Tovim *et al.*, 2008; Radnor, 2010; Fogliatto *et al.*, 2020). This evidence confirms our findings that the use of similar

well-designed studies which are widely disseminated will contribute to overcoming the barrier of the lack of evidence. Such evidence will help to build engagement more widely across professional groups and address the ‘scepticism’ about the benefits of lean. Well-designed evaluation studies are also required to support learning and to allow sufficient time for the longer-term benefits to be captured. From this theoretical and empirical discussion, we derive our third and final proposition:

Proposition 3 (P3): In a healthcare environment, evidence about the maturity and results from lean is still an emerging issue and raises ‘scepticism’ amongst clinical staff. To overcome this situation and promote sustainable implementation, great involvement from healthcare professionals is needed accompanied by well-documented results of lean from similar contexts.

5.4 Emergent barriers and value destruction

The propositions presented in this study address the impact of emergent barriers on lean healthcare implementation and sustainability. They also highlight different stakeholders’ aspirations and influences in the lean healthcare journey, leading to further analyses of these contextual and behavioural inhibitors under the value destruction lens. The creation of value emerges from the contribution of multiple service network actors through resource integration and service exchange (Vargo and Lusch, 2008; Verleye *et al.*, 2017). When failure occurs in one or several parts of the network it might result in value destruction. For instance, if the needs and interest of patients and the public are not secured it creates imbalances and leads to value deterioration and destruction (c.f. Tax *et al.*, 2011; Verleye *et al.*, 2017). In our study, the three emergent barriers present characteristics of potential value destruction, for instance,

professionalism is based on professional hierarchy, dominance behaviour and territory overprotection from physicians and nurses, which we define as ‘baronies’. Implementation fidelity is illustrated by public service ‘tribalism’ and emerges from public organisation influence, co-production environment (patient’s influence) and politicized context of healthcare. The need for evidence-based research emerges from medical professionals who are trained to refer to the evidence before taking actions that raise tensions and resistance between lean and healthcare stakeholders and create ‘scepticism’. These barriers illustrate imbalances between stakeholders’ aspirations during lean implementation in complex service networks such as healthcare settings, leading to value destruction which is opposite of a fundamental lean principle (Womack and Jones, 1996; Verleye *et al.*, 2017).

In response to these disruptions during lean implementation, it is crucial to achieve the concept of balanced centrality, where the interests of multiple parties are secured (Gummesson, 2008). The importance of balanced centrality in a complex service network such as healthcare is discussed by Hillebrand *et al.* (2015). They advocate that it contributes to enhancing the effectiveness and performance of organizations which leads to creating economic advantages. In our study, three propositions strive to reach balanced centrality and ease the impact of emergent barriers during lean implementation in healthcare. In that sense, Figure 1 summarises this discussion about emergent barriers, value destruction and balanced centrality. The triangle represents the complexity of the healthcare environment; the dotted arrows are restraining forces that indicate each emergent barrier and their corresponding, prominent impact on lean; for instance, professionalism motivates ‘baronies’ behaviour in healthcare operations. The solid arrows illustrate stakeholders’ aspirations represented by the interplay between baronies, tribalism and scepticism, and their influence towards value destruction.

...Insert Figure 1 About Here...

In Figure 1, the codes P1, P2, P3 represent the three main propositions that bring balanced centrality. Overall, the results of this study show that professionalism is based on the interaction of physicians and nurses' creating healthcare 'baronies', which work as a restraining force on healthcare operations. Hence, focus on patient value-added activities and synergy between healthcare professionals might ease this contemporary issue. Next, the fidelity issues around implementation raised discussion about the transferring of lean into healthcare environments, and how lean needs to consider contextual barriers based on politicised organisations that often emerge as a 'tribalism' culture. It also highlights the need for careful adoption of lean into the healthcare context (fit for purpose) and the education and training of staff to carry out the change. Finally, the 'scepticism' issues relating to the lack of evidence to support the implementation of lean in amongst healthcare professionals was discussed. We raised the issue concerning lean maturity in these environments and suggest enablers based on people's involvement, sharing of learning (successes and failures) and well-designed empirical studies using methods such as before and after studies.

6. Conclusion

This paper aimed to understand the underlying impact of three emergent barriers in healthcare operations (professionalism, implementation fidelity and the need for evidence-based research) on lean implementation and sustainability. A case study of two emergency units and one accident and emergency department in the UHS was conducted, where 37 semi-structured interviews were carried out with physicians, nurses and lean management consultants (Table 1). The

thematic analysis employed raised underlying themes (seven barriers and three enablers) related to the emergent barriers in healthcare (Table 2).

In the discussion section, together with the literature, we considered the impact of each barrier on value destruction. From these discussions, propositions emerged to support academics and scholars and bring balanced centrality to lean implementation in healthcare (P1, P2 and P3). Overall, these results address and answer our research aim by empirically examining the impact of the contemporary issues in healthcare operations on lean implementation and sustainability.

6.1 Implications to knowledge

Our study contributes to knowledge by responding to ongoing calls for in-depth analysis of these emergent barriers in healthcare (e.g. (Radnor *et al.*, 2012; Rich and Piercy 2013; Bortolotti *et al.*, 2018, Isfahani *et al.*, 2019; Akmal *et al.*, 2020; Leite *et al.*, 2020b; Lindsay *et al.*, 2020). We empirically examine these barriers within a emergency setting to provide a greater understanding as to how these manifest within practice. Parts of our research confirm findings from other scholars (e.g. Akmal *et al.*, 2020 and Lindsay *et al.*, 2020). In addition, we identify and classify elements that constrain the lean healthcare journey in terms ‘baronies behaviour’, ‘tribalism culture’ and; ‘scepticism’.

This study contributes to the theory and practice of understanding how lean is implemented in practice. As well as providing greater clarity of the three barriers to lean in healthcare that have recently emerged from the literature. We also provide a conceptual model and three propositions that require further attention from scholars and practitioners. Here we propose that the three barriers are interconnected and can impact the construction of value during

lean implementation. The three propositions indicate how the inhibitors may be addressed and create balanced centricity which considers stakeholders' aspirations.

6.2 Implications to practice

For healthcare managers and practitioners, our research contributes to the identification of enablers for these emergent barriers. Because these barriers are context dependent and disruptive in healthcare, our propositions also work as enablers to support those involved in the lean journey. For instance, in relation to the professionalism barrier, our proposition suggests that healthcare professionals have to coexist in synergy and should primarily aim to add value to patients in order to promote sustainable lean improvements in the processes. This proposition supports the move to multi-disciplinary working which is being advocated by many international healthcare systems. In regard to tribalism culture and the difficulties to transfer lean into healthcare, we make suggestions to managers and practitioners to consider adapting lean into a 'fit for purpose' model to ease these challenges in healthcare. Finally, to overcome lean scepticism in healthcare, our proposition encourages healthcare managers to consider healthcare professionals' involvement as well as the use of tested results from similar contexts during the lean journey.

6.3 Future research

We expect the outcomes from this study to motivate future research within and outside the healthcare settings. Further research should empirically test the conceptual model and research propositions within this study which may help to address prominent enablers to improve the implementation success rates of lean, also known as driving forces to support the sustainable

implementation of lean. In addition, further investigation of the concept of value destruction and options to bring balanced centrality to lean implementation in healthcare is required. As this study focused on ‘open door’ or emergency areas, with unbalanced demand and strong co-production processes (e.g. Osborne *et al.*, 2016), we expect future related studies in areas with controlled demand within the healthcare and other staff groups (e.g. departments and clinical areas, such as pharmacy, catering, management areas (e.g. finance, billing, human resources), and supply chain management).

Conflict of interest statement

We have no conflicts of interest to disclose.

References

Aij, K. H., Simons, F. E., Widdershoven, G. A. M., & Visse, M. (2013). Experiences of leaders in the implementation of Lean in a teaching hospital - Barriers and facilitators in clinical practices: A qualitative study. *BMJ Open*, 3(10), 1–8. <https://doi.org/10.1136/bmjopen-2013-003605>

Akmal, A., Foote, J., Podgorodnichenko, N., Greatbanks, R. and Gauld, R., 2020. Understanding resistance in lean implementation in healthcare environments: an institutional logics perspective. *Production Planning & Control*, pp.1-15.

Alexander, J. A., & Hearld, L. R. (2009). Review: What Can We Learn From Quality Improvement Research? *Medical Care Research and Review*, 66(3), 235–271. <https://doi.org/10.1177/1077558708330424>

Andersen, H., Røvik, K. A., & Ingebrigtsen, T. (2014). Lean thinking in hospitals: Is there a cure for the absence of evidence? A systematic review of reviews. *BMJ Open*, 4(1), 1–8. <https://doi.org/10.1136/bmjopen-2013-003873>

- Bateman, N., Hines, P., & Davidson, P. (2014). Wider applications for Lean. *International Journal of Productivity and Performance Management*, 63(5), 550–568. <https://doi.org/10.1108/ijppm-04-2013-0067>
- Ben-Tovim, D. I., Bassham, J. E., Bennett, D. M., Dougherty, M. L., Martin, M. a, O’Neill, S. J., ... Szwarcbord, M. G. (2008). Redesigning care at the Flinders Medical Centre: clinical process redesign using “lean thinking”. *The Medical Journal of Australia*, 188(6 Suppl), S27-31. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/18341473>
- Berwick, D. M., Nolan, T. W., & Whittington, J. (2008). The Triple Aim: Care, Health, And Cost. *Health Affairs*, 27(3), 759–769. <https://doi.org/10.1377/hlthaff.27.3.759>
- Bhasin, S. (2012). Prominent obstacles to lean. *International Journal of Productivity and Performance Management*, 61(4), 403–425. <https://doi.org/10.1108/17410401211212661>
- Bortolotti, T., S. Boscari, P. Danese, H.A.M. Suni, N. Rich, and P. Romano. 2018. “The Social Benefits of Kaizen Initiatives in Healthcare: An Empirical Study.” *International Journal of Operations & Production Management* 38(2): 554–578.
- Bowen, D. E., & Youngdahl, W. E. (1998). “Lean” service: in defense of a production-line approach. *International Journal of Service Industry Management*, 9(3), 207–225. <https://doi.org/10.1108/09564239810223510>
- Brandao de Souza, L. (2009). Trends and approaches in lean healthcare. *Leadership in Health Services*, 22(2), 121–139. <https://doi.org/10.1108/17511870910953788>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Briggs, W. T. (2009). Emergency Department Crowding: A Call to Action in the New Year. *Journal of Emergency Nursing*, 35(1), 1. <https://doi.org/10.1016/j.jen.2008.12.011>
- Burgess, N., & Radnor, Z. (2013). Evaluating Lean in healthcare. *International Journal of Health Care*

- Quality Assurance*, 26(3), 220–235. <https://doi.org/10.1108/09526861311311418>
- Bushell, S. and Shelest, B., 2002. Discovering lean thinking at progressive healthcare. *The Journal for Quality and Participation*, 25(2), p.20.
- Cima, R. R., Brown, M. J., Hebl, J. R., Moore, R., Rogers, J. C., Kollengode, A., ... Deschamps, C. (2011). Use of Lean and Six Sigma Methodology to Improve Operating Room Efficiency in a High-Volume Tertiary-Care Academic Medical Center. *Journal of the American College of Surgeons*, 213(1), 83–92. <https://doi.org/10.1016/j.jamcollsurg.2011.02.009>
- Costa, L.B.M. and Godinho Filho, M., 2016. Lean healthcare: review, classification and analysis of literature. *Production Planning & Control*, 27(10), pp.823-836.
- Currie, G., N. Koteyko, and B. Nerlich. 2009. “The Dynamics of Professions and Development of New Roles in Public Services Organisations: The Case of Modern Matrons in the NHS.” *Public Administration* 87(2): 295–311.
- De Souza, L. B., & Pidd, M. (2011). Exploring the barriers to lean health care implementation. *Public Money and Management*, 31(1), 59–66. <https://doi.org/10.1080/09540962.2011.545548>
- Dixon-Woods M, and Martin G. (2016). Does quality improvement improve quality? *Future Healthcare Journal*, J2016;3:191-4. doi:10.7861/futurehosp.3-3-191 pmid:31098223
- Dixon-Woods M, McNicol S, Martin G. (2012) Ten challenges in improving quality in healthcare: lessons from the Health Foundation's programme evaluations and relevant literature. *BMJ quality & safety*. Oct 1;21(10):876-84.
- Dixon-Woods, M., Leslie, M., Tarrant, C., & Bion, J. (2013). Explaining Matching Michigan: an ethnographic study of a patient safety program. *Implementation Science*, 8(1), 70. <https://doi.org/10.1186/1748-5908-8-70>
- Dorval, M., Jobin, M.-H., & Benomar, N. (2019). Lean culture: a comprehensive systematic literature review. *International Journal of Productivity and Performance Management*, IJPPM-03-2018-0087. <https://doi.org/10.1108/IJPPM-03-2018-0087>

- Drotz, E., & Poksinska, B. (2014). Lean in healthcare from employees' perspectives. *Journal of Health, Organisation and Management*, 28(2), 177–195. <https://doi.org/10.1108/JHOM-03-2013-0066>
- Eisenhardt, K. M. 1989. "Building Theory from the Case Study Research." *Academy of Management Review* 14(4), pp. 532–550. doi:10.5465/ amr.1989.4308385.
- Escuder, M., Tanco, M., & Santoro, A. (2018). Major barriers in Lean health care: an exploratory study in Uruguay. *International Journal of Lean Six Sigma*, 9(4), 466–481. <https://doi.org/10.1108/IJLSS-06-2017-0062>
- Fine, B., Golden, B., Hannam, R., & Morra, D. (2009). Leading lean: a Canadian healthcare leader's guide. *Healthcare Quarterly*.
- Fillingham, D. 2008. *Lean Healthcare – Improving the Patient's Experience*. Chichester: Kingsham Press
- Fogliatto, F.S., Anzanello, M.J., Tonetto, L.M., Schneider, D.S. and Muller Magalhães, A.M., 2020. Lean-healthcare approach to reduce costs in a sterilization plant based on surgical tray rationalization. *Production Planning & Control*, 31(6), pp.483-495.
- Fournier, P. L., & Jobin, M. H. (2018). Medical commitment to Lean: an inductive model development. *Leadership in Health Services*, 31(3), 326–342. <https://doi.org/10.1108/LHS-02-2018-0015>
- Fulop, N. and Robert, G. (2015), "Context for successful quality improvement", Evidence Review, The Health Foundation, London, available at: www.health.org.uk/publication/contextsuccessful-quality-improvement (Accessed 20th August 2019).
- Gao, T., & Gurd, B. (2019). Organizational issues for the lean success in China: Exploring a change strategy for lean success. *BMC Health Services Research*, 19(1), 1–11. <https://doi.org/10.1186/s12913-019-3907-6>
- Glouberman, S., and B. Zimmerman. 2002. "Complicated and Complex Systems: what Would Successful Reform of Medicare Look like?" *Romanow Papers* 2: 21–53.
- Grove, A. L., Meredith, J. O., Macintyre, M., Angelis, J., & Neailey, K. (2010). UK health visiting:

- challenges faced during lean implementation. *Leadership in Health Services*, 23(3), 204–218.
<https://doi.org/10.1108/17511871011061037>
- Guimaraes, C. M., & Carvalho, J. C. De. (2014). Cultural change in healthcare organisations through lean practices. *European J. of Cross-Cultural Competence and Management*, 3(3/4), 212.
<https://doi.org/10.1504/EJCCM.2015.071959>
- Gummesson, E., 2008. Extending the service-dominant logic: from customer centricity to balanced centricity. *Journal of the Academy of Marketing science*, 36(1), pp.15-17.
- Hallam, C. R. A., & Contreras, C. (2018). Lean healthcare: scale, scope and sustainability. *International Journal of Health Care Quality Assurance*, 31(7), 684–696. <https://doi.org/10.1108/IJHCQA-02-2017-0023>
- Hillebrand, B., Driessen, P.H. and Koll, O. (2015), “Stakeholder marketing: theoretical foundations and required capabilities”, *Journal of the Academy of Marketing Science*, Vol. 43 No. 4, pp. 411-428.
- Hu, Q., Mason, R., Williams, S. J., & Found, P. (2015). Lean implementation within SMEs: A literature review. In *Journal of Manufacturing Technology Management* (Vol. 26).
<https://doi.org/10.1108/JMTM-02-2014-0013>
- Isfahani, H., Tourani, S., & Seyedin, H. (2019). Features and Results of Conducted Studies Using a Lean Management Approach in Emergency Department in Hospital: A Systematic Review. *Bulletin of Emergency and Trauma*, 7(1), 9–20. <https://doi.org/10.29252/beat-070102>
- Jimmerson, C., Weber, D. and Sobek II, D.K., 2005. Reducing waste and errors: piloting lean principles at Intermountain Healthcare. *The Joint Commission Journal on Quality and Patient Safety*, 31(5), pp.249-257.
- Joosten, T., Bongers, I., & Janssen, R. (2009). Application of lean thinking to health care: issues and observations. *International Journal for Quality in Health Care : Journal of the International Society for Quality in Health Care / ISQua*, 21(5), 341–347. <https://doi.org/10.1093/intqhc/mzp036>

- Karlsson, C., & Åhlström, P. (1996). Assessing changes towards lean production. *International Journal of Operations & Production Management*, 16(2), 24–41.
<https://doi.org/10.1108/01443579610109820>
- Kim, C. S., Spahlinger, D. A., Kin, J. M., & Billi, J. E. (2006). Lean health care: What can hospitals learn from a world-class automaker? *Journal of Hospital Medicine*, 1(3), 191–199.
<https://doi.org/10.1002/jhm.68>
- L’Hommedieu, T., & Kappeler, K. (2010). Lean methodology in i.v. medication processes in a children’s hospital. *American Journal of Health-System Pharmacy*, 67(24), 2115–2118.
<https://doi.org/10.2146/ajhp100151>
- Leite, H. dos R., & Vieira, G. E. (2015). Lean philosophy and its applications in the service industry: a review of the current knowledge. *Production*, 25(3), 529–541. <https://doi.org/10.1590/0103-6513.079012>
- Leite, H. (2021), "The impact of non-urgent patients in emergency departments' operations", *International Journal of Quality & Reliability Management*, Vol. 38 No. 4, pp. 932-954.
- Leite, H., Bateman, N., & Radnor, Z. (2020a). Beyond the ostensible: an exploration of barriers to lean implementation and sustainability in healthcare. *Production Planning & Control*, 7287, 1–18.
<https://doi.org/10.1080/09537287.2019.1623426>
- Leite, H., Radnor, Z. and Bateman, N., (2020b). Meaningful inhibitors of the lean journey: a systematic review and categorisation of over 20 years of literature. *Production Planning & Control*, pp.1-24.
- Lindsay, C. F., Kumar, M., & Juleff, L. (2020). Operationalising lean in healthcare: the impact of professionalism. *Production Planning & Control*, 1–15.
<https://doi.org/10.1080/09537287.2019.1668577>
- Mannion, R. Konteh, F. and Davies, H. (2009), 'Assessing organisational culture for quality and safety improvement: a national survey of tools and tool use', *Quality and Safety in Health Care*, 18(2), pp.

153-156.

- Marodin, G., & Saurin, T. A. (2015). Managing barriers to lean production implementation: Context matters. *International Journal of Production Research*, 53(13), 3947–3962.
<https://doi.org/10.1080/00207543.2014.980454>
- Mazzocato, P., Holden R. J., Brommels M., Aronsson H., Bäckman U., Elg M., & Thor J. (2012). How does lean work in emergency care? A case study of a lean-inspired intervention at the Astrid Lindgren Children's hospital, Stockholm, Sweden. *BMC Health Services Research*, 12(28).
- Mazzocato, P., Savage, C., Brommels, M., Aronsson, H., & Thor, J. (2010). Lean thinking in healthcare: a realist review of the literature. *Quality & Safety in Health Care*, 19(5), 376–382.
<https://doi.org/10.1136/qshc.2009.037986>
- McNicholas, C., Lennox, L., Woodcock, T., Bell, D. and Reed, J.E., 2019. Evolving quality improvement support strategies to improve Plan–Do–Study–Act cycle fidelity: a retrospective mixed-methods study. *BMJ quality & safety*, 28(5), pp.356-365.
- Osborne, S. P., Radnor, Z., & Nasi, G. (2012). A New Theory for Public Service Management? Toward a (Public) Service-Dominant Approach. *The American Review of Public Administration*, 43(2), 135–158. <https://doi.org/10.1177/0275074012466935>
- Osborne, Stephen P., Radnor, Z., & Strokosch, K. (2016). Co-Production and the Co-Creation of Value in Public Services: A suitable case for treatment? *Public Management Review*, 18(5), 639–653.
<https://doi.org/10.1080/14719037.2015.1111927>
- Paim, J., Travassos, C., Almeida, C., Bahia, L., & Macinko, J. (2011). The Brazilian health system: history, advances, and challenges. *Lancet*, 377(9779), 1778–1797. [https://doi.org/10.1016/S0140-6736\(11\)60054-8](https://doi.org/10.1016/S0140-6736(11)60054-8)
- Papadopoulos, T., Radnor, Z., & Merali, Y. (2011). The role of actor associations in understanding the implementation of Lean thinking in healthcare. *International Journal of Operations and Production*

Management, 31(2), 167–191. <https://doi.org/10.1108/01443571111104755>

Parry, G.J., Carson-Stevens, A., Luff, D.F., McPherson, M.E. and Goldmann, D.A., 2013.

Recommendations for evaluation of health care improvement initiatives. *Academic pediatrics*, 13(6), pp.S23-S30.

Poksinska, B. (2010). The Current State of Lean Implementation in. *Quality Management in Health Care*, Vol. 19, pp. 319–329.

Portela, M. C., Pronovost, P. J., Woodcock, T., Carter, P., & Dixon-Woods, M. (2015). Republished:

How to study improvement interventions: a brief overview of possible study types: Table 1.

Postgraduate Medical Journal, 91(1076), 343–354. <https://doi.org/10.1136/postgradmedj-2014-003620rep>

Proudlove, N., Moxham, C., & Boaden, R. (2008). Lessons for Lean in Healthcare from Using Six Sigma

in the NHS Lessons for Lean in Healthcare from Using Six Sigma in the NHS. *Public Money & Management*, 28(1), 27–34. <https://doi.org/10.1111/j.1467-9302.2008.00615.x>

Radnor, Z. (2010). Review of Business Process Improvement Methodologies in Public Services.

Advanced Institute of Management Research (AIM), (May), 1–94.

Radnor, Z., & Boaden, R. (2008). Lean in Public Services—Panacea or Paradox. *Public Money &*

Management, (February), 3–8. <https://doi.org/10.1111/j.1467-9302.2008.00610>

Radnor, Z.J., Holweg, H., and Waring, J. (2012) “Lean in Healthcare: The Unfilled promise?” *Social*

Science and Medicine Volume 74, Issue 3, February 2012, pp 364-371 [4] ISSN 0277-9536

Radnor, Z., & Johnston, R. (2013). Lean in UK Government: internal efficiency or customer service?

Production Planning & Control, 24(10–11), 903–915.

<https://doi.org/10.1080/09537287.2012.666899>

Radnor, Z., & O’Mahoney, J. (2013). The role of management consultancy in implementing operations

- management in the public sector. *International Journal of Operations & Production Management*, 33(11/12), 1555–1578. <https://doi.org/10.1108/IJOPM-07-2010-0202>
- Radnor, Z., & Osborne, S. P. (2013). Lean: A failed theory for public services? *Public Management Review*, 15(2), 265–287. <https://doi.org/10.1080/14719037.2012.748820>
- Radnor, Z., & Walley, P. (2008). Learning to walk before we try to run: Adapting Lean for the public sector. *Public Money & Management February 2008*, 41(2), 325–330. <https://doi.org/10.1111/j.1467-9302.2008.00613.x>
- Radnor, Z., Walley, P., Stephens, A., & Bucci, G. (2006). Evaluation of the Lean Approach to Business Management and its Use in the Public Sector. *Government Social Research, Edinburgh*, (20).
- Reijula, J., & Tommelein, I. D. (2012). Lean hospitals: A new challenge for facility designers. *Intelligent Buildings International*, 4(2), 126–143. <https://doi.org/10.1080/17508975.2012.680429>
- Salgado, E. G., & Dekkers, R. (2018). Lean Product Development: Nothing New Under the Sun? *International Journal of Management Reviews*, 20(4), 903–933. <https://doi.org/10.1111/ijmr.12169>
- Savage, C., Parke, L., Von Knorring, M., & Mazzocato, P. (2016). Does lean muddy the quality improvement waters? A qualitative study of how a hospital management team understands lean in the context of quality improvement. *BMC Health Services Research*, 16(1), 1–9. <https://doi.org/10.1186/s12913-016-1838-z>
- Saunders, M.N. (2011), *Research Methods for Business Students*, 5/e. Pearson Education India, 6th ed., Pearson, London.
- Sisko, A., Truffer, C., Smith, S., Keehan, S., Cylus, J., Poisal, J. A., ... Lizonitz, J. (2009). Health Spending Projections Through 2018: Recession Effects Add Uncertainty To The Outlook. *Health Affairs*, 28(Supplement 1), w346–w357. <https://doi.org/10.1377/hlthaff.28.2.w346>
- Stanton, P., Gough, R., Ballardie, R., Bartram, T., Bamber, G. J., & Sohal, A. (2014). Implementing lean

- management/Six Sigma in hospitals: beyond empowerment or work intensification? *International Journal of Human Resource Management*, 25(21), 2926–2940.
<https://doi.org/10.1080/09585192.2014.963138>
- Tax, S.S., Smith, A.K. and Murali, C. (2011), “Tangled web or a tidy knot? Assessing failure and recovery in a service network”, *Naples Forum on Service*, Capri, 14-17 June.
- Timmons, S., Coffey, F., & Vezyridis, P. (2014). Implementing lean methods in the Emergency Department. *Journal of Health Organization and Management*, 28(2), 214–228.
<https://doi.org/10.1108/jhom-10-2012-0203>
- Toussaint, J. 2009. “Why Are we Still Underperforming?” *Frontiers of Health Services Management* 26(1) :27.
- Van Lent, W. A. M., Goedbloed, N., & van Harten, W. H. (2009). Improving the efficiency of a chemotherapy day unit: Applying a business approach to oncology. *European Journal of Cancer*, 45(5), 800–806. <https://doi.org/10.1016/j.ejca.2008.11.016>
- Vargo, S.L. and Lusch, R.F. (2008), “Service-dominant logic: continuing the evolution”, *Journal of the Academy of Marketing Science*, Vol. 36 No. 1, pp. 1-10
- Verleye, K., Jaakkola, E., Hodgkinson, I.R., Jun, G.T., Odekerken-Schröder, G. and Quist, J., 2017. What causes imbalance in complex service networks? Evidence from a public health service. *Journal of Service Management*.
- Volochtchuk, A.V.L. and Leite, H. (2021), "Process improvement approaches in emergency departments: a review of the current knowledge", *International Journal of Quality & Reliability Management*, Vol. ahead-of-print No. ahead-of-print.
- Walton, S., Rotter, T., Hartfield, D., Scott, S. D., Newton, A. S., Flynn, R., & Fiander, M. (2018). The sustainability of Lean in pediatric healthcare: a realist review. *Systematic Reviews*, 7(1), 1–17.
<https://doi.org/10.1186/s13643-018-0800-z>

- Waring, J. J., & Bishop, S. (2010). Lean healthcare: rhetoric, ritual and resistance. *Social Science & Medicine (1982)*, 71(7), 1332–1340. <https://doi.org/10.1016/j.socscimed.2010.06.028>
- Waring, J. J. & Bishop, B. 2010. “Lean healthcare: Rhetoric, ritual and resistance”. *Social Science & Medicine* 71: 1332-1340.
- Williams, S., & Radnor, Z. (2018a). An integrative approach to improving patient care pathways. *International Journal of Health Care Quality Assurance*, 31(7), 810–821. <https://doi.org/10.1108/IJHCQA-07-2017-0132>
- Williams, S., & Radnor, Z. (2018b). Using bandwidths to visualize and improve patient pathways. *Public Money & Management*, 38(1), 21–28. <https://doi.org/10.1080/09540962.2018.1389495>
- Womack, J. P., D. T. Jones, and D. Roos. 1990. *Machine That Changed the World*. New York: Simon and Schuster.
- Womack, J. P. and D. T. Jones. 1997. Lean Thinking—Banish Waste and Create Wealth in Your Corporation. *Journal of the Operational Research Society* 48 (11): 1148–1148.
- Yadav, G., Seth, D., & Desai, T. N. (2018). Prioritising solutions for Lean Six Sigma adoption barriers through fuzzy AHP-modified TOPSIS framework. *International Journal of Lean Six Sigma*, 9(3), 270–300. <https://doi.org/10.1108/IJLSS-06-2016-0023>
- Yadav, V., Jain, R., Mittal, M. L., Panwar, A., & Sharma, M. K. (2019). An appraisal on barriers to implement lean in SMEs. *Journal of Manufacturing Technology Management*, 30(1), 195–212. <https://doi.org/10.1108/JMTM-12-2017-0262>
- Yin, R. K. 2014. *Case Study Research. Design and Methods*. 5th ed. London, UK: Sage.
- Young, T., & McClean, S. (2009). Some challenges facing Lean Thinking in healthcare. *International Journal for Quality in Health Care : Journal of the International Society for Quality in Health Care / ISQua*, 21(5), 309–310. <https://doi.org/10.1093/intqhc/mzp038>
- Yousri, T. A., Khan, Z., Chakrabarti, D., Fernandes, R., & Wahab, K. (2011). Lean thinking: Can it

improve the outcome of fracture neck of femur patients in a district general hospital? *Injury*, 42(11), 1234–1237. <https://doi.org/10.1016/j.injury.2010.11.024>

Appendix I – Lean Consultants Profile

Consultant I

He has previously worked in the manufacturing industry implementing lean and WCM for 10 years. Currently, he is a lean healthcare consultant providing in-company training and support on lean implementation. He has a master's degree in lean service and is specialized in lean healthcare implementation.

Consultant II

He is a professor of operations and supply chain management in the South of Brazil and has focused his research in lean healthcare. In the last 10 years he has been working as a consultant to healthcare hospitals in Brazil.

Consultant III

She is a lean practitioner with industrial engineering background, responsible for several lean implementation in manufacturing and healthcare. She has been working with lean for 15 years and has written book chapters and articles about lean implementation.

Consultant IV

He is a MBA lecturer and manager in a manufacturing company in Brazil. He has a master's degree in industrial engineering and black belt certification. Over the last 20 years has worked with process improvements (lean and Six Sigma) in manufacturing and healthcare settings.

Consultant V

She has a background in nursing and currently is a partner in a consultancy company. Her healthcare background associated with her lean specialization has enabled her to implement lean in several hospitals in the last 10 years.

Table 1 – Case study outline

Case Study Sources	Average number of patients seen per day	Interviewees	Number of interviews	Interviewees' CODE
Two urgent and emergency Departments	600	Nurses	13	NUR_ED_1
		Physicians	7	PHY_ED_1
One accident and emergency department (trauma centre)	100	Nurses	7	NUR_AE_1
		Physicians	3	PHY_AE_1
		Coordinators	2	COO_AE_1
Lean management consultants	N/A	Management consultants	5	CONS_01

Table 2 – Themes and emergent lean barriers

Themes	Emergent barriers in lean healthcare
Conflict between physicians and nurses Functional silos Physician with perceived professional dominance Professional silos	Professionalism
Public organisation influence Consideration of the healthcare context Adapt and train to meet healthcare needs Politicised context of healthcare	Implementation Fidelity
Enablers to support the change Results from similar context	The Need for Evidence-Based Research

Table 3 – Theoretical themes: evidence from data and literature

Theoretical themes: prominent lean barriers in healthcare	Percentage of informants who mentioned and discussed the theme	Literature related	Representative quotes from data
Professionalism	35.60%	(Kim <i>et al.</i> , 2006; De Souza and Pidd, 2011; Aij <i>et al.</i> , 2013; Savage <i>et al.</i> , 2016; Isfahani <i>et al.</i> , 2019; Lindsay <i>et al.</i> , 2020)	'So, there's a lack of helping between the departments as well, the nursing team is closed on its group, so are the doctors, there is no relationship or help between them, they sometimes try to help one another, but it isn't that harmonious' 'it happens all the time, I feel like I'm the secretary of the doctors... They ask us (nurses) what to do all the time, we keep giving orientations...
Implementation Fidelity	35.30%	(Glouberman and Zimmerman, 2002; Kim <i>et al.</i> , 2006; Reijula and Tommelein, 2012; Drotz and Poksinska, 2014; Savage <i>et al.</i> , 2016; Gao and Gurd, 2019)	'Most of the problems that we have helped organisations to solve are not technical, they are about the mindset and culture. about understanding the mentality and how things work in the healthcare context... you need to be able to adapt lean into the healthcare processes' 'When you work with nurses and physicians, you have to remember that they don't know lean, so their first reaction is to avoid it... so we try to start with basic tools, we give basic management training in visual management, process mapping, and make daily meetings to help people to develop their skills'

The Need for Evidence-
Based Research

29.10%

(Alexander and Hearld, 2009; Joosten *et al.*, 2009; De Souza and Pidd, 2011; Andersen *et al.* 2014; Akmal *et al.*, 2020; Leite *et al.*, 2020b)

'When lean was first introduced in the hospitals, the approach was wrong, based on manufacturing ideas... and many experiments didn't work out.'

'But if you come into a hospital and you show what this concept is, you may even speak of the carmaker as an example, but also what that means in the area of health, and how it can help them to solve the problems they are having. So, they will not be resistant to change. So, it depends on the way you introduce the change and the evidence that you show'

Figure 1 –The impact of emergent barriers on lean healthcare



