

Escola Superior de Tecnologia da Saúde de Lisboa

Instituto Politécnico de Lisboa

Escola Superior de Saúde do Algarve

Universidade do Algarve

Mestrado em Gestão e Avaliação de Tecnologias em Saúde

**Contributo do Lean Healthcare para a Gestão em
Saúde: Aplicação na área de logística e stock**

Dissertação de Mestrado

Orientadora: Doutora Margarida Eiras, ESTeSL - IPL

Mestrando: Diogo Monteiro

Dezembro, 2020

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(Versão final)

Dezembro, 2020

Índice

Índice de tabelas	iv
Índice de figuras	v
Lista de abreviaturas	vi
Introdução geral	1
Lean in healthcare logistics and stock – a systematic review.....	5
Lean methodologies in logistics and stock: a study on the perspectives of healthcare professionals	19
Conclusão geral	41
Bibliografia	42
Anexo 1 – comprovativo de submissão – Lean in healthcare logistics and stock – a systematic review.....	44

Índice de tabelas

Table I – Inclusion and exclusion criteria. Own elaboration.	9
Table II - Attribute agreement analysis between reviewers – Minitab. Own elaboration.....	11
Table III: Full-texted articles considered for in-deep analysis. Own elaboration.	12
Table IV - Most frequent lean methodologies reported. Own elaboration.....	12
Table I - Emerged themes supported by evidence from the interviews. Source: own elaboration	29
Table II - Key differences between Portugal and International perspectives. Source: own elaboration	31

Índice de figuras

Figure I - PRISMA flow diagram	10
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Lista de abreviaturas

ESTeSL - Escola Superior de Tecnologia da Saúde de Lisboa

HCP – Healthcare professionals

IPL – Instituto Politécnico de Lisboa

JIT – *Just in Time*

MeSh – Medical subject headings

MGATS – Mestrado em Gestão e Avaliação de Tecnologias em Saúde

SW – Sweden

UAlg – Universidade do Algarve

UK – United Kingdom

Introdução geral

A complexidade e constante evolução no campo da saúde é algo a que estamos habitualmente familiarizados, quer sejam pelas novas técnicas, procedimentos ou *guidelines*, contudo, esta evolução afeta naturalmente todas as áreas envolventes à prestação dos cuidados de saúde. Vários serviços e atividades que podem não ser diretamente visíveis, quer para os utentes quer para os profissionais de saúde, desempenham um papel importante e relacionam-se em grande medida com a qualidade dessa prestação. A logística e gestão de stocks poderá ser elencada como uma dessas áreas, cuja atividade se desenrola em paralelo (Carvalho & Ramos, 2009).

Se por um lado, a gestão de stocks pode não ser percebida como a prioridade no que à prestação dos cuidados de saúde diz respeito, também é verdade que stock em excesso pode originar gastos desnecessários, produtos fora do prazo de validade ou obsoletos. De igual forma, a falta de stock poderá significar a interrupção de tratamentos, agravamento do estado de saúde dos doentes ou em última instância a sua morte (de Vries, 2011). Assume-se assim, a importância e responsabilidade da logística e gestão de stocks nesta matéria (Castro, Pereira, Sá, & Santos, 2020).

Os princípios Lean que tiveram origem na Toyota com Taiichi Ohno, focam-se nos processos e na gestão de tarefas, e no seu valor para o produto final, reduzindo e eliminando desperdícios. O sucesso deste conjunto de metodologias e filosofia de gestão foi rapidamente percebido como de aplicação transversal nas organizações. Após o seu surgimento no início dos anos 90 na indústria automóvel, a filosofia Lean foi sendo aplicada nos setores de serviços e gestão no final do sec. XX (Volland, Fügenger, Schoenfelder, & Brunner, 2017). A área da saúde não foi exceção, dando origem a conceitos como *Lean Healthcare* que atualmente figura em algumas das missões de instituições prestadoras de cuidados de saúde (Teich & Faddoul, 2013).

A filosofia Lean considera sete tipos de desperdício que podem ser identificados nos mais diversos processos e setores: excesso de produção, espera, transporte desnecessário, processamento incorreto, excesso de inventário, movimentação desnecessária e defeitos (resultantes da produção) (Ohno, 1988).

Os mesmos desperdícios identificados anteriormente foram também identificados para a logística, sugerindo-se como um comprometimento à gestão da cadeia logística e perceção do seu potencial (Garza-Reyes, Villarreal, Kumar, & Diaz-Ramirez, 2019; Sternberg et al., 2012).

É cada vez mais marcada a crescente visibilidade do setor da saúde e, naturalmente a afetação dos recursos disponíveis (Barros, 2009). A necessidade de melhoria da performance torna os hospitais importantes centros para a aplicação de metodologias e instrumentos de gestão logística (Carvalho & Ramos, 2009). O Lean foi considerado como uma solução capaz de melhorar a qualidade da prestação dos cuidados de saúde nomeadamente em matéria de eficiência e produtividade (Maijala, Eloranta, Reunanen, & Ikonen, 2018). Entre os trabalhos publicados destacam-se os eventos Kaizen – projetos que duram habitualmente 3 a 5 dias, e que se focam em atividades específicas onde se aplicam os conceitos Lean.(Mazzocato, Stenfors-Hayes, von Thiele Schwarz, Hasson, & Nyström, 2016)

A literatura corrobora também o facto de apesar de estarem implementadas há alguns anos, as soluções informáticas disponíveis na área logística, continuarem a ser muito onerosas. Pode considerar-se assim um espaço interessante de atuação do Lean, em articulação com outras soluções (Castro et al., 2020; Moons, Waeyenbergh, & Pintelon, 2019).

O carácter limitado dos recursos é transversal e, particularmente na área da saúde, a redução de custos deve ser observada na dimensão dos *outcomes* alcançados, salvaguardando potenciais limitações na prestação dos cuidados. Uma vez mais, na área da saúde, a multidimensionalidade destes *outcomes* assume uma expressão significativa. Como solução para redução de custos, a melhor alternativa passa muitas vezes por apostar em determinados serviços/processos reduzindo o custo de outros. A melhoria desta performance global depende da robustez e clareza na definição de objetivos estratégicos (Porter, 2010), com potencial contributo da filosofia Lean.

Relevância e objetivo

Apesar de assistirmos à implementação de práticas Lean ao longo dos anos, as orientações nacionais estão ainda pouco consolidadas. Podemos encontrar, ao nível do Serviço Nacional de Saúde (SNS), algumas recomendações sem que, no entanto, seja indicada uma estratégia integrada (Lapão, 2016).

Embora se encontre alguma literatura publicada sobre Lean, estudos e revisões sistemáticas sobre a aplicação das metodologias Lean são limitados (Gao & Gurd, 2019).

Alguns estudos que reuniram evidências relativas à “aplicabilidade” das metodologias Lean, relatam que no sector da saúde a maioria das publicações são nas áreas de farmácia, radiologia, patologia e emergência (Gupta, Sharma, & Sunder M, 2016). Estes estudos vêm corroborar a noção empírica da escassez de estudos na área da logística e gestão de stocks. Este facto

desperta alguma curiosidade, uma vez que a área logística e de gestão de stocks parece, em primeira instância, poder beneficiar largamente de metodologias Lean, talvez até com menor necessidade de adaptação (Maijala et al., 2018) à sua complexidade e incerteza (Barros, 2009).

A presente investigação propõe assim estudar o contributo dos princípios Lean para a gestão em saúde, tendo em conta a gestão do desperdício na área da logística e stock intra-hospitalar, nomeadamente:

- Identificar a aplicação das metodologias Lean na área logística e de gestão de stocks.
- Analisar a implementação das metodologias Lean na área logística e de gestão de stocks e o potencial impacto para as organizações de saúde.

Estrutura e organização

A presente dissertação desenvolve-se em torno do estudo das metodologias Lean na área da saúde, nomeadamente o seu impacto nos modelos de gestão associados à logística e stock e logística hospitalares.

O estudo é apresentado em formato de dois artigos científicos, que podem ser relacionados entre si, pretendendo-se dar resposta aos objetivos da investigação. O formato escolhido prende-se com o facto de possibilitar uma abordagem mais prática, acreditando-se que possa contribuir para uma maior e mais eficaz disseminação do conhecimento.

O primeiro artigo trata-se de uma revisão sistemática, *Lean in healthcare logistics and stock – a systematic review*, que tem como objetivo analisar a literatura existente no que respeita à implementação da filosofia Lean no contexto da logística e gestão de stocks intra-hospitalar. O artigo encontra-se redigido em língua inglesa e foi submetido para publicação no *International Journal of Lean Six Sigma* (Anexo 1 – comprovativo de submissão – *Lean in healthcare logistics and stock – a systematic review*).

O segundo artigo é um estudo qualitativo que recorre a entrevistas semiestruturadas – *Lean methodologies in logistics and stock: a study on the perspectives of healthcare professionals* – que tem como objetivo estudar as perceções dos profissionais de saúde no que respeita à implementação de metodologias Lean no contexto da logística e gestão de stocks. O artigo encontra-se redigido em língua inglesa e foi submetido para publicação na revista *Saúde & Tecnologia*.

Ambos os artigos, redigidos em língua inglesa, seguem as normas de publicação das respectivas revistas, existindo limitações e critérios definidos para os vários elementos textuais como títulos, resumos, número de palavras ou caracteres. De igual forma as regras de referência bibliográfica podem divergir entre os artigos e o restante documento.

Lean in healthcare logistics and stock – a systematic review

Lean in healthcare logistics and stock – a systematic review

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Abstract

Purpose

The purpose of this paper is to comprehend the evidence supporting the application of Lean methodologies in internal hospital logistics and stock management and identify research gaps to point to future research possibilities and priorities.

Methodology

A systematic review English or Portuguese-written articles using Medline, Scopus and Web of Science was conducted on 32 studies published from 2000 to April 2020. Search terms included “Healthcare”, “Lean”, “Lean Six Sigma”; “LSS”, “Logistics” and “Stock”. This systematic review followed the recommendations of the PRISMA-P 2015 (Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols). Screening and eligibility assessments were performed independently in standardised manner by three reviewers in order to reduce possible biases.

Findings

Mostly, visual management tools as 5S can be observed in logistics and stock related Lean applications. Kaizen events were also frequently reported with reference to implementation processes. Despite the generally favorable expectations over Lean contribution to improvement, the healthcare community has struggled to achieve and evidence commensurable and sustainable progress. This systematic review concludes that there is still limited critically validated scientific production on this topic.

Originality

The specific field of Lean Healthcare regarding internal hospital logistics and stock management is poorly described. The study could contribute to a deep analysis on Lean healthcare setting.

Keywords - Lean; Logistics; Stock; Healthcare; Management

Introduction

Lean was originally developed in Japan and applied in automotive mass production systems (Toyota Production System) (Ohno, 1988). Lean methodologies focus on improving flows and eliminating waste (characteristically called “muda”) in a process-oriented approach (Ohno, 1988; Salah et al., 2011). Based on workflow improvement techniques, these methodologies have recently been adopted by other industries, including the healthcare sector. Despite the standardisation of manufacturing procedures not being comparable to the healthcare practice, lean methodologies have proven their value in improving healthcare operational efficiency, clinical outcomes and well-being at work (Kim et al., 2006).

Service sectors have been slow to adopt Lean, mainly due to staff’s and organisation’s lack of awareness about its benefits. Nevertheless, since 2010, Lean has started to consistently appear in published articles, with the majority of work focusing on its application on IT and Healthcare sectors (Gupta et al., 2016). In 2016, the European Commission Expert Group on Health Systems Performance Assessment has listed Lean methodologies among the quality improvement tools available for Healthcare services (Legido-quigley et al., 2008).

Lean is used as a quality improvement methodology (Moraros et al., 2016) and the development of these practices is one of the management’s strategies that has been perused in the healthcare sector (Akmal et al., 2020) with positive sustainable outcomes, able to generate large economic and financial results and improve quality (Gupta et al., 2016).

While it is important to note that transportations and inventory represents a major component on supply chain costs, logistics and supply chain in specific are responsible for approximately 40%(Akmal et al., 2020; Kwon et al., 2016) of healthcare organisational costs. In fact, data has reported considerable inefficient exploitation of capital investment, for instance poorly warehouses utilisation rates of 60% to 70%(Kwon et al., 2016).

Even though Lean is widely recognised in logistics and supply chain regarding management and performance improvement, achievement of high levels of customer satisfaction concerning cost and quality and delivery (Salah et al., 2011), there is a lack of evidence regarding the implementation of Lean as a sustained and an integrated practice in healthcare (Lawal et al., 2014).

Some studies identified how a failure in healthcare sector's understanding of supply chain and respective logistics principles had consequently led decision makers into suboptimal solutions, ultimately limiting improvement advantages and scope (Kwon et al., 2016).

As logistics costs per transaction are also typically higher in the healthcare sector (Kwon et al., 2016) and Lean in material flow usually refers to stock and distribution (Henrique et al., 2020), it seems appropriate to focus on Lean strategies that have been deployed in this specific area. Business strategies based on Lean methodologies could potentially lead to a fairer, more equitable and more transparent redistribution of resources (Crema and Verbano, 2017) ultimately contributing to the overall healthcare management operational system.

This paper aims to identify and categorise the existing published literature that describes the application of Lean methodology in the context of healthcare logistics and stock, and to discuss its importance and contribution for the management of these areas. The primary review question is:

What is the evidence supporting the application of lean methodologies in healthcare logistics and stock?

We considered as participants (P), healthcare logistics and stock; as exposure (E), the Lean methodology and as an outcome (O) the evidence generated as a consequence of applying the methodology. The secondary review questions are as follows:

- 1) Are the Lean methodologies being applied within the hospital internal logistics?
- 2) What is the impact of Lean methodologies on healthcare logistics and stock management?
- 3) Are there frequently reported limitations or challenges associated with Lean methodologies implementation in healthcare logistics and stock?

Methodology

The systematic review was conducted following the recommendations of PRISMA (The PRISMA Statement for Reporting Systematic Reviews and Meta-Analysis) (Liberati et al., 2009).

An electronic literature search was conducted in May 2020 via Medline, Scopus and Web of Science online databases.

A comprehensive literature search was performed which looked at studies published between January 2000 and April 2020, publicly available and written in English. Studies with the title/abstract in English but with the text in Portuguese (the author's native language) were also

considered. The authors did not contact other institutions or authors in order to identify further studies.

A preliminary search was conducted to develop a strategy. The terms “Healthcare”, “Lean”, “Lean Six Sigma”; “LSS”, “Logistics” and “Stock” related to PEO elements were considered due to its relevance for the study. We also identify “Total Quality Management” as a medical subject headings (MeSh) term for “Lean Six Sigma”, however, the topic proved to be too broad and did not show added value to the research and it was not considered. These elements were combined using boolean features “OR” and “AND” into the following final search: ((healthcare [All Fields]) AND (lean [All Fields] OR lean six sigma [All Fields] OR LSS [All Fields]) AND (logistics [All Fields] OR stock [All Fields])).

All records from the search were uploaded to Mendeley software and then a total of 20 duplicates were identified and removed.

Screening and eligibility assessments were performed independently in standardised manner by three reviewers in order to reduce possible biases. The relevance of each article was determined by reading the title and abstract. The titles and abstracts were screening against the predetermined inclusion and exclusions criteria with regard to the field of Lean methodologies in Healthcare Logistics and StockTable I – I. A records list was prepared in an Excel spreadsheet and the studies were classified in “Relevant”; “Some/partial relevance” and “Not relevant”.

Table I provides an overview of inclusion and exclusion criteria used for the screening phase, followed by an in-deep analysis of the remaining articles.

Inclusion Criteria	Exclusion Criteria
Studies from January 2000 to April 2020	Studies published before the year 2000
Studies in English or Portuguese	Studies in languages other than English or Portuguese
Studies that were connected to Lean Healthcare	Studies that did not cover Lean methodology
Studies that were connected to Logistics or stock management	Studies that did not cover Lean Healthcare
	Studies that did not cover Logistics or Stock Management
	Studies on fields not related to healthcare providers.

Table I – Inclusion and exclusion criteria. Own elaboration.

Full texted articles were retrieved from an electronic library and examined in detail. The study selection process is summarised in

Figure I

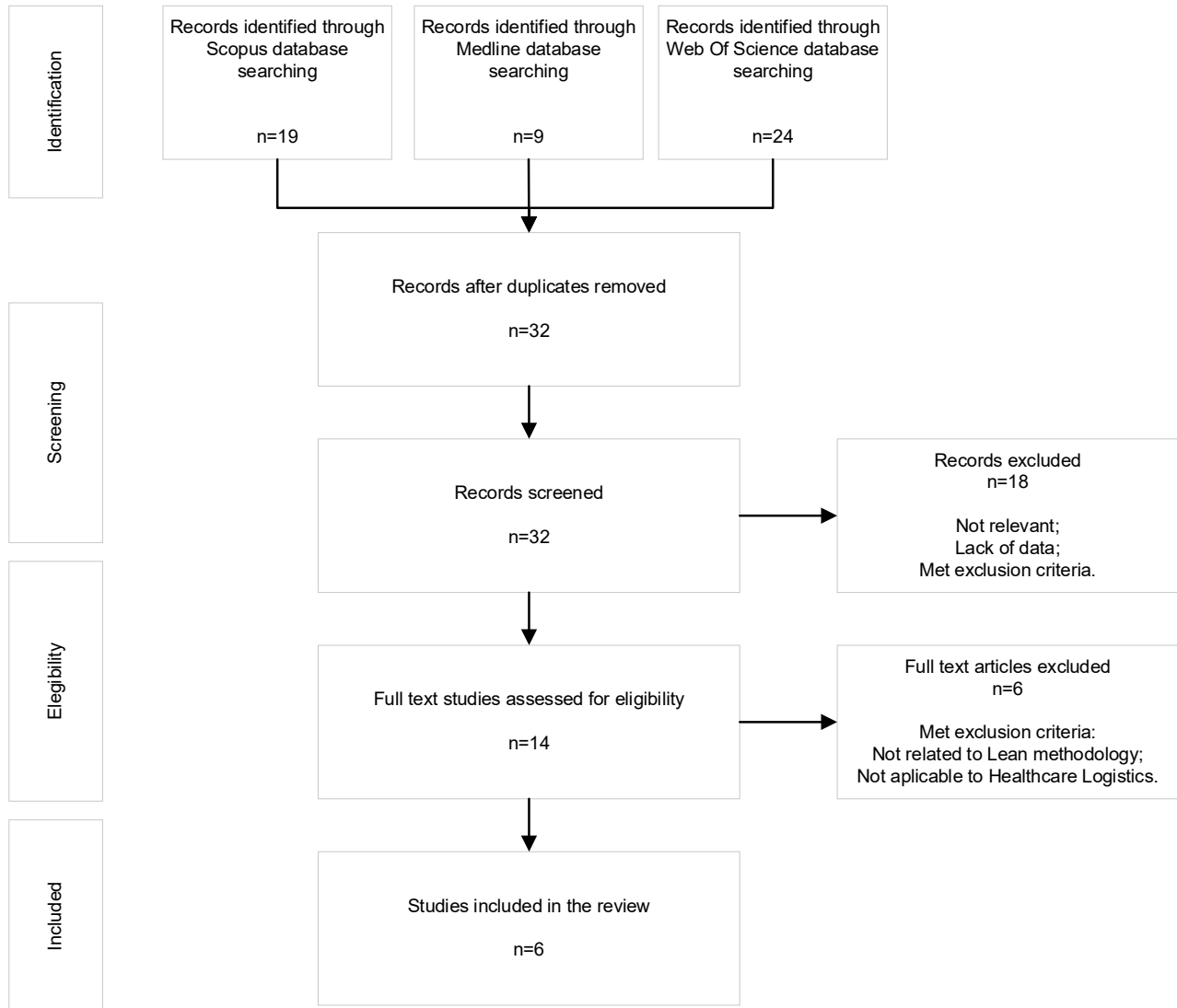


Figure I - PRISMA flow diagram

The quality of the reviewed articles was assessed, and the data was organized manually regarding author's name; year of publication, country, study design, aim of study and a descriptive synthesis of the results.

For the set of 32 studies, we measured the agreement for consensus between reviewers using Fleiss' Kappa statistic (agreement can be categorized as poor, slight, fair, moderate, substantial, or almost perfect) (Hartling et al., 2012). The independent review reached a level of substantial agreement (analysis details available in Table II). The discrepant ratings were reassessed and discussed, and a total consensus was achieved.

Assessment Agreement

# Inspected	# Matched	Percent	95% CI
32	27	84,38	(67,21; 94,72)

Matched: All appraisers' assessments agree with each other.

Fleiss' Kappa Statistics

Response	Kappa	SE Kappa	Z	P(vs > 0)
1: Not relevant	0,791576	0,102062	7,75583	0,0000
2: Some/partial relevance	0,590909	0,102062	5,78970	0,0000
3: Total relevance	0,872284	0,102062	8,54660	0,0000
Overall	0,799316	0,084120	9,50215	0,0000

Table II - Attribute agreement analysis between reviewers – Minitab. Own elaboration.

Results

A total of 32 relevant references were identified.

Based on this set of criteria, 18 studies were further excluded from the review resulting in a total of 14 eligible research articles.

From this screening a total of 6 full-texted articles were considered for in-deep analysis.

First Author, year, Country	Main Intervention	Lean tools/methods reported	Described impact on logistics and stock management	Limitations or challenges reported
Adebanjo, 2016, United Kingdom	Supply chain management initiatives	✓	✓	✓
Hasle, 2016, Denmark	Lean maturity, complexity, and the value concept	✓	✓	✓
Serrou, 2016, Marocco	Lean and maintenance	✓	✓	

Volland, 2017, Germany	Material logistics management	✓	✓	✓
Forgliatto, 2020, Brazil	Surgical tray rationalization.	✓	✓	
Castro, 2020, Portugal	Ambulatory pharmacy logistics.	✓	✓	✓

Table III: Full-texted articles considered for in-deep analysis. Own elaboration.

Are the Lean methodologies applied in healthcare logistics network?

Mostly, visual management tools as 5S can be observed in logistics and stock related lean applications. Kaizen events were also frequently reported with reference to implementation processes.

First Author, year, Country	5S	VSM	Visual management	Pull System	Pokayake	Kanban	Just In Time	Kaizen events
Adebanjo, 2016, United Kingdom	✓	□	✓	✓	✓	✓	✓	✓
Hasle, 2016, Denmark	✓	✓	□	□	□	□	□	✓
Serrou, 2016, Marocco	✓	✓	□			□	□	□
Volland, 2017, Germany	✓	□	□	□	□	✓	□	□
Forgliatto, 2020, Brazil	✓	✓	□			□	□	✓
Castro, 2020, Portugal	□	□	□	□	□	✓	□	□

Table IV - Most frequent lean methodologies reported. Own elaboration.

What is the impact of Lean methodologies on healthcare logistics and stock management?

The drive to apply Lean tends to be more related to the potential financial benefits than to the possibility of deriving comprehensive, sustainable performance improvements. Particular emphasis is given to profitability and operating cost. The management is reported to privilege isolated actions instead of substantiating the integral adoption of the philosophy across the organisation. Besides, those actions are more likely to be focused on inventory turn-over, space utilisation and, clinically, the length of patient's stay (Adebanjo et al., 2016). Lean in logistics

catches the management's attention due to its savings prospective for example by reducing several costs in favour of medical devices maintenance (Serrou et al., 2016).

In fact, and in line with Hasle's findings, Lean's most prolific results have seen in non-patient facing tasks, such as the logistic functions (Hasle et al., 2016).

Regardless of the context, gains and performance outcomes have been described as a consequence of three processes: waste elimination, flow management and incessant, sequential improvement of specific processes, which pragmatically translate in more efficiency. Continuity is a recognised determinant factor for improvement (Adebanjo et al., 2016). In addition, Volland et al. (2017) have shown the increase in inventory turnover attained by investing in 5S methodology. The same authors attested the advantages of opting for forecast-based demand planning as well as for inventory control policies (in the healthcare setting).

The organisation's reputation is not significantly impacted which is probably associated to the fact that Lean is often imperceptible to patients even if they benefit from its implementation (Adebanjo et al., 2016). However, when looking objectively at the data, both Farrokhi et al. (2015) and McGuire et al. (2014) shared very positive outcomes. The first opted for Lean principle of 5S to achieve reductions in around 70% of the quantity of instruments used for spine minimally invasive surgery and complex deep brain stimulation surgery. The second intended to optimize the use of STs for orthopaedic and neurosurgical spine cases. His final report referred to an average decrease of 41% in trays (with a sample of over 38 cases). Considerations for Lean in hospital-based, non-clinical areas included (Hasle et al., 2016): description of Lean applied to the lab, namely the layout reconfiguration, deliberately promoting more spacious facilities rather than congested ones, reassess the ordering process in order to coordinate the department needs with a timely delivery of supplies. Likewise, (Fogliatto et al., 2020), presented the case of the sterilization plant managers who realised the possibility of discerning improvement through a parallel but logical comparison of the production systems and the healthcare delivery systems.

Alternative (Lean based) methods have emerged as an attempt to adapt to the market needs. These include, for example, visual management methods such as the double box method and the car exchange system, but the sock system (built from the Kanban system) is also mentioned. The list continues to include the replenishment method by levels and the computerized and automated method (with multiple and diverse applications like warehousing and bar coding). Moons et al. (2019) has credited the automated method with the solution to address the "most challenging inventory and distribution management barriers of product variability, charge capture inaccuracies,

complicated workflows". Its value is corroborated by (Castro et al., 2020) that reiterates its initial expensive investment is justifiable.

Finally, it is important to reflect on the consequences that efficient hospital inventory and stock management can have in a broader scale, namely the improvement of patient experience, reduction of treatment waiting times and even the death of a patient (e.g. if linked with lack of material). On the other hand, stock surplus can also be problematic but it is often ignored.

Are there frequently reported limitations or challenges associated with Lean methodologies implementation in healthcare logistics and stock?

The implementation of Lean in healthcare logistics and stock is often threatened by the uncoherent and erratic commitment expressed by the management and its reluctance to launch it system wide. Previously, organisations have failed to understand the cultural and structural conditions that underpin the successfully implementation of Lean and they neglected and underestimated the importance of the human resources into the process (Dahlgard and Mi Dahlgard-Park, 2006; Peter et al., 2004) In order to generate a positive transformation, the organisation's culture and vision needs to change and its strategic direction ought to be clear (Peter et al., 2004). This includes being disposed to invest in training to allow staff to develop adequate competencies and skills to incorporate on their daily practice so that it becomes "routine" (Adebanjo et al., 2016). Leadership and technical knowledge were pointed as of paramount importance. It is crucial to note though that financial support is provided with the assumption of a financially sound return (Adebanjo et al., 2016).

Resistance was noticed from specific professional groups, such as doctors, who distanced themselves from the Lean concept. Following a Kaizen meeting, they claimed not to anticipate any impact on their work. Lean was, in their view, associated with "administrative processes". One of the previously adopted measures, the Kaizen boards, were therefore discarded (Hasle et al., 2016).

(Hasle et al., 2016) described analogous substandard results. Kaizen meetings were overall not well received by staff who felt that this additional procedure was time consuming and seen as "taking away time from (...) treatment and care".

According to (Castro et al., 2020), Lean projects, often initiated by dedicated teams (e.g. lean support units) are typically short-lived and of transient nature. He described their experience with

Kanban cards that were updated in 17% of the 34-day for the selected audited period. Out of 105 new patients, only 14 were correctly recorded in the Kanban system which corresponded to 13% (Castro et al., 2020).

Overall, despite the global promising view over Lean contribution to Healthcare, the healthcare community has found it challenging to present measurable improvement indicators (Volland et al., 2017).

Other relevant findings

Rapidly evolving technologies have brought a range of unique and novel possibilities for Lean healthcare. Among these, there is the chance of contribute to develop better electronic medical records and specific e-procurement features (Adebanjo et al., 2016; Volland et al., 2017).

An example is “Just in time” (JIT) which is presented as an exceptional method to reduce inventory in healthcare settings. It was described initially by (Whitson 1997) and more recently by (Jarrett 2006). Other highly technologic systems were generally associated with innovation and progress generated a more positive impression than the traditional physical logistic techniques. These new dynamics and Lean fitting on the new systems are yet to be properly studied and understood by the academic community (Adebanjo et al., 2016). Lean’s integration in the new systems can be done through the combination with tools with proven-value (e.g. value stream mapping and kaizen) and standard procedures (visual schemes and short standing meetings (huddles)) (Hasle et al., 2016).

Nevertheless, some constraints have persisted along the years: to raise healthcare providers’ awareness of the significance of inventory management and spur responsiveness. Castro et al (2020), also highlighted that while these systems can bring advantages, a deficient adherence by staff may result in discrepancies between the stock levels in the databases and the physical available stock, which may inclusively mean that medicines consumed may go unrecorded (Castro et al., 2020).

(Volland et al., 2017) raised an important concern on its publication: logistic tasks are characteristically and conventionally assigned to staff without a logistics educational background which averts the implementation of advanced concepts and programs. This is aggravated by the shortage of a qualified workforce (Adebanjo et al., 2016).

Conclusion

Auspicious results reported in industry have slowly imbued professionals to attempt to implement Lean in logistics and stock systems of work. However, despite the generally favorable expectations over Lean contribution to improvement, the healthcare community has struggled to achieve and evidence commensurable and sustainable progress. The drive to apply Lean tends to be more related to the potential financial benefits than to the possibility of deriving comprehensive, sustainable performance improvements.

Hitherto, the literature has focused mostly on projects targeting main warehouses efficiency optimisation and on refining patient flow and pathway. This systematic review concludes that there is still limited critically validated scientific production on this topic.

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Lean methodologies in logistics and stock: a study on the perspectives of healthcare professionals

Lean methodologies in logistics and stock: a study on the perspective of healthcare professionals

Running title: Lean in Health logistics and stock

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Abstract

Introduction/Objectives

Prior research has shown that there is limited evidence that Lean methodologies have been adopted by healthcare providers and professionals in regards to logistics and stock management (Kachitvichynaukul et al., 2015). Lean benefits can be substantial, including improved care quality and safety; elimination of delays and increased productivity.(NHS, 2007)

Main objective: to understand if the scarcity of literature reflects the reality experienced by healthcare professionals (HCP) in regards to using Lean to manage stock

Secondary objective: to identify potential determinants that discourage or/and preclude staff from adopting innovative stock management improvement methodologies in general, and Lean in particular.

Methodology

Semi structured qualitative interviews were conducted. Interviewees were selected in order to ensure representation by profession, practice setting and geographical region. This research is exploratory in nature and its findings are meant to provide real-world insights.

Findings

Semi structured qualitative interviews were conducted with 10 HCP. Common reported issues included inadequately sized storage facilities; the level of engagement in stock-related duties being determined by seniority level; absence of root cause analysis when investigating stock incidents; lack of staff involvement/training and a fragmented, non-systematic departmental approach.

Conclusion

The lack of universal and national published literature correlates with HCP's poor experience of Lean. By combining qualitative methods and looking into user-centered design/working principles, these findings can potentially inform how Lean can contribute to better address the logistic and stock management-related needs and preferences of employees and providers. Finally, it stressed the importance of the implementation being underpinned by motivated, informed staff feel confident following clear, user-friendly steps.

Keywords - Lean, stock, logistics, healthcare, healthcare professionals

Introduction/Objectives

Lean thinking emerged in operations in the beginning of the 1990s, in service operations management around mid/end 1990s, and entered the healthcare sector in the early 2000s (Volland et al., 2017). Lean originally defined seven major 'internal' types of waste namely: overproduction, waiting, unnecessary transport, incorrect processing, excess inventory, unnecessary movement and defects (Ohno 1988). Some studies suggest that these wastes keep the management of supply chains from realizing its full potential (Sternberg et al., 2012).

Along the last few decades, the value of Lean methodologies across fields other than the original manufacturing one has been explored. Healthcare is counted among one of these fields. Several studies have shown its potential in identifying faulty processes and directly or indirectly improving clinical services (Amaratunga and Dobranowski, 2016; Grove et al., 2010; Lin et al., 2013; Rezk and Miller, 2016). Amid the informatics technology revolution and the scientific advances, the adoption of Lean has resulted in benefits such as enhanced efficiency, increase of the diagnostic yield of diagnostic pathways (Martens et al., 2014), streamline of processes and reduction of turn-around times (Agarwal et al., 2016; Inal et al., 2018; Toda and Mihaela, 2019), which ultimately may translate in increased patient satisfaction (Godley and Jenkins, 2019). The aforementioned goals of Lean align with well-known strategic endpoints of many organization.

The definition of stock in healthcare is very broad, with the range going from stationary to clinical consumables, pharmaceuticals and specific healthcare assets. While large organisations sometimes have dedicated procurement and facilities management teams that are responsible for this component, who is in charge of stock management within each department can be highly variable, from nursing to allied HCP. The involvement of specialist professionals is advantageous due to their product knowledge and their awareness of departmental needs and budget.

After reviewing and appraising the literature available in regards to this thematic, in comparison with other areas that require stock management, there is a general lack of evidence focused on the use of Lean methodologies in healthcare stock. It is therefore important to understand if:

- 1) this phenomenon is indeed representative of the reality of healthcare stock management.
- 2) the results of the previous research do not reflect real-world practice.

This study was conducted to (1) ascertain HCP role in stock management and establish their experience in applying different methodologies to stock management, namely Lean; (2) determine

the participants' knowledge of Lean methodologies (3) elicit feedback on their perception of own and their colleagues' attitudes and behaviours in respect to use Lean methodologies to improve stock management.

Therefore, this study main objective is to understand HCP experiences in regards to using Lean methodologies to manage stock and compare it with published literature.

Secondary objective: to identify potential determinants that discourage or/and preclude staff from adopting innovative stock management improvement methodologies in general, and Lean in particular.

This article constitutes preliminary work towards a more detailed and in-depth analysis of the Portuguese reality and the respective case for change and improvement. In the future, it may be particularly relevant to investigate if some professional groups are particularly more willing, interested or in need of such methodologies, and whether there is a difference in the prevalence of this methodological approach (up)taken by professional individuals from the health sector.

Methodology

Setting and Participants

This study was conducted in diverse settings, both in primary and secondary care, and involving different geographically located healthcare providers. This was meant to capture modus operandi of staff from different educational backgrounds and professions in order to reflect the breath of healthcare professionals whose roles include duties related to stock management. Among the participants, two work abroad (in the United Kingdom (UK) and Sweden (SW)). This was a deliberate choice to provide a brief comparison with the reality of countries that have a long tradition of quality strategies in healthcare (Legido-quigley et al., 2008). In total, ten professionals across seven departments were selected, including three cardiac physiologists, one nurse, one radiographer, one nuclear medicine technologist, two optometrists and two biomedical scientists, were invited to participate in qualitative interviews via email. Invitees were presented with a project information sheet at the time of initial email contact.

Data collection

We conducted semi structured interviews over the phone during May and June 2020. A qualitative approach was selected to explore the user's job role, the current and previous practices/ methods

employed in stock management in their workplace, their level of knowledge in regards to Lean methodologies, their overall attitude towards adopting new methodologies and in specific Lean methodologies, and their team's behaviour and determinants of workers' uptake of new improvement methodologies in the context of stock management (interview guide available for consultation in Appendix 2 - Interview Guide - semi structured interview). Interview guides were elaborated with the aim of allowing for the identification of major facilitators and barriers that participants face, overall perceptions about Lean and stock management (as separate concepts and as one being used to potentially facilitate the other), and recorded participants' levels of satisfaction/mindset. Interviews were audiotaped, transcribed verbatim, and lasted an average of 25 min (17-45min). One member of the research team conducted all interviews. Participants were not compensated for their time, and participation was confidential and completely voluntary. Participants were informed that they could withdraw from the study at any time.

Data analysis

The records analysis was conducted applying a synthesis and interpretive approach. Firstly, each transcript was reviewed and coded in order to determine the key concepts emerging from the data. Secondly, summaries were generated for each of the main themes with relevant illustrative quotes.

Findings

In this section, the results will be presented along with discussion points to facilitate the reader's understanding and to follow the themes. Five topics were identified, namely: 1) insufficient/ineffectual guidance on addressing near misses; 2) lack of staff training and involvement in improvement; 3) "sticking-plaster" solutions; 4) ineffective layout/facilities; 5) Partial management's commitment to quality improvement.

General Context

All participants stated the existence of three types of stock areas in their workplace: two on-site, easily accessible storerooms which comprise of 1) stock areas in each room (where a limited quantity of the products used in that specific room are kept), 2) a larger storeroom (still within the department); and then a main warehouse.

All but one participant confirmed they are directly involved in stock-related activities such as monitoring inventory levels, notifying senior colleagues who are in charge of placing orders, receiving material and stocking shelves.

Half of interviewees are responsible for placing orders and claimed to spend between 1:30h and 3h per week doing this task.

Insufficient/ ineffectual guidance on addressing near misses

Only two of the interviewees were aware of the organisation's/departmental standard operating procedure (SOP) when a near miss, incident or adverse event were identified. In both cases, it involves formal reporting of the occurrence:

“If a product is in the wrong shelf, I must immediately notify the stock coordinator. If the product is a pharmaceutical, I fill a Datix (incident report). This leads to an investigation and, as a result, measures are put in place to prevent it from happening again” (1/UK)

“An incident form is to be completed, in a paper format. However, staff don't really follow this procedure. In a total of forty professionals, only two people, at most, do it accordingly”. (10/PT)

The remaining interviewees declared to informally report the occurrence to the line manager, or to being oblivious of the (existence of an) appropriate SOP:

“If there is a procedure, I am not aware” (3/PT)

“I just inform my manager” (9/PT)

“There isn't anything in place (a SOP). For example, if a product has expired, we just mark it as “used” in the (computerized/ electronic) stock system”. (5/PT)

“As we sort the problems as they come, I am not sure if they, the management, teams ever get to know about them” (4/PT)

The establishment of a safety culture where error/incident reporting is encouraged is a known priority of the UK National Health System (NHS) (Jones et al., 2018). This followed the Quality Care Commission's 2018 report that criticised the poor-quality local reporting systems and the need to support staff when they speak up about error. In line with Lean concept's origin, the Commission suggested that there were lessons that could be learned from other industries with simpler and more transparent reporting systems (CQC, 2018). It has consequently led to the

elaboration of better standardised processes and the maxim has extended beyond the clinical procedures in a sign of. The testimonial of (1/UK) reflects this change of paradigm and contrasts with the other HCP's approach to errors.

SOP avoid error, ambiguity and confusion (Jones et al., 2006) and allows for structured improvement. Error SOP should include clear guidance not only on how to document incidents but on how to investigate them (NHS, 2015). In this context, Gangidi (2019), previously discussed how using Lean methodologies and root cause analysis (RCA) can be beneficial to resolve operational issues in logistics, supply chain and stock management (Gangidi, 2019). The joint use of this methodology and the RCA technique implies a meticulous analysis of incident causes to create a clear action plan that works set with an error-preventive aim (ECTA, 2015).

Lack of staff training and involvement in improvement

The interviews revealed that there is a general lack of training associated with quality improvement. In fact, only one HCP working in Portugal underwent Lean training (as per her own initiative). Involvement from staff in improvement projects is not actively sought as suggestions from keen, diligent staff are not necessarily well received by senior members of staff/management who traditionally carry out those duties. There is inclusively one interviewee who describes a measure that is identified by the interviewer as a well-known quality improvement measure (the colour code method which is used as a visual prompt with a specific meaning for that service) but that was never explained to the interviewee or his colleagues. This demonstrates that non-compliance cannot be automatically associated with lack of interest or resistance to change.(Shah et al., 2013).

The involvement and empowerment of all team members is a Lean core principle which promotes direct participation of HCP in identifying problems, generating solutions, and implementing new plans, thus creating an enriched culture of change (Shah et al., 2013). Several other authors (Boronat et al., 2018; Gleich et al., 2016; Pinney et al., 2015) have acknowledged how the involvement of the whole team was a determinant factor for a favourable outcome, hence fostered staff's satisfaction.

“To attempt to modify any existing processes, such as the ordering or the stock management, is highly problematic/ taxing because it is seen as interference in the established hierarchy and the scope of action.” (3/PT)

“Sticking-plaster” solutions

“Sticking-plaster” solutions are temporary and inadequate decisions or courses of action for serious problems. The quotation below illustrates how lack of proper measures results in a cycle of problems. As Johnson once stated, “failure to ensure an adequate stock inventory helped to create and was created by error enforcing conditions” (Johnson, 2003). Poor stock management constitutes a problem on itself and often initiate or aggravate recurrent challenges.

“When the person in charge of the ordering process is absent, either we don’t have enough or we pre-order in excess – in the latter case, we then need to manage it carefully as we have limited storage space” (4/PT)

This situation is recurrent even though the staff are conscious that overstocked leads to an overflowing storeroom (that they already struggle to manage). A secondary consequence is the deficient inventory oversight. Excess of stock in the storeroom is indeed one of the seven types of waste listed (and possible to be sorted) by Lean (NHS, 2007).

This theme is strongly linked with the following theme “Ineffective layout/ facilities”.

Ineffective layout/ facilities

Stock management frequently reported flaws are related to “Motion”, another type of waste defined by Lean (NHS, 2007). It covers unnecessary people motions/travel, walking and searching between multi-location storage rooms, complaints over products not being within reach or easily accessible (NHS, 2007). “Correction” is also a type of waste (focused on the time spent around faulty processes) that, according to the interviewees, includes the mismatch between the database information and the actual amount of inventory, the frustration originated from the endeavour of trying to understand and make sense of the mismatches between the variations in demand and variations in capacity, and the failed attempts to keep up-to-date consignment stock records.

Lean principles can be applied to help to eliminate these forms of waste (NHS, 2007) and to overcome challenges related to the limited space and small/ poorly located facilities by optimising the space utilisation through logical planning of the storage space.

*“There is not enough space to keep all the materials close and the warehouse is in a separate building, which makes it difficult to access, and the supply requests take very long to be fulfilled”
(7/PT)*

*“Too often we run out of a specific product in the main storage area and have to re-distribute the limited stock from a certain room to the other rooms, which ultimately causes problems.”
(8/PT)*

Partial management’s commitment to quality improvement

All the interviewed HCP based in Portuguese reported partial, ergo defective, commitment from the management team to quality improvement. They claimed that improvement processes in Logistics are overall disregarded and only endorsed in specific circumstances (e.g. pre-audit or accreditation visits/ inspections or if it is expected to generate cost-savings). This posture discredits the management’s resolution and mission and discourage staff from proposing improvement measures.

“During the re-accreditation process, it is indeed easier to get support from the management team because the measures are necessary to address non-conformities that would otherwise lead to fail audits.” (9/PT)

Other testimonials on challenges that were experienced by HCP in regards to these five themes can be found in Table V.

Themes	Example quotations
<p>Miscellaneous (e.g. rules for organising products)</p>	<p><i>“All products and shelves are stored according to the items’ expiry date. Each shelf has an associated removable label and when one of the shelves becomes empty, the member of staff using the last item removes that label and places it in a board (in the door) for the logistics team to see and re-stock appropriately” (2/SW)</i></p> <p><i>“The products are stored with space allowing space between them (not packed) and they have different colour codes so that they are not mistakenly identified. For example, if I need to grab a solution of sodium-chloride with glucose, I know straight away that it is in the red section/shelf.” (1/UK)</i></p> <p><i>“When we (staff) or the logistics team refill the shelves, we place the ones that expiry first in the front” (3/PT)</i></p> <p><i>“The items that expire first are placed in the front” (5/PT)</i></p> <p><i>“Generally, everything is organised as per First Expired, First Out (FEFO)” (9/PT)</i></p> <p><i>“Some storages have colour markers and we know that if we notice those markers, then we need to order more of that item” (9/PT)</i></p>
<p>“Sticking-plaster” solutions</p>	<p><i>“The location for the storage of the items is contingent on the available space. For example, the bigger items are storage in the back” (4/PT)</i></p>
<p>Lack of staff training and involvement in improvement</p>	<p><i>“Yes, some shelves have different colours, but I have no clue what they mean, neither do my colleagues.” (7/PT)</i></p>
<p>Ineffective layout/facilities</p>	<p><i>“The inventory database and the product count on site never match” (5/PT)</i></p> <p><i>“We can’t anticipate how much we spend” (3/PT)</i></p> <p><i>“There is not enough space to keep all the materials close and the warehouse is in a separate building, which makes it difficult to access, and the supply requests take very long to be fulfilled” (7/PT)</i></p> <p><i>“Too often we run out of a specific product in the main storage area and have to re-distribute the limited stock from a certain room to the other rooms, which ultimately causes problems.” (8/PT)</i></p> <p><i>“There is not enough storage space” (9/PT)</i></p>

“The warehouse is 20km away from the hospital, it is very hard to coordinate requests and deliveries” (10/PT)

Partial
management's
commitment to
Quality
Improvement

“The management team values measures that improve the logistics process, especially when it frees employees’ time who can then dedicate themselves to other activities; or if it helps to prevent errors related with the quantity or availability of products” (2/SW)

“Improvement projects in this area are not considered important, there is not an improvement-focused culture” (5/PT)

“Improvement processes are likely to be supported since they are important to maintaining the service accreditation” (6/PT)

“The management team has discussed this topic but it was felt that it would not be possible to improve the logistics without better facilities” (7/PT)

“Any process that aims to reduce costs is valued by the management team” (8/PT)

Table V - Emerged themes supported by evidence from the interviews. Source: own elaboration

As a sample study, it is only possible to conduct a crude comparative analysis between the national/international context. The authors recognise the unreasonableness to attempt to generalise the results and therefore advise caution in interpreting them. Nevertheless, it is possible to draw attention to the disparity between the points of view and experiences from HCP working in Portugal and HCP working in other European countries, namely Sweden and the United Kingdom (summary of key differences available on Table VI). Such discrepancy may be related to the previously mentioned track record of commitment to Quality in Healthcare of both these countries in contrast with Portugal's.

While the authors recognise that a single testimonial is not enough to draw conclusions, both in the UK and in Sweden there seems to be a robust incident reporting process in place and an effective, congruous training strategy as a result of the consistent implementation of an improvement process throughout the organisation. On the other hand, there seems to be evidence of Portuguese institutions' intention to start to invest in quality improvement – for

instance, the adoption of FEFO by all but two organisations. It is worth noting that the UK's/ Sweden's drive for improvement has begun just few years earlier than the one perceived by Portuguese staff. In either case, the testimonials have reinforced the continuous nature of quality improvement – that continuity is, according to the Lean principles (Ohno, 1988) one of the keys for a successful sustainable change (Gao and Gurd, 2019). Nevertheless, the HCP working in Portugal stated that the management's support to quality improvement initiatives is not sustained nor it feels long-lasting, instead it feels like a temporary measure to ensure good results in the audits and to achieve the accreditation status. This attitude demonstrates that while the management recognises that these processes are important, they are not prioritising them or showing that the investment is actually worth. The goal is to make rapid improvements instead of creating a culture of continuous improvement long term which undermines the overall aim (Jones et al., 2006). Without a strong, clear direction of the management team expressing their serious dedication to improvement, staff does not feel motivated to fundamentally embrace these changes. When staff is truly engaged, they will naturally tend to want to share their learning on by working with other staff members on specific projects (Jones et al., 2006) – like it was expressed by both the UK and Sweden interviewees who called for the opportunity to train all staff and consequently set stricter accountability arrangements. Oppositely, when enquired on a change they would like to make, HCP working in Portugal reply they would simply like to be able to “take matters on their own hands” and be able to order the products themselves. Their answers can be classified as action-oriented (Jones et al., 2006) and reveal a fragile consolidation of the quality improvement philosophy. It is crucial that staff is seen by the management as key agents of change and resist the impulse to impose those changes (Jones et al., 2006; Teixeira, 2012). Awareness campaigns like the ones launched in the UK/ Sweden involve the workers in the “bigger picture” promoting understanding of the impact on the wider context (economic and patient safety).

Portugal Context	UK / Sweden Context
Lean concepts and training:	
<ul style="list-style-type: none"> - Although some of the interviewees recollect having heard about “Lean”, they are not conversant with the topic. - One interviewee, motivated by her own interest, has completed an online course about Lean. 	<ul style="list-style-type: none"> - Knowledgeable about Lean. - They have not attended Lean-specific training but it has been mentioned as part of the organisation’s yearly mandatory training.
Given the opportunity, which process they would modify:	
<ul style="list-style-type: none"> - To be given autonomy to place orders which is linked to their belief that it would prevent mistakes and delays. 	<ul style="list-style-type: none"> - To invest in training to everyone who is involved in stock management (regardless of the level of involvement) and consequently establish accountability.
Recent improvement projects:	
<ul style="list-style-type: none"> - Predominantly in the last 2/3 years. - Recent commitment to service accreditation has determined the need to implement changes. Examples of changes include changing the storage conditions of substances hazardous to health; and adopting the FEFO method. 	<ul style="list-style-type: none"> - Predominantly in the last 4/5 years. - The organisations have provided training and awareness campaigns focused on the importance of stock management. This include drawing attention to the possible negative repercussions of poor stock management on patients’ care and associated economic impact.

Table VI - Key differences between Portugal and International perspectives. Source: own elaboration

Limitations and Future Research

Despite the small number of HCP sampled to be part of this study, those who participated in the interviews provided relevant, authentic insights that allowed for a perceptive and incisive prelude data analysis. This study's findings were intended to be preliminary and will be used to inform which lines of work should be pursued as a matter of a more comprehensive portrait of the national healthcare stock methodologies and whether there is opportunity and added value in considering implementing Lean based methodologies in this field of activity.

Conclusion

HCP are generally comfortable with the paradigm shift to adopting quality improvement methods for stock management but are less clear on Lean principles. Staff seemed to recognise how improving stock management and logistics processes could benefit them and facilitate their day-to-day job. They referred to avoidable issues such as the shortage of products related to an inefficient or disorganised ordering procedure, to inaccurate inventory records, and the waste generated due to the misplacement or lack of oversight of products. Non-adoption of improvement methodologies for this area are not necessarily due to staff's disbelief or resistance against the methodologies, but are sometimes due to not being trained or feel engaged. As per one of the fundamental principles of Lean, it is paramount to involve everyone in every stage of the process (developing, designing and implementing) in order to embed the changes. To sum up, the dearth of seemly and workable stock management systems easily develops into in disruptive practices which are presented as a cause of anxiety/apprehension. Furthermore, the inefficient storeroom layout and the insufficient storage space were pointed as major underlying problems. Additionally, this study allowed us to identify considerations from the management's position and potential barriers perceived by HCP which ought to be addressed so that Lean methodologies can be successfully implemented. The HCP's interviews highlighted that there is not a consistent culture of continuous improvement across all disciplines and as such projects to improve the stock and logistics processes do not seem to be intrinsically valued by the management teams. However, the management teams tend to endorse them on the periods prior to audits or service reaccreditation assessments are carried out.

Preliminary results seem to corroborate the hypothesis of a correlation between the limited published literature on Lean methodologies in stock management and the absence of those methodologies in Portuguese healthcare logistic services. Finally, it is worth to reiterate that this work is intended to serve as a starting point for broader investigations on mapping national and international variations in incorporating and applying Lean methodologies in healthcare stock systems across Europe.

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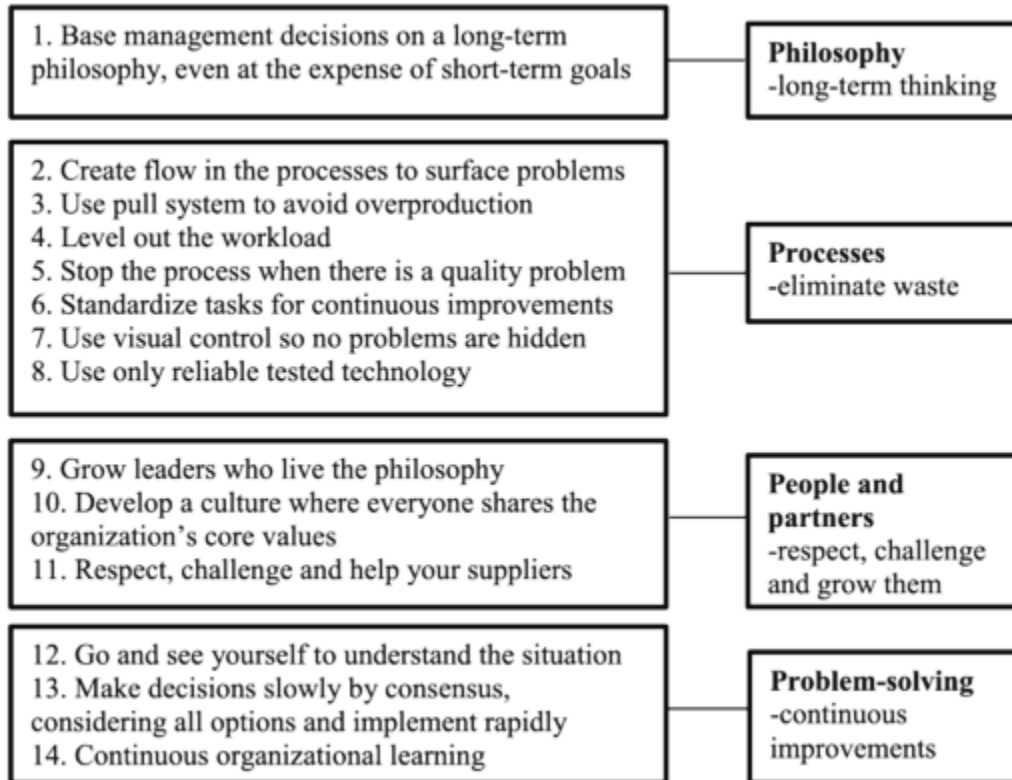
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Appendix 1 – Lean as described by Liker



Lean as described by Liker in terms of 4 domains and 14 principles.

Appendix 2 - Interview Guide - semi structured interview

Type of question/ Main subject	Selected interview questions/ Sub-topics	Domain
General Questions/ Demographic data/ Participant's profile	Age; Academic qualifications; Profession; Department; Private/ Public sector; Region and Country.	N/A
Lean methodology awareness and training	Are you familiar with the "Lean" concept? Have you ever had training in Lean methodologies? If so, do you recall the contents of the training/ the principles you learnt/ were taught? Can you please disclose how this specific training was funded (own investment, the costs were co-/ supported by the employer, the training was an integral part of the course content of your degree/masters, as applicable)?	1, 3, 4
Work context – the department's reality	<u>Please think about a product/ material that you use daily.</u> In your department, what is the global perception in regards to the stock units/ facilities? If there is more than one, are they linked (e.g. are the same type of items stored in more than one location?/ How are they grouped/ stored?). How are the items displayed/ organised? Is there a mechanism that allows you to notice if something is out of place/ missing/ about to expire? Please think about a product/ material that you use daily. Can you please describe how it is ordered, and what the procedure is when it is delivered (how/ by who/ is it received and stored?).	2
		2, 3, 4

	What is the standard operating procedure for when a fault or a near miss is identified (e.g. is the member of staff expected to solve the matter autonomously, is the fault escalated, is there a committee or a discussion?).	
Work context – the individual’s reality	Can you briefly describe your involvement in logistical tasks in your department (this can include equipment, stationary, consumables)? Is this voluntary/ suggested/ required? How would you describe your level of satisfaction in relation to undertaking these tasks? How much time do you typically spend per day/week (whichever is applicable) undertaking each of these tasks/ in total?	2,
Reflective – own practice	What challenges do you encounter when performing these duties (possible examples to be provided if there is need to facilitate the discussion: urgent requests, insufficient stock, persistently inadequate levels of stock, multiple delivery points, multiple suppliers)?	1, 3, 4
	Within your department, which areas do you think that could be positively impacted by optimising the stock management?	1, 2, 3, 4
	If you were given the opportunity to modify something in the logistic process, what would you prioritise (excluding information technology changes)?	4
History of improvement processes	Are you aware of any improvement projects which involved the use of lean-based methodologies? Could you please describe what they entailed? How would you describe the results? How long have they been in place?	1, 2, 4
Reflective – departmental practice	Logistic processes suffer changes and improvement actions along the time. From your experience, can you please describe the implementation phase of those changes (e.g. including the management’s perspective, the economic component, the user’s/ users’ view, how were the updates/ results shared with the team)?	2
		1, 3

What did you feel that was the main driver of the people implementing those changes? What impact has it had on the individuals and your department you have worked with?

What challenges were experienced when attempting to implement new stock management strategies (individual resistance/ institutional/ societal/ financial)??

1, 3, 4

Lean Domain: 1) Philosophy 2) Processes 3) People and Partners 4) Problem solving

Appendix 3 – Interviewees’ details

Reference	Location	Educational level	Public/Private Sector
1/UK	Oxford, United Kingdom	Master degree	Public
2/SW	Stockholm, Sweden	Licentiate degree	Public
3/PT	Porto, Portugal	Licentiate degree	Public
4/PT	Lisboa, Portugal	Licentiate degree	Private
5/PT	Lisboa, Portugal	Licentiate degree	Private
6/PT	Lisboa, Portugal	Licentiate degree	Private
7/PT	Évora, Portugal	Licentiate degree	Public
8/PT	Faro, Portugal	Licentiate degree	Private
9/PT	Lisboa, Portugal	Postgraduate degree	Public
10/PT	Faro, Portugal	Master degree	Public

Conclusão geral

Os resultados do estudo permitem concluir a aplicabilidade da filosofia Lean no sector da saúde, em particular na atividade logística e de gestão de stocks intra-hospitalar. As metodologias Lean partilham desafios de implementação semelhantes a outras áreas no sector da saúde, destacando-se a sua aplicação de forma isolada. É habitual serem usadas ferramentas Lean para solução de problemas pontuais, desalinhadas com os objetivos estratégicos, contrariando a base da sua filosofia.

A evidência referente aos singulares desafios operacionais no sector da saúde é vasta contudo, sectores menos dependentes da estrutura interna já adotaram estratégias Lean com importantes resultados operacionais e financeiros. Aplicar algumas das soluções iniciados nos processos logísticos externos poderá, a curto prazo, contribuir de forma positiva para melhorias na logística interna.

Potenciar o estudo qualitativo efetuado e conduzi-lo nos vários intervenientes do processo logístico de uma instituição, poderia revelar-se útil na identificação de processos que beneficiassem particularmente da adoção metodologias Lean. Poderia constituir um auxílio importante para um processo de adoção da filosofia Lean mais adaptado, com resultados crescentes e sustentados, que pudessem ser progressivamente amplificados internamente.

A filosofia Lean tem uma importante tónica naquilo que acarreta valor para produto final contudo, a definição de valor e a quantificação do valor da saúde é complexa e está longe de ser consensual. Havendo evidencias da filosofia Lean como uma abordagem capaz de proporcionar altos padrões de qualidade e equilíbrio financeiro, não será arriscado assumir que um bom domínio da filosofia Lean poderá contribuir para conceitos mais robustos em matéria de valor em saúde como os refletidos pelo *e-procurement* ou *Value Based Healthcare*.

Por fim, o cenário epidemiológico atual não pode ser ignorado, tendo contribuído em grande medida para alguns dos principais desafios enfrentados na execução deste estudo. Importa assim referir que, se em situações de crise a prestação de cuidados de saúde é habitualmente afetada, estratégias que possam contribuir para a melhoria do desempenho operacional, redução de desperdício e de custos, devem naturalmente ser consideradas, especialmente pela natureza relativamente modesta do investimento necessário.

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<https://doi.org/10.1016/j.omega.2016.08.004>

Anexo 1 – comprovativo de submissão – Lean in healthcare logistics and stock – a systematic review

Submission Confirmation



Thank you for your submission

Submitted to International Journal of Lean Six Sigma
Manuscript ID IJLSS-09-2020-0151
Title Lean in healthcare logistics and stock - a systematic review
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