

Lean and Safety Management: A Project to Improve the Continuity of Care for Chronic Patients

Anna Tiso¹, Joan Cháfer-Vilaplana², Macarena Torrego-Ellacuría², Manuel Francisco Morales Contreras³ and Chiara Verbano¹

¹University of Padova, Italy

²Hospital, Spain

³Universidad Pontificia Comillas, Madrid, Spain

anna.tiso.2@phd.unipd.it

jchaferv@gmail.com

macarena.torrego@gmail.com

mfcontreras@icade.comillas.edu

chiara.verbano@unipd.it

Abstract: Enhancing the quality of care for chronic patients means guaranteeing the delivery of integrated care. Integrated health systems help overcome the fragmentation of care processes, by bridging the organisational, managerial, and informational gaps, with the final purpose of improving the access, quality, and continuity of services. Indeed, chronic patients require the assistance of multiple providers, referring to different levels of care (primary, secondary, or tertiary). However, hyper-specialised and fragmented healthcare systems hamper the achievement of these goals, resulting in suboptimal care, higher cost, and poor quality of care. The implementation of lean and safety management (L&SM) within hospitals demonstrated its ability to improve efficiency, effectiveness, and patient satisfaction, through proactive identification and reduction of risks and wastes. The novelty lies in adopting this approach to act on integration and continuity between different levels of care. With this aim, a L&SM project has been developed in a Spanish hospital. The project focuses on improving the discharge process from internal medicine to primary care, essential to prevent further patients' readmissions. In fact, cooperation between the hospital and primary care is crucial to ensure continuity in chronic pathways, providing adequate assistance to patients' healthcare and social needs. The first results show how this approach was instrumental to engage in the project all key actors involved in the pathways, overcoming departmental barriers, and enhancing continuity of care. Moreover, this approach facilitated the convergence of identified inefficiencies with the clinicians' interests, focusing only on the aspects considered of primary importance, such as the communication between the hospital and primary care. The expected outcomes encompass the achievement of a better understanding of the process, the identification of the criticalities in terms of risks and waste, the proposal and implementation of improvement interventions. This project represents an innovative attempt to implement L&SM outside of hospital boundaries to improve new performance dimensions, focusing on integration and continuity of care.

Keywords: Lean healthcare, Healthcare management, Chronic care pathways, Care integration

1. Introduction

Continuity of care is the degree to which care events are experienced by patients as coherent and interconnected over time and consistent with their health needs. This concept constitutes a pillar in the field of chronic disease management, characterised by long and complex care pathways (WHO, 2018). However, healthcare compartmentalisation in silos creates gaps in the transition between diverse levels and settings of care, hindering the realisation of an integrated and continuous health service (Nolte and McKnee, 2008), thus affecting the quality of care provided.

Chronic diseases represent a relevant burden for the economic and social sustainability of the healthcare system globally. Their impact on healthcare resources, overall measured by the cost of hospitalizations, highlights the need to improve not only the clinical, but also the organisational and managerial structures of chronic pathways. Indeed, thanks to a coordinated network of health care providers who support the patient at home, acute episodes resulting in hospitalisations should be rare events. In this sense, ensuring continuity of care means 13% fewer hospital admissions, 27% fewer visits to an emergency department, and thus 17% lower medical costs (WHO, 2018). Furthermore, hospital readmissions represent a risk and a harm to patients, emphasising the probability of adverse events and complications.

With the aim of strengthening continuity across care boundaries, improvement initiatives are needed.

Health Lean Management (HLM) is a managerial approach to continuously improve patient value, through the systematic reduction of wastes. The benefits obtained mainly touch services timeliness and efficiency (McDermott *et al.*, 2022). However, to strive for quality health services, other dimensions should also be

considered: effectiveness, safety, integration, people-centredness, and equity (WHO, 2006). For this purpose, HLM can be combined with clinical risk management into a Lean and Safety approach (L&SM). The synergies between the two approaches allow the integration of their tools and practices to proactively manage risks and wastes simultaneously (Crema and Verbano, 2016).

Although HLM counts several experiences in the last twenty years literature, the analysis of the integration between hospital and territorial care represents a novelty for this methodology. Indeed, just few attempts of chronic pathways improvements from primary care to hospital and vice versa have been reported in the empirical HLM literature (Paccagnella, Mauri and Spinella, 2012; Patton *et al.*, 2015; Sampalli *et al.*, 2015; Kutz *et al.*, 2018; Van Eeghen, Littenberg and Kessler, 2018; Lee *et al.*, 2019; Kelendar, Faisal and Mohammed, 2020). The same happens for L&SM. However, L&SM could have great potential in this setting, reducing wastes and risks that limit coordination between hospital and territory, thus fostering continuity of care.

Therefore, this paper aims to evaluate how L&SM could be implemented in chronic care, extending the field of application beyond hospital boundaries, towards territory. Therefore, the current work analyses an ongoing L&SM project conducted in a Spanish hospital to improve the quality of care provided to COPD (Chronic Obstructive Pulmonary Disease) patients.

In this way, the paper contributes to the academic debate, broadening the application setting of an already existing methodology, the L&SM. It also supports practitioners and healthcare providers with a step-by-step guide for future project developments. Finally, this research addresses the theme of chronic diseases as a major burden for the economic and social sustainability of the healthcare sector.

2. Methodology

Considering the immaturity of knowledge and experience in the adoption of L&SM in integrated hospital and territorial care (Tiso, Pozzan and Verbano, 2022), a project was developed to assess the effectiveness of this approach in this setting.

The study was carried out at a Spanish hospital, covering a population of 350.000 people, and counting 5000 employees. The hospital provides tertiary and secondary care services and it is connected to a network of 15 primary care centres of pertinence.

The project regarded COPD patients, critical for the high number of readmissions to the hospital, with a particular focus on the discharge process from the Internal Medicine (IM) ward to primary care (PC). This process was analysed, extracting data from the hospital database, interviewing the health workforce involved, and through direct observation in the field. The information collected allowed to map the target process using HLM tools, and to identify risks and wastes. Moreover, risks have been assessed with FMEA (Failure Mode and Effect Analysis) in focus groups with experts and process stakeholders. Future project steps will lead to the identification of root causes of risks and wastes, arriving to collaboratively generate a countermeasure for each of them. Once the countermeasures are prioritised, an implementation plan will be developed.

3. Results

The preliminary results of the project, which is still in progress, are presented following the DMAIC cycle (Pyzdek and Keller, 2009).

3.1. Define

The project team consisted of a professor, a PhD student, a master student from the Department of Management and Engineering, a professor of Operations Management, a data analyst, a physician from the innovation unit of the hospital, and a physician from IM. Preliminary analysis of the hospital database highlighted the consistent number of hospital readmissions due to COPD exacerbations (an average of 2,08 readmissions per patient during 2021-2022). Indeed, in that period, about 14% of hospitalised patients for COPD exacerbation as the main diagnosis was then readmitted to the hospital at least once. For these reasons, the project aim was to reduce the number of COPD readmissions, improving the quality and continuity of care provided by the hospital and the territory. Thanks to flow analysis, it was possible to design a demand map, highlighting the COPD hospitalisation process characterised by the highest patient volumes: IM admitted 451 patients out of 843; these 451 patients were then discharged equally at home, with a PC follow-up, or at home, with the hospital follow-up. Additionally, the demand map highlighted how the hospital constitutes the main provider of health services for COPD patients, showing a lack of territorial care.

Therefore, the analysis focused on the discharge process from IM to home, considering both hospital and PC follow-up.

3.2. Measure

Data about the process (patients, activities, resources, timings) were gathered through data mining from hospital and PC databases, semi-structured interviews with IM, PC, Emergency Department (ED) and discharge liaison nurse workforce, and direct observations (Gemba walks) in ED and IM. Thanks to information collected, a swim lane map of the target process was elaborated, also contributing to identify the main criticalities:

- Communication gaps between hospital and primary care;
- Difficulties in carrying out COPD diagnosis tests in primary care centres;
- Lack of patient education to precociously recognise the symptoms of the disease;
- Lack of coordinated care between hospital and territorial care in planning the therapy for the patient (i.e.: drugs);
- PC follow-up is responsibility of the patient.

3.3. Analyse

The identified criticalities were deepened and analysed, arriving to define a list of specific wastes and risks. Some examples regarded:

- Delayed specialistic exam prescriptions inside IM;
- Duplication of patient information transcriptions in IM;
- Missing patient information in hospital software;
- Many hospitalised patients do not have a diagnosis;
- Delays in discharges;
- Delays in IM follow-up visits;
- Frequent changes in prescribed therapies;
- Many patients miss PC follow up visits.

Risks were then assessed through FMEA, assigning a value - the Risk Index - to each of them based on their impact, frequency, and detectability. In addition, the causes of each risk were defined.

In the next phases, a root cause analysis will be performed for each waste to determine its source. The risks and wastes analysis will then be integrated with key performance indicators, and the countermeasures will be generated through brainstorming with the health workforce involved.

3.4. Improve

In this phase, countermeasures to criticalities will be identified. Preliminarily, it is possible to consider some provisional intervention areas:

- Internal reorganisation of PC centres, eliminating non-value added activities to free up time for nurses to perform spirometry;
- Training nurses in spirometry to increase the number of workers available for the diagnostic activities;
- Educating patients and caregivers about COPD symptoms, drugs or oxygen administration, and risks;
- COPD prevention campaigns to smokers;
- Creating a procedure to increase communication at discharge between hospital wards and PC physicians.

During the following project steps, these initiatives will be discussed and validated in terms of feasibility and priority with the entire project team to formulate an implementation plan.

4. Conclusions

This study provides evidence on how L&SM implementations can be extended to the analysis of chronic pathways that cross different levels of care, specifically involving hospital and territory. The DMAIC cycle helped to well structure the project, and HLM tools contributed to map the process and identify inefficiencies across the various settings considered. Finally, risk management with FMEA added the perspective of patient safety, especially in the transition between different levels of care. Therefore, L&SM could represent a comprehensive approach to improve the continuity of care provided in chronic pathways, helping to define the inefficiencies that cause gaps between the hospital and territorial care. Indeed, it is acknowledged that the lack integration

and continuity of care is often caused by time losses, errors, missing standardised procedures, and duplications, improvable through the application of L&SM.

This article contributes to enrich the knowledge about L&SM, by providing an empirical experience that extends the application field beyond the hospital boundaries. At the same time, it also offers a social impact, working on the burden of chronic diseases, improving their access to care, reducing their hospitalisations, thus reducing cost and risks.

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