

Towards a model for implementing the lean management approach in Moroccan hospitals

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Abstract:

The present study aimed to develop a contextualized model for applying Lean management approach (LM) to Moroccan hospitals (i.e University Hospitals)

This is a descriptive cross-sectional study (empirical article), based on a case study performed in the Mohammed VI University Hospital Centre in Marrakesh, Morocco. Based on the model of Régis & al, (2019), we used data collection methods consistent with the aims of the study. Interviews were conducted with the main clients of the LM approach, the final clients (patients), and the internal clients (staff and managers). For an in-depth understanding and valid contextualization of the LM approach to Moroccan hospitals questionnaire was given to a representative sample of staff to identify their needs and feedback about the approach.

For interviews data analysis, and in order to come up with an adapted LM approach, the initial model developed by Régis and collaborators (2019) was amended. Hence some steps were phase-shifted, added or detailed. Or instance, we started with an assessment of the situation and the preparation of the field which enabled us to carry out an initial validation to determine whether or not the field was well prepared before moving on to the application phase, with the addition of a final evaluation after the model had been applied.

The research gaps and the calls from researchers are the starting point of our study, which is the first study in Africa concerning LM approach in health care centers. The development of the current model is, therefore, a relevant contribution to the development of practical knowledge for applying the Lean approach in Moroccan hospitals.

Our model proposes a holistic approach to all healthcare institutions

Keywords: Lean management, healthcare, implementing, model, Moroccan hospitals.

JEL Classification: I15

Type of paper: Empirical research

Résumé

La présente étude visait à développer un modèle contextualisé pour l'application de l'approche du Lean management (LM) aux hôpitaux marocains (essentiellement les centres hospitaliers universitaires).

Il s'agit d'une étude transversale descriptive (article empirique), basée sur une étude de cas réalisée au Centre Hospitalier Universitaire Mohammed VI de Marrakech, Maroc. Sur la base du modèle de Régis & al, (2019), nous avons utilisé des méthodes de collecte de données cohérentes avec les objectifs de l'étude. Des entretiens ont été menés avec les principaux clients de l'approche LM, les clients finaux (patients) et les clients internes (personnel et gestionnaires). Pour une compréhension plus profonde et une contextualisation valide de l'approche LM dans les hôpitaux marocains, un questionnaire a été remis à un échantillon représentatif du personnel pour identifier leurs besoins et leurs avis sur l'approche.

Pour l'analyse des données des entretiens, et afin de proposer une approche LM adaptée, le modèle initial développé par Régis et al, (2019) a été modifié. Ainsi, certaines étapes ont été décalées, ajoutées ou détaillées. Par exemple, nous avons commencé par une évaluation de la situation et de la préparation du terrain, ce qui nous a permis d'effectuer une première validation pour déterminer si le terrain était bien préparé ou non avant de passer à la phase d'application, avec l'ajout d'une évaluation finale après l'application du modèle.

Les lacunes de la recherche et les appels des chercheurs sont le point de départ de notre étude, qui est la première étude en Afrique concernant l'approche Lean dans les centres hospitaliers universitaires. Le développement du modèle actuel est donc une contribution pertinente au développement des connaissances pratiques pour l'application de l'approche Lean dans les hôpitaux marocains.

Notre modèle propose une approche holistique à tous les établissements de santé.

Mots clés : Lean management, soins de santé, implantation, modèle, hôpitaux marocains.

Classification JEL : I15

Type du papier : Recherche empirique

1. Introduction

Public and private hospitals are under increasing pressure to cut costs while improving patient care across all disciplines and departments (Nabelsi & Gagnon, 2017).

This increasing pressure has driven public hospitals to become more patient-centered to optimize healthcare processes, helping to reconcile efficiency imperatives with patient needs and hospital's mission (Nabelsi & Gagnon, 2017; Taiichi, 1988).

Globally, healthcare services have responded by implementing a wide range of process and quality improvement methodologies, including Lean management (LM), Six Sigma, Business Process Reengineering (BPR), and Total Quality Management (LaGanga, 2012; Martin & al., 2009; Radnor & Osborne, 2013).

In a literature review by Radnor (2010) focusing on the use of process improvement methodologies in the public sector, he summarised that 51% of the publications relate to Lean management, 35% of which relate to health services (Papadopoulos & al., 2011; Radnor & Osborne, 2013).

Lean management (LM) goes back to the 1950s, but its implementation to healthcare sector is recent 157. It originated in Japan with the Toyota company and spread rapidly to the United States and Europe, and was also applied in developing countries (Godinho Filho & al., 2016). The migration of Lean principles from manufacturing to healthcare facilities has proven successful in US hospitals (i.e Denver Health Medical Center to streamline operations and eliminate waste (LaGanga, 2012). In 2006, Denver Medical Center saved around \$2.8 million without reducing staff or patient care standards (LaGanga, 2012).

The concept of Lean (Womack & al., 1990) has gained widespread attention, both in academic literature and in practice. The principles of Lean are based on the underlying assumption that organizations are made up of processes and are linked to the concept of value, waste reduction (MUDA), and continuous improvement (kaizen) through an ever-recurring process (Carter & al., 2012; Daultani & al., 2015; Folinas & Faruna, 2011; Kelendar, 2020; Maqbool & al., 2019; Papadopoulos & al., 2011; Radnor & Osborne, 2013; Staats & al., 2011; Waring & Bishop, 2010; Young & McClean, 2008).

In Lean management, the notion of value must never be ignored and is essentially the capability delivered to the customer at the right time at the right price, as defined in each case by the customer. It is not just the patient who is the final customer (Bhasin & Burcher, 2006), but there are two types of customers for a healthcare process : the patients for whom the care is provided and the group of staff working in the care process (Ben-Tovim & al., 2008).

Lean implementation is often described as "a journey" made up of a set of processes. Hines et al (2008) also argue that this journey consists of developing a Lean philosophy within organizations, based on "a Lean lifestyle" in all processes (P. Womack & al., 2005; Radnor & Osborne, 2013).

By analyzing the wide range of studies published on the subject, the first characteristic that emerges is the limitation of initiatives to develop models of Lean management implementation throughout the organization and even the information available is not summative and often illusive, which complicates the recognition of general conclusions on the best ways and practices for the application of the Lean approach in each context (Plytiuk, 2013; Régis & al., 2019). In Africa, to our knowledge, no study was conducted to assess the implementation of LM in healthcare systems.

By analyzing the research proposals in the literature, we can say that most of the research perspectives converge toward the study of the process of implementing Lean management in healthcare (Abdelmalek, 2018; Bezzaze, 2015).

Several studies have shown that in implementing the Lean approach in healthcare, contextual particularities have emerged that could be taken into account to improve the process of

implementation and success of the method. Specific knowledge of the philosophical behaviour in each particular context is useful, as it would then be more likely to overcome problems when they arise. A Lean roadmap is not a cookbook of actions that must be strictly followed for each implementation, as each implementation will be singular and each organization has its own culture. Until now, and since there are no clear guidelines on how systems should be implemented in each specific case, implementation must rather take into account the particular requirements of each system. Researchers have begun to address this issue, but much research work remains to be done to enable the practitioner to properly manage Lean in healthcare implementations (Anvari & al., 2011; Joosten & al., 2009b; Plytiuk, 2013; Ulhassan & al., 2013). The aim of our study is to fill this gap in research by proposing a more suitable model for implementing this approach in the context of public health establishments in Morocco.

2. Literature review :

To fully understand the implementation of Lean management in healthcare and particularly in hospitals, we have presented in this part the preparation factors (facilitating factors), the obstacles, the advantages, examples of models for implementing Lean. LM in health care and more precisely the model chosen in this study in order to conclude our contextualized model.

2.1. Health Care LM Preparation Factors:

Several factors for preparing for the application of Lean management in healthcare have been documented in the literature, we will present the most cited factors. According to Waring & Bishop (2010), these factors include the use of hospital automation technology to develop the capacity to reduce this waste by freeing up staff to focus more on patient care and safety (Waring & Bishop, 2010).

Similarly, research also proposes the importance of adequate organizational preparation, a culture of continuous improvement (Nordin & al., 2010; Waring & Bishop, 2010), effective leadership, an adequate communication strategy and the availability of necessary resources (Waring & Bishop, 2010). In the study of Upadhye & al (2010), implementing lean requires many organizational and cultural changes in order to create radical changes in the way of work is done (Upadhye & al., 2010).

The leadership factor was also supported by Kumar & al (2018), Nordin & al (2010), P. Womack & al (2005) and Upadhye & al (2010) ; for them, strong commitment and leadership from management are essential to the success of the LM (Kumar & al., 2018; Nordin & al., 2010; P. Womack & al., 2005; Upadhye & al., 2010).

Factors for the success of LM also include the participation of hospital management and staff, putting the patient first, staff involvement and the development of a clear and detailed action plan (Martin & al., 2009).

Another factor qualified as critical in any attempt at application is the training of staff and managers on the principles and philosophy of Lean (Folinas & Faruna, 2011; Nordin & al., 2010).

189. Radnor (2010) highlighted the importance of organizational readiness factors for Lean implementation. These factors include an understanding of the processes of delivering care services and active staff engagement. any lack of attention to these factors will consequently lead to a lack of sustainability of the application of LM (Radnor, 2010)

2.2. Obstacle of implementing LM in healthcare:

Any change and quality improvement initiative presents obstacles that can prevent its success. The Lean management approach is not excluded from this rule, we will cite some of these factors. The first major obstacle is resistance from staff (Joosten & al., 2009; Waring & Bishop,

2010), also lack of commitment from senior management, change objectives that are not aligned with strategic planning and customer requirements, a lack of staff training and poor selection of projects to be implemented (Z. Radnor & Osborne, 2013).

Ismail Salaheldin (2005) reported that the main obstacles are linked to human resources such as lack of training on LM for managers and staff; lack of communication between the two; lack of support from top management plus a lack of cooperation from suppliers to provide them on time; necessary materials (Ismail Salaheldin, 2005).

De Souza & Pidd (2011) summarized the obstacles related to the implementation of Lean thinking in healthcare according to several elements. In relation to people, mainly resistance to change constitutes the major factor, lack of appropriation of activities with the objectives and needs of patients, one or other of the current activities or proposed processes, failure of the direction in the management and supervision of projects, the compartmentalization where each department works in an isolated manner with lack of coordination and synergy, lack of resources and poor communication between all stakeholders within the hospital (De Souza & Pidd, 2011).

2.3. Benefit of Implementing LM in Healthcare:

Reports on the implementation of Lean management in healthcare have concluded that there is concrete evidence of a consensus on the potential of LM to bring very significant advantages when applied in the field of health care, these advantages have been realized mainly in the following areas: deadlines, quality and safety care, costs, patient and staff satisfaction, inventory management, productivity, error minimization and communication. The following table summarizes these tangible and intangible benefits by reporting studies that mentioned these benefits.

Table 1 : Benefits of Implementing LM in Healthcare.

Advantage of LM	Studies
Minimizing delays and reducing waiting times	(Al-Shawi & Manhal, 2020; Bhasin & Burcher, 2006; Carter & al., 2012; Daultani & al., 2015; De Souza & Pidd, 2011; Kumar & al., 2018; Martin & al., 2009; P. Womack & al., 2005; Singh, 2019; Smith & al., 2012; Sullivan & al., 2014)
Quality and safety of care	(Daultani & al., 2015; Joosten & al., 2009; Kumar & al., 2018; LaGanga, 2011; Martin & al., 2009; Singh, 2019; Spear, 2005; Veres, 2020)
Costs	(Bhasin & Burcher, 2006; Daultani & al., 2015; Joosten & al., 2009; LaGanga, 2011; P. Womack & al., 2005; Singh, 2019; Smith & al., 2012; Spear, 2005; Veres, 2020)
Staff satisfaction	(Al-Shawi & Manhal, 2020; De Souza & Pidd, 2011; Ismail Salaheldin, 2005; Joosten & al., 2009; D. Z. Radnor, 2010; Smith & al., 2012; Yasin & al., 2003)
Stocks	(Bhasin & Burcher, 2006; De Souza & Pidd, 2011; Kumar & al., 2018; Veres, 2020; Yasin & al., 2003)
Productivity	(Anvari & al., 2011; Bhasin & Burcher, 2006; Godinho Filho & al., 2016; Kumar & al., 2018; LaGanga, 2011; Smith & al., 2012; Veres, 2020)
Error	(LaGanga, 2011; D. Z. Radnor, 2010; Yasin & al., 2003)
Communication	(Ismail Salaheldin, 2005; LaGanga, 2011; D. Z. Radnor, 2010; Yasin & al., 2003)
Patient satisfaction	(Bhasin & Burcher, 2006; De Souza & Pidd, 2011; Ismail Salaheldin, 2005; Joosten & al., 2009; Martin & al., 2009; D. Z. Radnor, 2010; Sullivan & al., 2014; Veres, 2020; Yasin & al., 2003)

Source: Developed by the authors.

2.4. Example of the LM implementing model in healthcare:

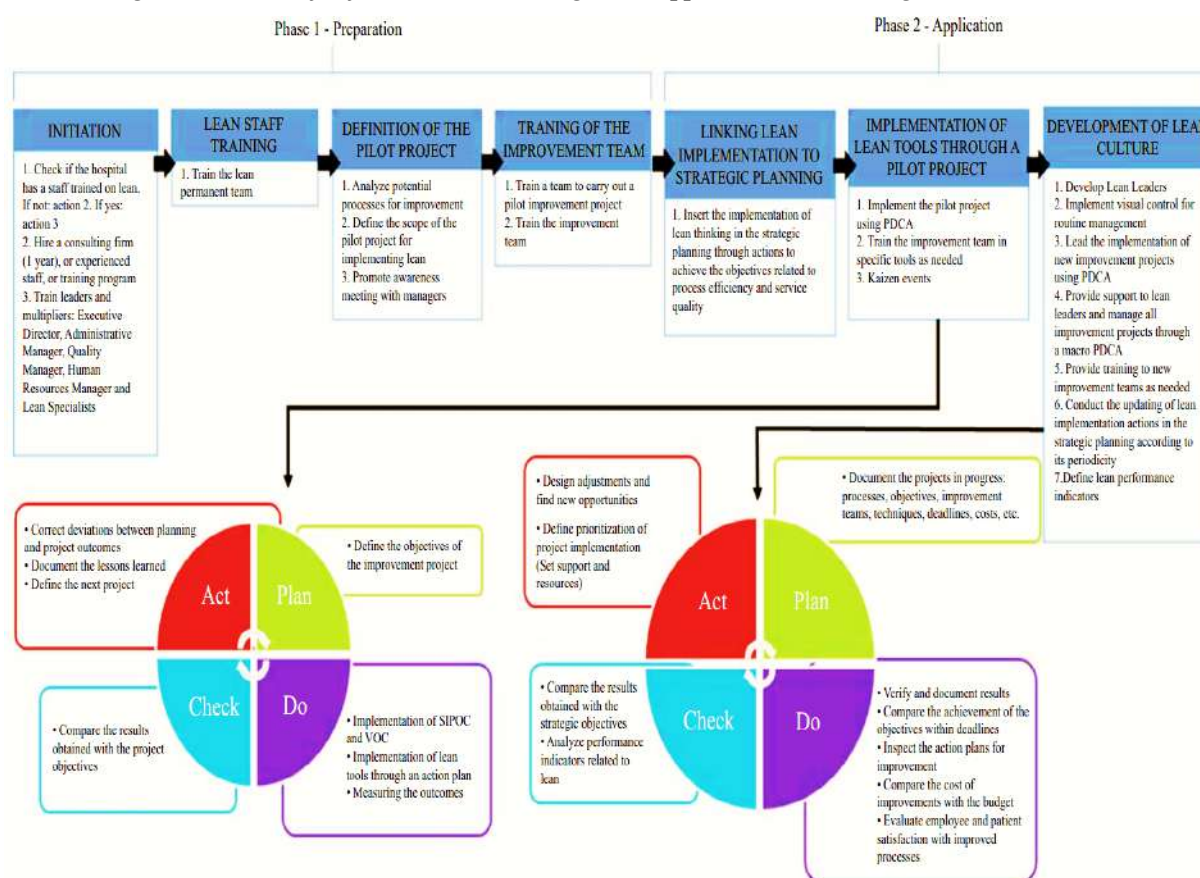
Most of the LM application modules are developed in the field of industry and few studies have reported the development of specific models in the field of health (Abdelmalek, 2018).

To achieve the objective of the study, we worked in line with a model developed in the study of Régis and collaborators (2019) conducted in Brazil, the contribution of our study is to adapt and contextualize this model by taking into account the specificities of our Moroccan context and

more precisely, the University Hospital Mohamed VI of Marrakech (CHU) (Régis & al., 2019). The reasons for choosing this model are, firstly, that it was developed in a developing country, which is close to our context compared with other models developed in developed countries; secondly, its stages are clear and cover implementation throughout the organization and aim for sustainability; thirdly, it is based on the Deming Wheel (PDCA) approach, which is very well known in our context, which may facilitate acceptance and implementation within the CHU. In the following section we will explain the components and characteristics of this model, which will be adapted and contextualized in this study.

The contextualised framework could inspire healthcare decision-makers, especially in developing countries, to successfully implement lean management in healthcare practices. As shown in figure 1, LM is formed by two main phases, a preparation phase and an application phase.

Figure 1: Frame of reference: Lean management application model (Régis & al., 2019)



Source : Régis & al. (2019), « Acase-based methodology for Lean implementation in hospital operations ».

First the **phase 1 « Preparation »** (Régis & al., 2019), it aims to form a Lean team to drive the whole process, define the pilot project and train the team that will drive it. It consists of four steps. The step 1.1 : « launching », seeking for qualified practitioners, if not train them, step 1.2 : « training Lean staff », the Lean staff is a permanent team that must be trained to manage the Lean project throughout the organization, step 1.3 « Define the pilot project », designate and select a pilot project (it will then be used primarily to convince the staff not involved and to remedy any shortcomings) and the step 1.4 « forming the improvement team », it must be determined which employees will be part of the improvement team for the implementation of the pilot project.

Second, the **phase 2 « Application »**, it begins with strategic planning, as management considers Lean to be a strategic objective of the hospital. From there, improvement projects are

generated and the Lean culture arise. It consists of four steps. The step 2.1 « link Lean implementation to strategic planning », the actions of the Lean project must be linked to the hospital's strategic objectives. This increases commitment and ensures financial support, step 2.2 « Implementation of Lean tools through a pilot project », this implementation is carried out using the PDCA improvement cycle methodology. Plan: draw up a pilot project plan, do: describe the current process, using the VSM tool. Then, a future state is designed and applied through kaizen events, which stimulate team building, check: measure the results against the pilot project objectives and readjust: on the basis of the deviations observed, it is possible to modify or establish new objectives, deadlines and budgets, and new improvement projects are documented, based on the hospital's overall strategy.

The last step 2.3 « developing a Lean culture », the development of a Lean culture is a never-ending process that must be implemented strategically throughout the hospital's structures and processes. Improvement projects are implemented as a PDCA cycle. When this cycle is integrated into the organisational routine, it becomes a culture and a way of thinking and working for all hospital staff.

3. Research methodology :

In this part we will present the characteristics and methodological process of our study, namely, the type of study, location, target population/sample size/sampling method and the methodological process followed in the study.

3.1. Type of study :

This is a mixed cross-sectional study with a descriptive aim, the purpose of which is to develop a contextualized model of the implementation of Lean management within Moroccan hospital structures, through a case study of the Mohammed VI University Hospital Centre in Marrakech (CHU).

3.2. Location of the study :

The Mohammed VI University Hospital Centre is a public institution with legal personality and financial autonomy. It essentially covers the Marrakech-Safi region in the center of the country (as well as other regions), which is made up of 7 provinces and one prefecture, covers an area of 41,384 km² and has a population of nearly 4,774,413 (the third most populated region in our country). The center comprises five hospitals with different specialties, two centers (one for clinical research and the other for regenerative medicine), and a capacity of 1,598 beds, with a total of 3,385 human resources (1,588 paramedical staff, 1,409 medical staff, and 388 administrative and technical staff).

3.3. Target population, sample size and sampling methods:

The table below summarizes our sample

Table 2: Population, size and sampling methods.

Populations	Total	Measuring instrument	Sample size	Sampling methods
Health professionals	2997	Interview	20	Non-probabilistic accidental
		Questionnaire	402	Non-probabilistic by quota and accidental
Managers	10	Interview	10	Non-probabilist accidents
Patients	51	Interview	51	Non-probabilist accidents

Source: Developed by the authors.

3.4. Methodological process :

Our study aimed to adapt and contextualize the chosen model of Lean management implementation through a case study of the Mohamed VI University Hospital in Marrakech. To do this, we gave a detailed description of the model in the previous section. The study concerned three types of populations of interest. First, the patients, in the philosophy of Lean management any attempt to apply Lean management must take into consideration the determination of value (what satisfies) from the point of view of the customers, and since the patient is the main customer of the healthcare system, we interviewed to explore their feedback and needs along the passage within the UHC (Home, diagnosis, hospitalization, care, safety/environment and financial accessibility). Second, the managers and healthcare professionals to discuss the proposed model and their views on the feasibility and factors influencing the application of Lean within the UHC. Finally, a representative sample of healthcare professionals on the stages and process of the proposed model to get an overall idea of the opinion of the main actors in the implementation of Lean management at the UHC.

The results of the interviews and questionnaire were collated and analysed to gain an in-depth understanding of the changes proposed to develop the appropriate model for implementing Lean management within the structure of the University Hospital.

3.5. Data analysis : (qualitative and quantitative analysis) :

The results of the interviews with patients, healthcare professionals and UHC managers were transcribed word by word and were coded according to the order in which the interviews were conducted. For patients they were coded from E1 to E51, for professionals from Ep1 to Ep20 and for managers from Eg1 to Eg10. The results were analysed verbatim, and the ideas were collated and summarised according to the items raised in the questions asked.

The questionnaire was administered directly to healthcare professionals. The data was entered into SPSS software. Items were analysed by the proportions of responses from professionals on the stages of implementing Lean management in the UHC and by the mean and standard deviation for the age variable. The results were presented in the form of graphs and tables.

4. Résultats et discussion :

The results of our study will be presented in three parts. Part of the results of the interviews with patients, part of the results of the interviews with staff and UHC managers and the part that concerns the results of the data collected from staff via the questionnaire. All the results were compared and taken into account to develop our contextualised model.

4.1. Results of the interview with patients :

The interview with patients aimed to explore their views on the processes they go through during their stay at the UHC and to explore their needs. The questions asked concerned the following processes: hospitalization, reception, staff behaviour, waiting times, diagnosis/treatment/follow-up of patients, care safety/environment, and the affordability process. The results will be presented according to the following themes :

- ***Patients' views on the hospitalisation process :***

For hospitalization at the CHU, there are two possibilities, either the patient is admitted via the emergency department and then receives the hospitalisation ticket and completes the administrative procedures at the reception and admission service (SAA) before being hospitalized. Alternatively, they can go to the diagnostic centre to undergo the necessary tests before being referred to the inpatient department. Once the patient has obtained a hospital admission ticket, he or she follows the administrative procedures for hospitalization in the

reception and admission department (SAA).

Most of the patients were satisfied with the procedures followed for hospitalization at the CHU, they said that the procedures were not complicated, which shows the quality of the hospitalization process, once the doctor has given the go-ahead for hospitalization the rest is simple and mechanical,

E3 : I was being monitored for high blood pressure and developed a cerebrovascular accident (plus hemiplegia). I had a check-up in the emergency department and was admitted to the hospital the same day. I'm satisfied with the hospitalization process".

E15 : "I had intense abdominal pain and in the emergency department they asked for a check-up, they gave me an appointment for a week, I had the check-up again and then I was admitted to the hospital. The hospitalization process went well.

However, some patients reported that there was a slight delay in obtaining the doctor's authorisation to admit them to hospital because of the large flow of patients (to follow a diet or treatment or due to a lack of space) and sometimes for no reason known to the patient :

E25 : "The hospitalisation process was very normal, even though I waited 2 months before the decision to hospitalise was made".

E30 : "The operation was scheduled but because of the goitre it was delayed. The hospital stay was normal, no difficulties, no complexity".

E31 : "Before 1 and ½ years, I had a consultation at the university hospital with all the necessary tests. They told me they would contact me afterward to do the operation. I waited a long time for them to call me. I tried several times to get them to explain the delay but to no avail. After 1 and ½ years, as I've already said, I finally got the go-ahead to have another check-up for hospitalization purposes. I was hospitalized for a week before the operation because of a problem with hyperglycemia, which always prevents the operation from being carried out".

- ***Patients' views on the staff behaviour :***

All patients appreciated the behaviour of the health and support staff in the inpatient wards and in the AAS and they mentioned that the welcome was very remarkable despite the workload:

E17 : The staff on the ward, both doctors and nurses, behave impeccably. They always listen to us, they try to meet our needs and explain every little thing to us.

E11 : The administrative staff, doctors, nurses, security guards, and cleaners all behave with humanity and empathy. I feel as comfortable as if I were at home with my sons and daughters. It's better than the way staff behave in private health establishments".

Some patients who had been through the emergency department complained that some health professionals and security guards did not behave well with patients, which impacted on the course of treatment, waiting times, and even on patients' mental and physical health (conflicts, delays, etc.). The patients stated that this bad behaviour could be due to the large flow of patients, the lack of staff, the unsuitable structure of the emergency department, and also certain unhealthy individual behaviours (clientelism, corruption, etc.):

E40 : In emergency departments, some people don't behave well with patients and those accompanying them, especially certain security staff, but the majority are good".

E5 : "There is a difference between the behaviour of the day staff and those who work at night in the cardiology department. Some people don't behave well and don't give enough time to the patients".

Patients mentioned that good behaviour is an essential condition for good care, and can sometimes have effects that go beyond those of medication. Good behaviour helps patients to

integrate into the hospital environment, to accept the therapeutic process and, above all, to feel satisfied.

- ***Patients' views on the waiting time :***

As with staff behaviour, there was a difference in patients' views on waiting times. Most said that waiting times were very normal throughout the patient care process :

E10 : "The waiting times at all stages were very reasonable. The time between hospitalisation and the operation was no more than 24 hours".

E16 : "I didn't have to wait very long, it was very normal".

In other cases, some of them stated that there was a slight delay in providing care, but each time there were logical reasons behind these small delays, and these reasons were presented to the patients so that they would be aware of them and avoid problems :

E17 : "The waiting times were very acceptable given the workload. There was a slight delay in carrying out the operation, but that was due to the goiter and its complications".

E31 : "The waiting time was normal, even though I waited almost 1 month. The delay in the emergency department was justified".

However, the other patients were not satisfied with the delays that were recorded in the course of their care, the delays were long without presenting convincing and appropriate explanations, which influenced the delay in diagnosis and the quality of care :

E19 : "The waiting time between diagnosis and hospitalization is very long, I spent a lot of time waiting for a reply from the hospital..."

E23 : "The waiting times were a bit long, 8 months back and forth, and after the check-up, I waited 2 months and even after hospitalization I waited a long time to get the results of the check-ups, I don't know if this delay is normal or not".

Patients confirmed that waiting times are a very important issue. Despite the efforts made by the Ministry of Health and hospital management, especially when it comes to booking appointments via a platform, waiting times are sometimes unacceptable for patients, given that their physical, mental and even social health is always altered when they are ill.

- ***Patients' views on access to information :***

Concerning communication and access to information, patients' views differed between services. They said that access to information was very easy in cardiology and visceral surgery, and that staff were good at communicating. In the emergency department, some patients mentioned that there was a major problem with communication and access to information. This situation always leads to delays in treatment, poor triage of patients, and sometimes some patients who are more urgent than others can be passed over for less urgent patients. Similarly, given the characteristics of the emergency department, the flow of patients will automatically be unmanageable as a result of this problem.

E1 : "We had easy access to the necessary information. The team allowed us to have access to information before and again during hospitalization: during staff visits and each time we needed information."

E10 : "Access to information in the emergency department was very difficult; I couldn't find people to whom I could contact to ask for information. On the other hand, in the surgery department, I received all the information necessary to know everything about my situation."

- ***Patients' views on the diagnosis/treatment/monitoring :***

The therapeutic management of patients involves diagnosis, treatment, and monitoring of their state of health. In general, patients were satisfied with the overall care provided by the

University Hospital :

E47 : "The diagnosis and the hospitalization process went well. The doctor told me that I needed to adjust the vital parameters so that he could carry out the operation. I now have regular check-ups on my state of health and I'm satisfied.

E19 : "From the diagnostic check-up, through the operation, and up to now the treatment has gone well, my state of health is improving every time I have check-ups, I have painkillers and everything. I feel better every day ».

The satisfaction expressed by most patients was considered normal, since patients are already in the hospital and care begins as soon as they enter the ward, since the greatest suffering according to some patients was before hospitalization.

- ***Patients' views on the care and environmental safety process :***

Similarly, the majority of patients mentioned that for ergonomic conditions, patient safety and the physical environment in which they are housed, are of good quality. They stated that the service is well organised, staff ensure good hygiene in the wards and patients' rooms, they monitor the work of the cleaners at all times and also the people responsible for food respect the patients' schedules and diets. The patients' rooms are well equipped, the beds are comfortable and the nurses change the linen whenever necessary to ensure the cleanliness of the patient's environment. Some patients have commented on the cleanliness of the rooms, and on some items that need changing, such as certain bedside tables or beds. But in general, we can say that patients were satisfied with this process. Likewise, some patients stated that the emergency department requires new organization and structuring to improve quality and patient safety.

E2 : All conditions are favorable for hospitalization, the beds are comfortable and the rooms are clean. Sleeping in a common room allows us to share our worries and be reassured by each other.

E4 : Public hospitals have really developed better than before, everything is equipped with clean rooms, no noise. There is progress in improving the comfort of hospitalized patients.

E21 : The emergency department requires new structuring and new reorganization to have more safety and better quality of service. On the other hand, the cardiology department is secure, well equipped, airy and clean.

- ***Patients' views on the affordability process :***

A significant proportion of patients stated that they had a problem with the affordability of healthcare benefits. To date, some patients have not been affiliated with any health insurance scheme or are still in the process of changing from RAMEL to AMO. These patients do not know whether or not they will pay the charges when they are discharged from the hospital or whether there will be another procedure. This problem can aggravate the situation of patients, especially those who are unable to pay these charges. However, most patients are affiliated to the AMO scheme and we are well aware that the AMO covers a large proportion of the costs associated with patient care, but generally the patient pays part of these costs. Payment for certain services or the purchase of medicines and health products is made in full and on the spot before the AMO reimburses. These payments are generally made outside the UHC to laboratories, pharmacies, drugstore and even private clinics. For a large proportion of patients, these payments represent a heavy burden over the long term while waiting for reimbursement, which can take up to three months.

This is why the patients asked that the UHC should invest more to provide all the check-ups, health products, medicines, and services needed for the overall care of patients, or that private health structures should provide these services and products in the same way as the UHC, since

patients are affiliated to the AMO.

E1: I am affiliated to the AMO scheme. Most of the expenses were covered by the AMO. But I paid a more or less significant sum directly to do an external assessment (in a private laboratory).

E4: I am affiliated with the AMO, but I have to buy an expensive medication for me that I will use for 10 days (before and after the operation), but I do not have the means to buy it (I only purchased the two-day treatment). I cannot pay and expect reimbursement of the covered amount.

- ***Patients' suggestions for solving process problems and improving satisfaction?***

For this question, patients were asked to give their recommendations for improving the quality of care and their satisfaction. Patients made some very relevant suggestions, in relation to reception, waiting time, financial accessibility, hospitalization and staff behavior.

For the reception, the teams of health professionals (doctors and nurses) are appointed to sort patients as they enter the emergency department to avoid delays, overcrowding, and the problem of urgent cases that can go unnoticed.

There are 4 cubicles in the emergency department, each dedicated to a medical or surgical specialty. When a patient comes to the emergency department, the general practitioner consults the patient, and if he sees that he needs a specialist, he calls the specialist on call, which always causes delays and congestion. Sometimes the specialist doesn't reply, which creates problems. What's more, the specialists are always in hospital wards, which means they have to go to emergency every time. My proposal is to assign specialists to the emergency departments, one specialist per cubicle, to avoid delays and improve patient care. And to ensure that patient flows are well organized, managers could assign certain people (preferably girls) who are reception specialists (as in Europe).

The structure of emergency services needs to be reviewed to ensure that patient flows are properly managed.

We need to provide accommodation for those accompanying patients, to minimize their suffering throughout the course of their treatment, as is the case abroad. They pay a token contribution, which is used to pay for the cleaning and service staff (sometimes girls sleep alone in the street next to or inside the hospital, which is a major risk for them).

The second point is work on waiting times in order to minimize these waiting times as much as possible. Then financial accessibility where the university hospital must ensure the availability of medicines and reagents to carry out assessments.

Finalement, the hospitalisation and staff behaviour. The administration needs to control and supervise staff and security guards in the emergency department to limit the inappropriate behaviour of some people (clientism, certain aggressive behaviours, etc.).

In hospital wards, there must be clothing for patients and even gowns and showers that can be used either by patients or visitors (as in Europe). The hygiene in patients' rooms needs to be improved, as sometimes the cleaners come in quickly without doing any real cleaning. And even one patient pointed out that there was a problem with lighting (electricity) in the toilets, and at night patients find it difficult to access them and only use batteries to relieve themselves in the toilets.

4.2. Results of interviews with managers and healthcare professionals:

For these interviews, the managers and health professionals were asked to describe the organization and the efforts made by the UHC to improve service quality, to describe their knowledge of Lean management, and finally to give their opinions on the proposed application model to synthesize a contextualized model adapted to the application of Lean management at the CHU.

- **Quality improvement approaches and methods used in the wards/hospital:**

With the approaches and methods used for quality improvement, the professionals generally indicated certain methods but these were not specific, they were just general statements such as: division of tasks, good communication, participative leadership, the nurse visit, meetings, the reflective approach, the department charter.

On the other hand, a few participants mentioned certain methods as ways of improving quality within the university hospital center, namely the development of standardized protocols, supervision, ongoing staff training on quality and risk management, the Deming wheel (PDCA), the patient satisfaction survey, the use of a valid information system, the dashboard, the Ishikawa Diagram and the ongoing evaluation of activities and objectives.

From the responses of the interviewees, and since only a few people reported the adoption of certain quality improvement methods, we can say that either certain methods are applied but the staff do not know that they are quality methods, or no methods have been adopted in their services and departments.

The managers mentioned that the tools used to improve quality within the UHC are the drafting of standard protocols for each process (the example of the laboratory service about the use of equipment), the use of dashboards, and the use of platforms and software that optimise the management and quality of processes.

Ep 11 : « No initiative declared is known as a quality improvement approach in our service ».

Eg 2 : « The quality initiatives and methods adopted in our service are : developing standardized protocols, promoting good communication and adopting participatory leadership ».

Ep 19 : « Among the initiatives used in the hospital, there are : continuous evaluation, the organization of periodic meetings, the use of certain quality tools: the PDCA, and the Ishikawa Diagram »

- **Barriers and facilitators to the adoption of quality improvement approaches and methods in the departments/hospital:**

There will be obstacles to adopting any type of quality improvement method or approach. In our case, a number of obstacles were mentioned which they felt needed to be either eliminated or minimized for these projects to succeed. Facilitating factors were also declared as conditions for the adoption of these methods. The following table shows the various statements made by staff and managers.

To organize these proposals, we have tried to classify them into four areas (see table 3).

Table 3: Obstacles and facilitating factors in implementing a quality approach.

Domains	Obstacles	Facilitating factors
Stakeholder commitment (patients, staff and managers)	<ul style="list-style-type: none"> - Staff resistance - Lack of commitment - Lack of will and demotivation among staff - Diversity of staff profiles - Variability of patients (each patient is a unique case): Problem of standardising care 	<ul style="list-style-type: none"> - Empowerment, integration and commitment of all stakeholders (especially patients, staff and top management) in concerted actions. - Awareness of the need to improve, - Young, committed staff - Team confidence
Resources (human, financial and material)	<ul style="list-style-type: none"> -Lack of resources (financial, human and material) - Equipment failure - Unsuitable department structure - Delays in completing tasks and meeting patients' needs. - Time pressure due to work overload - Waiting times for certain interventions - High patient flow compared to resources 	<ul style="list-style-type: none"> Availability of resources: - Material - Autonomous budget - Sufficient, knowledgeable and well-trained staff - Creation of associations to improve hospital conditions

Setting targets	Derivation of objectives between employees "several visions and actions to be undertaken".	Setting clear objectives for the entire establishment and for each player
Administrative procedures	Complex processes (bureaucracy)	Easier procedures and less red tape.
Communication and coordination	<ul style="list-style-type: none"> - Lack of communication - Poor communication - Lack of staff monitoring and support 	<ul style="list-style-type: none"> - Open/active communication - Interdisciplinary collaboration (doctors / nurses / administrators, etc.) - Team coherence - Coordination with the nursing service (SSI) - Support, monitoring and evaluation of process implementation.
Training for staff and managers	Inadequate training / Lack of training in quality and management	<ul style="list-style-type: none"> - Manager training - Trained and qualified staff, - Specific Lean management training for staff and managers - Use of online platforms and distance learning tools

Source: Developed by the authors.

- **Knowledge of Lean management :**

Most of the interviewees (18/20 healthcare professionals and 8/10 managers) said that this was the first time they had heard the word "Lean management", hence the importance of integrating this approach into the basic and/or continuing training of healthcare professionals so that they are ready to apply it in their departments. However, some participants declared that their knowledge of the concept was superficial, and they tried to define the approach :

Ep2-E18-E20-Ep7 : "It's a management process based on eliminating waste".

Ep13-Ep15 : "Developed in Japan, it is an approach to continuous quality improvement in a company or hospital".

Ep1 : "Lean management is an administrative management method based on the theoretical and practical study of processes".

These definitions show that only a small number of participants came close to the Lean management approach by formulating a few definitions and citing certain keywords, namely, the elimination of waste, a management approach, and a continuous improvement approach.

- **La motivation pour participer à l'application du lean management dans le service/l'hôpital :**

Before asking this question, we presented all the participants with a document containing explanations of the Lean management approach, its philosophy, its characteristics and the principles that guide every attempt to apply the approach in a healthcare establishment, and we tried to answer all the questions they asked about the content of the document.

The responses of all the participants to this question were positive, as they showed their enthusiasm and motivation to participate in the adoption of this approach. Some of them justified this motivation :

Ep11 : "Yes, I'm very motivated, as this approach seems very interesting and practical. We support any initiative that will improve the quality of care".

Ep16 : "Yes, of course, I'm motivated, the LM, if applied correctly, will enable us to improve the quality of care and optimize our work processes".

Ep20 : " Yes I am motivated, this approach seems very promising and its philosophy is in harmony with the culture and philosophy of health care ".

However, some of the others demanded the existence of certain conditions to be motivated to begin this journey:

Ep5-Eg4-Ep12 : "Yes I am motivated especially if there is commitment from the staff and if the players can overcome the obstacles at the start of the project".

- ***Opinion on the technical, financial and cultural feasibility of the application of Lean management within the University Hospital:***

There are three possibilities for this question. Firstly, some participants confirmed that at UHC level, there are all the ingredients to ensure the technical, financial, and cultural feasibility of successfully applying Lean management. This is justified by the quality of the existing staff, the availability of financial resources and the general climate seems favourable to adopting any quality improvement initiative. Secondly, for the project to be feasible on all three levels, some people pointed out that the administration had to meet many requirements, namely working on eliminating obstacles before the project was launched, the commitment of all the players, especially the managers, the permanent availability of resources, motivation and the setting of clear, shared objectives for everyone. Finally, some of the participants stated that the application of Lean management at the UHC is feasible from a financial and technical point of view, especially with the financial autonomy of the CHU's management, and if the approach and its tools are adapted to the technical specificities of the health sector. But the big problem remains in cultural feasibility, which requires hard and serious work on a strategic level since some have mentioned that the favorable culture is not shared throughout the establishment and for all staff, it requires a real cultural change and mentalities of both managers and staff, especially the existence of cultural diversity with differences in profiles and sub-cultures within the CHU. If we do not give importance to this cultural aspect, we may achieve partial success in the short term, but systematic and comprehensive implementation in the medium and long term will not be guaranteed.

Ep 1 : « Yes at the CHU there are facilities of this kind since there is financial autonomy and also because of the quality of the staff that exists and the favorable climate at the CHU ».

Eg 3 : « For the technical and financial feasibility this is ensured at the university hospital level, but for the cultural feasibility it is up for discussion, the favorable culture is not really shared throughout the establishment and for all the staff, we have to work on that »

- ***Opinion on the capacity and acceptability of staff regarding the application of Lean management within the UHC:***

All the participants in the interview agreed that the majority of UHC staff have the capacity and skills needed to apply Lean management, especially given the existence of a very young, motivated and committed population that only requires support and access to high-quality continuing training. There will naturally be resistance from several staff, especially if there is a problem with communication and staff integration from the start of the adoption of Lean, the lack of staff and work overload, and the lack of training. We therefore need to double our efforts to convince and prepare staff psychologically through good communication, motivation, training, and support for staff and their involvement in decision-making throughout the application of Lean management.

Ep1 : « Yes, the UHC staff in general are competent and accept any improvement initiative, but they must be integrated and explained to them the reason for things. But that doesn't mean there won't be any resistance from certain people, there's still this problem ».

Ep3 : « Yes generally there will be acceptance, although there will be resistance at the beginning but it will be overcome over time by good communication, motivation, training and support of staff throughout the application of Lean management ».

- ***The obstacles and facilitating factors specific to the application of Lean management within the University Hospital:***

For the participants, the obstacles and facilitating factors for each quality improvement initiative are almost the same for Lean management. They pointed out all the obstacles and facilitating factors already mentioned, but some elements were mentioned specifically for the Lean approach, which is detailed in the table 4:

Table 4 : Obstacles and facilitating factors specific to the Lean management approach :

Facilitating factors	Obstacles
<ul style="list-style-type: none"> - The UHC has already launched innovative quality improvement initiatives, so there's the notion of experience in the matter. - The rationale for implementing Lean for staff - Legislative and administrative support and guidance - The introduction of an evaluation system at each stage in the implementation of Lean management. - Adopting Lean management at a strategic level by aligning the application of Lean management with the Human Resources Plan. - Diversification of motivation methods - Developing a sense of belonging 	<ul style="list-style-type: none"> - The problem of sustainability and strategic commitment - Lack of accompanying measures and ongoing evaluation

Source: Developed by the authors.

- ***Opinion on the proposed model for the application of Lean management in a healthcare organization:***

To answer this question, we presented the proposed model to the participants, explaining the different stages, and then asked for everyone's opinion on the model as well as possible contextualization possibilities for application within the UHC.

All the respondents said that the proposed Lean management model was well structured, with consistent, organised steps that provided a clear vision of how the UHC and healthcare establishments in general could adopt this approach. Here are a few examples of what participants said:

Ep3 : "The model is well structured and contains all the steps needed to implement it in the University Hospital. I can see that each action in the model fulfils its objective.

Ep6 + Ep10 : "The model is well structured with logical and exhaustive steps, it is very well adapted to our establishment".

Ep7 : "The model includes logical and practical steps and contains the necessary elements for any type of quality approach".

To better adapt the proposed Lean management model to the UHC, some adjustments were suggested by several respondents. We begin by adding a phase (which will constitute the first phase of the model) that represents an in-depth analysis of the overall situation of the university hospital to identify its strengths and limitations, and to detect customer needs before embarking on the project. Another proposal is to evaluate the various stages of the model to ensure that the objectives are achieved. Two participants mentioned that UHC professionals are trained and have the necessary skills to adapt and succeed in the Lean management project, so the UHC will not need a specialist company to prepare the ground, but according to the results of the questionnaire with UHC staff, the majority are not trained in management and also in the literature almost all the researchers recommend hiring a specialist company to launch the project and especially to train the Lean management team and the resource persons.

Another recommendation concerning point number 5 "continuous training for the new improvement team" is proposed to be moved to the preparation phase instead of the application phase. Similarly, the step of "Linking the implementation of Lean management to strategic planning" must be integrated into the preparation phase from the outset. According to several participants, the adoption of the Lean approach within the UHC must be linked to the hospital establishment project (HEP), which is an official, regulatory and strategic document that guides all hospital activity.

Ep3 : « The model is well structured and contains all the steps necessary to implement this model in the university hospital. I see that each action in the model serves its purpose well ».

Ep1 : « The model is very well adapted to our context at the University Hospital, the steps are linked, all that remains is to add a first step in the preparation phase. It is the in-depth analysis of the situation to know the strong points and weak points before embarking on the project ».

Ep18 : « The model is generally adapted, the stages are complementary and chronological and only one thing needs to be added: the evaluation of the different stages of the model to ensure monitoring of the achievement of the objectives ».

4.3. Results of the staff questionnaire:

Table 5: Description by age, Gender, Management training and Professional status.

Variables	Modalities/Parameters	Average / Number / Percentage
Age	-Average/standard deviation	31,2 (± 6,79)
	-Age categories :	
	➤ < 25 years	
	➤ 25-30 years	➤ 14 %
	➤ 30-35 years	➤ 28 %
	➤ 35-40 years	➤ 31 %
	➤ 40-45 years	➤ 18 %
Gender	➤ F	➤ 269 (67%)
	➤ M	➤ 133 (33%)
Management training	➤ Yes	➤ 76 (18,90%)
	➤ No	➤ 326 (81,10%)
Professional status	➤ Medical profession	➤ 170 (42,29%)
	➤ Paramedics	➤ 232 (57,71%)

Source: Developed by the authors.

• Gender :

The proportion of females in this population is more dominant, representing 67% (33% male). The male/female sex ratio was 0.494, which is quite normal given that the number of females trained and recruited each year is greater than the number of males.

• Management training :

The majority of participants in the study (81.10%) had not received management training. This can be an obstacle to implementing Lean management if the administration has not invested in it. This lack of training may be the main source of staff resistance.

• Professional status :

72.6% of respondents were paramedical professionals and 27.4% were medical professionals.

4.4. Professional opinion on the stages in the implementation of Lean management:

Table 6: Staff opinion on the LM implementation stages.

Questions	Q 1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9
I don't agree	35 (8.70%)	42 (10.5%)	90 (22.22%)	20 (5 %)	30 (7.46%)	20 (5 %)	20 (5 %)	16 (4 %)	34 (8.45%)
I don't know	47 (11,7%)	71 (17,71%)	134 (33,33%)	55 (13,70%)	63 (15,67%)	84 (20,89%)	147 (36,54%)	74 (18,40%)	73 (18,16%)
I agree	320 (79.6%)	289 (71.79%)	178 (44.25%)	327 (81.3%)	309 (76.87%)	298 (74.11%)	235 (58.46%)	312 (77.6%)	295 (73.39%)
Total	402 (100 %)								

Source: Developed by the authors.

Analysis of the data in Table 5 reveals some important results. Most healthcare professionals (79.6%) were in favour of preparing the ground and eliminating obstacles, especially staff resistance, before embarking on the Lean management project in the hospital (11.7% did not know). A consultancy firm appears to be important at the start of the implementation of Lean Management, since the majority of participants (71.79%) agreed with the recruitment of a consultancy firm to train internal specialists and support the hospital in launching the Lean Management project (17.71% did not know). Similarly, only 22.22% of participants considered that the CHU had qualified staff and could adopt the Lean project with its own resources. This company will withdraw gradually, which is why 81.30% of participants insisted on designating a team responsible for applying the quality approach, which will be trained before starting the project (13.70% did not know).

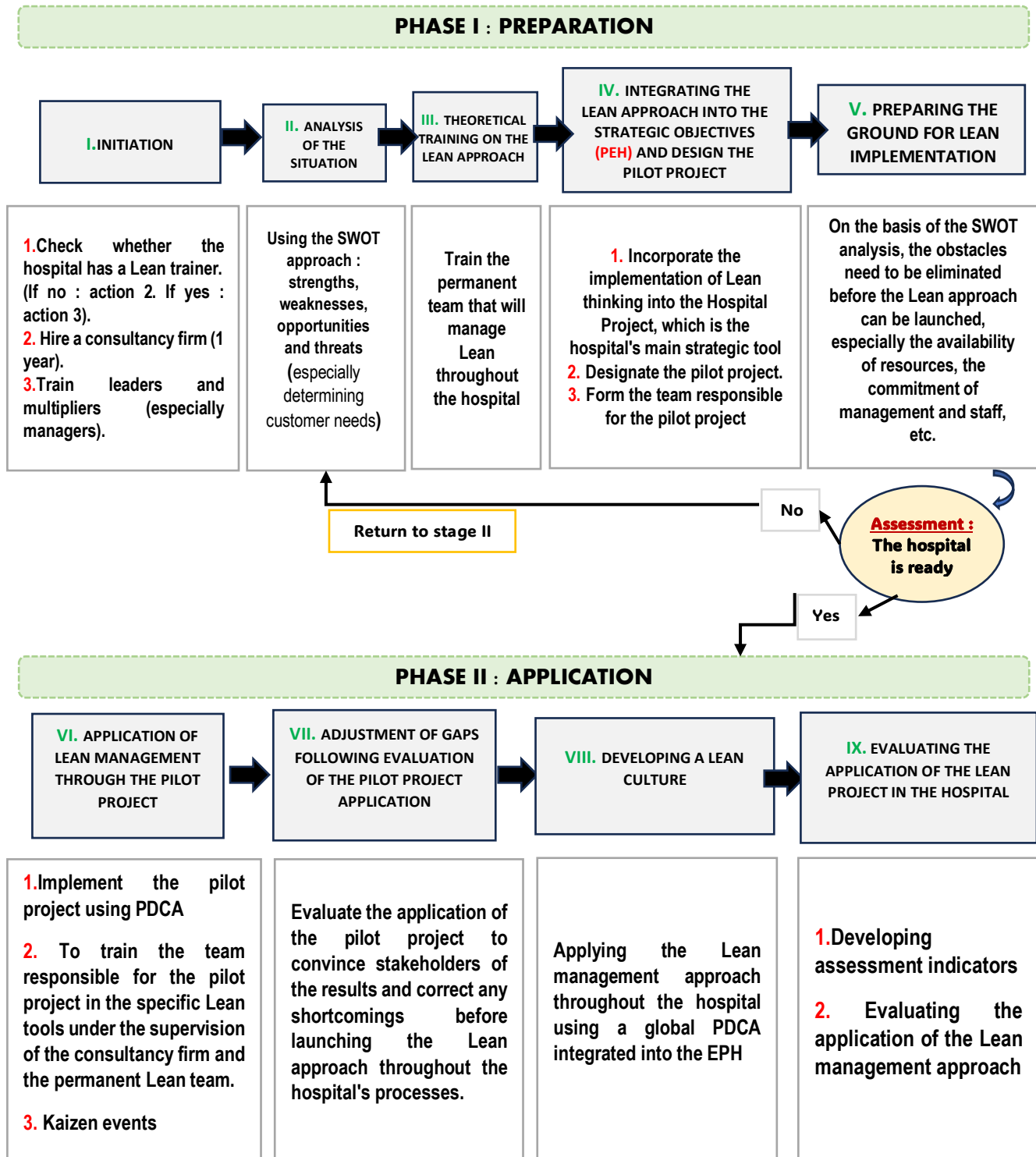
However, given the lack of staff training in Lean management, most of the staff (76.87%) agreed that the Lean management approach should begin with a pilot project, which would allow lessons to be learned before it was rolled out across the whole establishment, and also to minimise resistance by convincing staff of the benefits of the project. Once the pilot project has been completed, the application of lean management must be rolled out across the entire hospital by adopting this approach in strategic planning. 74.11% of staff agreed and 20.89% did not know. For the adoption of the Lean approach in the facility's strategic planning, 58.46% of staff agreed to choose the Deming wheel for this holistic adoption (36.54% did not know and only 5% disagreed). For 77.60% of participants, the adoption of Lean management in the strategic planning of the facility will develop a culture of continuous quality improvement, since they will be shared objectives for everyone (18.40% did not know).

Lean management as an approach to New Public Management developed in the private sector has proved its effectiveness in the health sector. 73.39% thought that the experiences and tools developed in the private sector should be used to improve the quality of care in the UHC, and 18.60% did not know.

4.5. Results of interviews with managers and healthcare professionals:

Based on the analysis of the interviews and the questionnaire, the comments and recommendations mentioned in the results were taken into consideration to propose the new model, which is contextualised and adapted to the context of the University Hospital. The model is presented in the figure 2 below, This model I will call it the YOSAHEL Leanhealthcare model:

Figure 2 : « YOSAHEL Leanhealthcare model » Contextualised model of the application of Lean management in Moroccan hospitals (UHC)



Source: Developed by the authors (Based on analysis of study results).

5. Discussion

Based on the literature, our study is the first to deal with the subject of the LM process in healthcare. The objective of this study was to develop a contextualized model for the application of LM within the UHC which can be adapted to all hospital structures in Morocco. According to the LM philosophy, the first principle is to detect the value from the customers' point of view, i.e. what satisfies the customers' needs in all the processes within the CHU. To this end, we conducted interviews with patients to find out their needs and their satisfaction with the treatment process. Subsequently, another interview was conducted with healthcare professionals and managers to find out about their knowledge and perceptions in relation to the LM and the proposed model. To have an overall view of all the healthcare professionals on the stages of the proposed models for a deeper understanding and a better adaptation and valid contextualization of the said model, we carried out a questionnaire with a representative sample of healthcare professionals on the stages of the model.

The development of the model was a relevant contribution to the development of practical knowledge for the application of the Lean approach in Moroccan hospital structures. The model developed in our study includes the two main phases and all the stages of the Régis & al. model (2019) (Régis & al., 2019), with more details and the reconstitution of some stages (such as the stage of "integration of the LM into strategic planning", which has been moved from the "application phase" to the "preparation phase"), and the addition of other stages such as the analysis of the situation using the SWOT matrix, the preparation of the field and the evaluation of the LM (in phases I and II).

In comparison with the other modules for applying the LM already found in the literature, which are all inspired by the five guiding principles of the Lean approach, our module proposes a holistic approach to all the healthcare organization's processes. However, most of the other modules propose a limited implementation (with unclear steps) on a few tools and on one or a few processes rather than on the whole facility, which limits the optimal use of the LM philosophy and consequently limited and unsustainable benefits.

Pavnaskar & al (2003) identify the main reasons for the pitfalls of "Lean": "using the wrong tool to solve a problem", "using one tool to solve all problems" and "using all tools on every problem" (Aberdeen, 2013; Anvari & al., 2011; Ballé & Régnier, 2007; Bhasin & Burcher, 2006; Daultani & al., 2015; Godinho Filho & al., 2016; Hines & al., 2020; Hohmann, 2012; Hussain & al., 2016; Joosten & al., 2009a, 2009b; Lyonnet et al., 2010; Matthias & Brown, 2016; Papadopoulos & al., 2011; Radnor & Osborne, 2013; Waring & Bishop, 2010).

Most LM application modules are developed in the field of industry and few studies have reported the development of specific models in the field of health. With the rarity of these modules, they present limitations and failures. The study by Ait Abdelmalek & Houfaïdi (2018), summarised some models (Abdelmalek, 2018).

Kotter's model, provides an eight-step framework: creating a sense of urgency among staff, having a motivated and skilled group, developing a vision and strategy, communicating the vision for change, involving people in decision-making processes, generating short-term gains, consolidating gains and producing more change, and finally, embedding change in the corporate culture (Ismail Ait Abdelmalek & Souad Houfaïdi, 2018) (Abdelmalek, 2018).

The "Iceberg" model introduced by Hines comprises two main components: the visible part of a process represents 10% (it is above and includes technology, tools and techniques, and process management) and the invisible part 90% (it is below, made up of strategy, supported by decisive leadership and a responsible workforce). This means that 90% of the establishment and its environment is either completely or partially untapped (Abdelmalek, 2018.).

Nightingale and Srinivasa's model, which makes it possible to achieve radical and progressive change in three phases: the "strategy phase", in which we need to justify the transformation and

express management's commitment; the "planning phase", in which we analyze the current and future state of the organization, then draw up a transformation plan; and finally, the "execution phase", in which the plan is implemented. This model also presents global phases that can be applied to any type of project.

These models describe the LM implementation process, but they do not provide practical details to follow them, they only present the broad outlines of the implementation. These models do not report clear steps for implementation.

Finally, the model developed by Almutairi et al in 2020 (Almutairi & al., 2020), the framework is articulated around four phases with well-detailed activities facilitating the implementation of LM, but this model was developed only for the hospital supply chain and not on the whole processes and services so it will not allow a global adoption on the whole hospital structure (Almutairi & al., 2020).

6. Conclusion :

The aim of our study was to develop a model for the application of LM in our context of hospital structures in Morocco. The LM approach is a relevant approach to quality improvement which is based on a logic which is in harmony with the philosophy of care and the satisfaction of health needs. This relevance appears above all on three points. Firstly, the LM approach puts customer satisfaction at the center of our work, in this sense a special and very remarkable thing is that the objective of Lean is not only the satisfaction of the external customer (patient) but also the satisfaction of the internal customer (healthcare staff) and the improvement of their working conditions.

Secondly, the elimination of waste in all processes. We know that our healthcare processes are full of waste, so the application of Lean will be an opportunity to rationalize work processes, especially given the complexity of the healthcare sector, the scarcity of resources, and the insatiable demands of the population. Finally, the LM philosophy can create a favorable, and permanent environment for improving the quality of care, especially as the LM principles are in line with the values and principles of health. Also, most of the participants pointed out that the philosophy of the Lean management approach is used partially and implicitly and even certain tools are already applied, in particular PDCA, visual management, and the Ishikawa diagram.

These tools are applied without knowing that they are specific Lean tools. So it would be great to have a model of how the LM approach is applied in our hospitals. This study has major implications. A theoretical implication, which aims to fill the gaps and respond to the calls from researchers to work on the LM process in healthcare. Practical implications, enabling managers and healthcare staff in Morocco to have a practical and adapted LM model to follow to improve the quality of healthcare provision, and finally social implications since LM is an approach that enables the satisfaction of customer needs, the creation of a favorable climate and good working conditions. Proper implementation of the LM approach, with its true philosophy and the correct application of its principles, makes it possible to develop a culture of total quality, where each person in each process considers quality and LM as a way of doing things and a working style. As an extension of our work, other studies seem relevant, namely:

- The development of a training programme for staff and managers on the application of the LM;
- The application of the model developed in order to test its feasibility in the field and show the results of its adoption;
- The development of an evaluation model to measure the degree of achievement and the results of applying the LM in care establishments;

- The impact of the application of the LM on the satisfaction of the various stakeholders and even with suppliers.

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Appendice : Questionnaire for UHC staff

1: Strongly disagree / 2: Disagree / 3: Neutral / 4: Okay / 5: Completely agree

- Question 1:** Before launching a quality improvement initiative, should the groundwork first be done and obstacles eliminated (especially staff resistance)?
- Question 2:** Before adopting a quality improvement approach, should a specialist company be hired to train staff and prepare the ground?
- Question 3:** Does the UHC have the qualified staff to implement quality initiatives, and does it not need a specialist company to support it?
- Question 4:** Before implementing each quality initiative, is it necessary to designate a team responsible for applying the quality initiative?
- Question 5:** Before launching a quality approach throughout the organisation, should we start with a pilot project (to convince staff and learn lessons)?
- Question 6:** After the pilot project, should the quality approach be adopted as part of the authority's overall strategy?
- Question 7:** Can the Deming wheel be adopted as an approach to implementing a quality approach?
- Question 8:** Will adopting the quality approach into the organisation's strategy develop a culture of continuous quality improvement?
- Question 9:** In adopting a quality approach, should we draw on successful experiences and tools developed in other sectors?