

# Enteral diet therapy: use of the Lean Healthcare philosophy in process improvement

*Dietoterapia enteral: utilização da filosofia Lean Healthcare na melhoria do processo*  
*Dietoterapia enteral: la utilización de la filosofía Lean Healthcare en la mejora del proceso*

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## How to cite this article:

Siqueira CL, Siqueira FF, Lopes GC, Gonçalves MC, Sarantopoulos A. Enteral diet therapy: use of the Lean Healthcare philosophy in process improvement. Rev Bras Enferm [Internet]. 2019;72(Suppl 1):235-42. [Thematic Issue: Work and Management in Nursing]. DOI: <http://dx.doi.org/10.1590/0034-7167-2017-0746>

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**Submission:** 06-27-2017      **Approval:** 03-06-2018

## ABSTRACT

**Objective:** To identify the nonconformities of the enteral diet therapy process. **Method:** Exploratory case study, using as a theoretical framework the philosophy of Lean Healthcare in an inpatient unit of a large hospital in Minas Gerais State. The sample consisted of 19 professionals from the multidisciplinary team involved in the enteral nutritional therapy process and the unit's documentary sample. For the data collection, we used a semi-structured script, participant observation and documentary analysis. **Results:** There were eight nonconformities related to enteral diet therapy. During the participant observation, there was a lack of a management model that seeks the continuous improvement of the process, as well as resistance to change. **Conclusion:** Although enteral diet therapy is important in the patient's evolution, there are adverse events that could be prevented and the Lean philosophy assists in the identification of process nonconformities. **Descriptors:** Health Management; Quality of Health Care; Enteral Nutrition; Cost Reduction; Quality Management.

## RESUMO

**Objetivo:** Identificar as não conformidades do processo de dietoterapia enteral. **Método:** Estudo de caso exploratório, utilizando como referencial teórico a filosofia Lean Healthcare em uma unidade de internação de um hospital de grande porte de Minas Gerais. A amostra foi composta por 19 profissionais da equipe multidisciplinar envolvida no processo de terapia nutricional enteral e a amostra documental da unidade. Para a coleta de dados, utilizou-se roteiro semiestruturado, observação participante e análise documental. **Resultados:** Constataram-se oito não conformidades relacionadas à dietoterapia enteral. Durante a observação participante, evidenciou-se a falta de um modelo de gestão que busca a melhoria contínua do processo, bem como resistência à mudança. **Conclusão:** Embora a dietoterapia enteral seja importante na evolução do paciente, existem eventos adversos que poderiam ser prevenidos e a filosofia Lean auxilia na identificação das não conformidades dos processos. **Descritores:** Gestão em Saúde; Qualidade da Assistência à Saúde; Nutrição Enteral; Redução de Custos; Gestão da Qualidade.

## RESUMEN

**Objetivo:** Identificar las no conformidades del proceso de dietoterapia enteral. **Método:** Estudio de caso exploratorio, utilizando como referencial teórico la filosofía Lean Healthcare en una unidad de internación de un hospital de gran porte del estado de Minas Gerais. La muestra fue compuesta por 19 profesionales del equipo multidisciplinario involucrado en el proceso de terapia nutricional enteral y la muestra documental de la unidad. Para la recolección de datos, se utilizó un itinerario semiestructurado, la observación participante y el análisis documental. **Resultados:** Se constataron ocho no conformidades relacionadas a la dietoterapia enteral. Durante la observación participante, se evidenció la falta de un modelo de gestión que busca la mejora continua del proceso, así como la resistencia al cambio. **Conclusión:** Aunque la dietoterapia enteral sea importante en la evolución del paciente, existen eventos adversos que podrían prevenirse y la filosofía Lean ayuda a identificar las no conformidades de los procesos. **Descriptorios:** Gestión de la Salud; Calidad de la Asistencia de Salud; Nutrición Enteral; Reducción de Costos; Gestión de la Calidad.

## INTRODUCTION

Nutrition has always been essential for the body's metabolic integrity. Hospitalized patients may present malnutrition at the time of hospital admission or develop it during hospitalization. The nutritional deficit may result in an increase in the period of hospitalization, increased susceptibility to infections and higher hospital costs<sup>(1)</sup>. The enteral diet therapy consists of the nutritional offer from nasoenteric probe, for every client with preserved gastroenteral clinical condition, who is unable to supply their metabolic needs orally. Nursing activities in this process are linked to administrative, care, educational and research functions<sup>(1)</sup>.

It is incumbent on the nurse, in a private way, to establish enteral access, due to the high degree of complexity involved, and this professional is unique within the nursing team able to perform such attribution. The maintenance, monitoring and administration of infusion of said diet may be performed by nursing technicians and assistants<sup>(2)</sup>. As in all health care processes, in enteral diet therapy, both professionals and patients are involved in the occurrence of Adverse Events (AEs) that affect the quality and the therapeutic functioning of this diet. AEs are incidents resulting from care delivery that result in patient harm<sup>(3)</sup>.

The ineffective nursing record related to enteral diet therapy was delineated as a study problem. In this sense, the objective was to identify the nonconformities of the enteral diet therapy process. To support the study, the Lean Healthcare philosophy was used, which provided theoretical and practical.

The Lean philosophy, whose origins go back to the Toyota Production System, seeks to eliminate waste, that is, to exclude what has no value to the customer and to print speed, efficiency and quality to the institution. From this approach, Lean Healthcare excels in healthcare as a transformative philosophy, capable of generating countless benefits within customer service units, defining principles that unplug the flow of care and qualify the process. These transformations range from deeply personal issues to sociocultural factors that may be extremely ingrained in terms of usual daily practices, as well as the use of tools and techniques in the day to day of the collaborators. In this sense, Lean Healthcare emerges as a revolutionary strategy for overcoming the barriers that eventually make up a system unaltered and plastered over so many years of thoughtless practice<sup>(4)</sup>.

It is known, however, that sometimes, in an attempt to implement the Lean principles in an institution, some negative aspects can be highlighted, for example, when the changes in the processes are carried out, being able to increase the workload as reported in some studies<sup>(5)</sup>. Even knowing the negative aspects of Lean implementation today, hospitals and large first-rate centers around the world and even healthcare systems such as the Canadian Health Care System and the National Healthcare System in the UK have been working hard to implement Lean. The results of the application of Lean in hospitals range from the reduction of errors in medication administration, improved adherence to Bundles, improved customer satisfaction, shortened hospital stay, and reduced cost. These were the initial results presented by Theda Care, a system with four hospitals in Wisconsin in the United States<sup>(6)</sup>.

To make the concepts practical and achieve the desired improvement, a set of quality tools assists in the management

of services, is applied to health and aims, in general, to see the wastes and simplify the processes, bringing practical benefits to the performance of daily activities<sup>(7)</sup>.

The strategies to achieve the results found in the literature are based on Lean principles and tools. As a principle, the focus of the health institution should be on the patient and should direct all actions of improvement and change in the institution. Employees should ask themselves if what they are doing adds value to the patient<sup>(6)</sup>.

The basis for defining patient value is found in the six dimensions of care at the U.S. Medicine Institute: safe, efficient, effective, agile, patient-centered, and fair care. Everything that is not considered value to the patient is defined as activities that do not add value, or waste. To find the waste, use the Lean tool called Value Stream Mapping<sup>(4)</sup>.

Another tool that assists in the elimination of waste is the 5S. The 5S is a step by step organization consisting of five Japanese words: *Seiri* (Utilization), separating the necessary from the unnecessary to eliminate from the workspace what is useless. *Seiton* (Organization), put everything in its proper place to better organize the workspace effectively. *Seiso* (Clean), clean and take care of the work environment. *Seiketsu* (Hygiene), create standardized standards for housekeeping, identification and cleaning, and lastly, *Shitsuke* (Discipline) where everyone helps to keep previous 4S and encourage continuous improvement. Applying these steps, the work environment becomes more practical, agile and assertive<sup>(6)</sup>.

The study and application of Lean concepts are justified by the need to develop research that lead to the improvement of the processes related to enteral nutritional therapy and the need to overcome the resistance of nursing professionals regarding the adoption of models originally developed for business or industrial administration, contributing to the excellence, efficiency and effectiveness of hospital institutions, given the complexity of existing processes and technologies coupled with scarce resources and increased demand for health<sup>(8)</sup>.

It is worth noting that such resistance, if not properly administered, can turn out to be a negative aspect of the Lean system, becoming a hindrance and making processes unfeasible. The tools provided in their theoretical framework should be procedural facilitators and make the practical lives of the employees simpler and more objective; otherwise they will be integrated into the bureaucratic and tiring system to which they are already generally accustomed. For this, it is necessary to train the teams so that these tools are in control of all the involved ones and so that the continuous improvement is experienced daily<sup>(9)</sup>.

Lean Healthcare is not a set of tools that works in isolation, as some managers mistakenly interpret, instead they need to function in an integrated way to promote the linear progression of managerial processes within an institution. When the top management of the institutions decides to start the journey of Lean implementation, it is important to know the barriers already reported in the literature, based on the unsuccessful experiences of past attempts<sup>(9)</sup>.

The literature cites some barriers to Lean implementation: lack of good leadership; training and poor training; continuing training in the workplace; lack of professional awareness, which

hampers any change needed for improvement; poor management of resources with countless wastes, and finally, the culture and resistance to change present in most health institutions<sup>(4)</sup>.

## OBJECTIVE

To identify the nonconformities of the enteral diet therapy process of the medical-surgical unit of a large hospital that is located in a municipality of Minas Gerais State.

## METHOD

### Ethical aspects

The project was approved by the Research Ethics Committee of the *Pontifícia Universidade Católica de Minas Gerais*. All the norms of Resolution 466/2012 were met<sup>(10)</sup>.

### Theoretical-methodological framework

In Lean philosophy, it is a priority to know the current state of the context studied before proposing any significant changes to be made. To know the current state, in this study, information was collected from the unit and from a joint analysis between researchers and collaborators of the institution, involved in the process; it was possible to understand the origin of the eight root causes. These root causes were surveyed by the application of a Lean Healthcare philosophy called "5 whys".

### Type of study

In view of the uniqueness of the phenomenon to be studied, which are the adverse events related to enteral diet therapy, the research method chosen was the qualitative exploratory case study. It is an empirical investigation that investigates a contemporary phenomenon in depth and in its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. It also allows the investigation of multiple variables with multiple sources of evidence, besides being able to benefit from the previous development of the theoretical propositions to guide the data collection<sup>(11)</sup>.

The method allowed us to study in depth the phenomenon of enteral diet therapy, which is a contemporary phenomenon, present in the daily health services. It allowed knowing the several variables that impacted in the non-reach of the caloric goal, through evidence that were proven in the analysis of the data. The adjustment of the method to the object to be studied also allowed the benefit of reviewing the theoretical propositions previous to the data collection, so as to make adjustments for the achievement of results in a reliable way.

### Methodological procedures

Initially, the project was presented to the members involved in the assistance, allocated to the unit of study. A meeting was held with an exposition on the Lean Healthcare philosophy, the purposes of the study, its relevance to the institution, and what

was expected of each member. Visits to the institution were initiated and previously authorized by the hospital administration. There were 10 visits with an average duration of 2 hours and 40 minutes in all periods, without prior notice.

The quality office nurse has been asked the main AEs reported by professionals during the last six months. At the same time, the researchers questioned the events of greatest occurrence in the unit.

### Study setting

The field of study was a medical-surgical unit of a large hospital, accredited Level 3 by ONA (*Organização Nacional de Acreditação*). The hospital is located in a municipality of Minas Gerais State, has 123 beds and 440 employees. The study's focus unit is a 53-bed facility that serves medical, surgical, neurological, cardiology, and psychiatric clinics. They have five nurses in their workforce, four of whom are assistants and one coordinator, in working hours ranging from 12x36 hours and eight hours a day. In the sector work 44 nursing technicians in regime of 12x36h. In addition to these professionals, they work doctors, residents in medicine and nursing, nutritionists, physiotherapists, speech therapists, hygienists among others.

### Study participants

The population was composed of professionals assigned to the above-mentioned unit and members of the Multidisciplinary Nutritional Therapy Team (MNNTT), who had been in this sector for at least three months, were present at the time of data collection, and agreed to participate in the study. Participating were nursing assistants, nursing supervisor, a member of the multidisciplinary team of nutritional therapy, nursing technicians, nutritionists, one being the coordinator of the nutrition sector and another clinic, lactarist and doctor. Of these, only 19 contributed with the research to the end.

### Collection and organization of data

As used in the case study, which is a research strategy that seeks to find solutions to real-life difficulties, it was concerned with giving reliability to the data collected. Thus, we chose triangulation in data collection<sup>(11)</sup>. The semi-structured script, the participant observation and the documentary analysis of the diet request forms, patient charts, process checklist, infusion maps, etc. were used. All data collection took place within the unit of study itself.

As recommended by the Lean Healthcare philosophy, an A3 sheet has been developed that is a procedural facilitator that in a playful and simplified way, through the active participation of all those involved, proposes the application of resolute actions. To find the root causes to be inserted in A3, we used the five "whys" that is a quality tool capable of overcoming the most obvious characteristics of a problem and analyzing the causative source from the question repetition method "why?" The moment there is a problem to solve<sup>(12)</sup>.

For the characterization of the study participants, acronyms were used consisting of letters and numbers in order to guarantee

the anonymity of the participants. And for nurses, NT for nursing technicians, N for nutritionists, L for lactarist and D for doctor, and a sequential number for each category according to the order that the questionnaires were collected.

In the case studies, the direct observation of events associated with interviews with the participants involved, allows to deal with a great variety of evidence<sup>(13)</sup>. In the field reports, the observations made and the important points of the participants' speeches were recorded, as well as the activities performed and the observed nonconformities.

The semi-structured script is one of the main means that the investigator has to collect data, besides valuing the presence of this one, offers all possible perspectives so that the informant reaches the necessary freedom and spontaneity, enriching the investigation<sup>(14)</sup>. Such a data collection tool was used in a way that identified if the nursing report related to enteral diet therapy was not the most prevalent event in the unit. It contemplated questions regarding the effectiveness of the nursing record, the team's knowledge about the protocol established by the institution, the regularity of the stipulated schedules for the performance of procedures related to diet therapy, and the efficiency of nutritional therapy technologies.

Participant observation is a mode of data collection in which the researcher becomes an active character of the investigative process, raising information from his subjective perception of the facts witnessed<sup>(14)</sup>. The Lean Healthcare philosophy predicts this interaction in the data collection process. Researchers and workers must be together in the process.

### Data analysis

For the analysis of the quantitative data collected from the institution's documents, the absolute and relative frequency statistics were used. For the qualitative data that emerged from the semi-structured script, similarity groupings were made.

### RESULTS

The study participants are characterized, according to Table 1.

According to the institution's statistical data, the AEs most reported in the unit according to the occurrence were: non-compliance of the nursing report regarding enteral diet therapy, noncompliance in the medical prescription (prescription without checking), nonconformity in the medical prescription, patient drop and noncompliance in patient identification. After participating observations, document analysis and application of the questionnaires, it was noticed that in fact the most reported event and that most caused problems in the unit was the noncompliance of the nursing report related to enteral diet therapy.

With all the data collected in hand, groupings were made by similarity and the following root causes were chosen that will subsidize the action plan, shown in chart 1:

Of the 30 participants selected to answer the questionnaire, chosen from the inclusion criteria, 19 actively contributed to the research until its completion, filling in the script and returning to the researchers. The other 11 did not return within the stipulated delivery deadline, showing a relatively low rate of return of

63.33%, which in turn justifies the lack of employee compliance in the filling of industry-related roles, root causes and evidenced by the statements of NT5 and N2:

*[...] the institution has to have rules, protocols, but in practice things change, but not always can do everything according, unforeseen happens. (NT5)*

*The correct completion does not occur, we attribute the lack of adherence to the protocols [...]. (N2)*

**Table 1** – Sociodemographic and professional characterization of study participants, Minas Gerais, Brazil, 2017

Variables		F	%
Age group	21 to 31 years	13	68.42
	32 to 42 years	3	15.79
	43 to 53 years	3	15.79
	Total	19	100
Sex	Female	16	84.21
	Male	3	15.79
	Total	19	100
Marital status	Not married	11	57.89
	Married	7	36.85
	Divorced	1	5.26
	Total	19	100
Professional Classification	Nurse	4	21.06
	Nursing Technician	11	57.89
	Nutritionist	2	10.53
	Lactarist	1	5.26
	Doctor	1	5.26
	Total	19	100
Workplace	Unit of Clinical and Surgical Hospitalization	15	78.95
	Nutrition and Dietetics Service	4	21.05
	Total	19	100
Time experience	0 to 5 years	15	78.95
	6 to 10 years	3	15.79
	11 to 15 years	-	-
	Above 16 years	1	5.26
	Total	19	100
Working time on unit	3 months to 2 years	14	73.68
	3 to 5 years	3	15.79
	6 to 9 years	2	10.53
	Over 10 years	-	-
	Total	19	100

Note: f – frequency.

**Chart 1** – Root causes found from tool A3, Minas Gerais State, Brazil, 2017

Root Causes
Lack of team adherence to protocols
Ineffective nursing report
Complex tool
Infusion pump malfunction
Irregular and inconstant infusion times
Excessive activities that interrupt diet therapy
Inadequate staffing
Undervaluation of enteral diet therapy

Source: Dados do estudo, 2017.

The noncommitment of those involved results in an ineffective nursing record considered by the institution as the main AE. Likewise, this study also confirmed this fact, and is treated as a root cause for the non-achievement of the nutritional goal established by MNNT, of  $\geq 80\%$ , and as the main justification for the wastage of enteral diets. The utterances of N1, NT1 and NT2 illustrate the lack of involvement in.

*Some people, collaborators, still fill incorrectly perhaps for lack of guidance, especially the beginners, for lack of attention or lack of time. (N1)*

*[...] report is sometimes very hurry. (NT1)*

*Does not fill correctly [...]. (NT2)*

Another data collected that corroborates the inefficiency of the nursing record evidenced above is the complexity of the tool used in the sector to group information pertinent to the process of enteral diet therapy. The tool presents a confusing and extensive layout, which discourages correct filling, leading to the loss of relevant information to obtain quality indicators.

*Very confusing [talking about the tool]. (NT4)*

*[...] there is still the difficulty of developing a tool that is easy for the nursing team to understand and adhere to. (N2)*

Regarding the efficiency of enteral nutritional therapy technology used by the institution studied, more than half of the participants reported a high frequency of technical failures related to infusion pumps. The NT2 is aware of the problem, demonstrated through the following speech:

*[...] equipment sometimes with malfunction [...]. (NT2)*

The inconstant and irregular schedules were also detected as a recurrent impediment that contributes to the failure of the nutritional goal, as well as to increase the wastage index of the diets. This is due to the difficulty of performing these activities in the face of the general demand attributed to the nursing team, which is evident in the statements below:

*[...] is not always effective due to constant changes in schedules [...]. (N3)*

*I do not agree, because 08:00 a.m. [pump start time according to the institution's protocol] is a "peak" time to do much at the same time [...]. (NT6)*

*The time to start the diet is better at 10 o'clock, because at 08:00 a.m. [...]. (NT7)*

Excessive activities that interrupt enteral diet therapy have also been identified as a critical node that interferes with the performance of team functions linked to enteral nutrition.

*[...] there are days that time contradicts the protocol [...]. (NT3)*

*[...] within these 14 hours (time established by the institution for infusion of the diet/day) client goes to bath, XR, TC, CC and then is stopped the diet. (NT8)*

One characteristic of the sector analyzed is the fixed-scale regimen for nursing technicians. The scale is not applied correctly. Participant N1 recognizes such a failure that leads to overworking.

*[...] Incorrect scaling due to non-effectiveness of the Fugulin scale making them overloaded inducing error and filling faults. (N1)*

A last root cause detected was the undervaluation of the importance of enteral diet therapy by the nursing team. This fact may be associated to the lack of knowledge about the relevance and functions of nutrition for the evolution of the patient's clinical picture, which can be identified in the following statements:

*[...] lack of attention and undervaluation of the importance of nutrition in the therapeutic plane of the patient [...]. (N4)*

*[...] difficulty of understanding the importance of nutrition for the treatment of the patient [...]. (D1)*

## DISCUSSION

Lean Healthcare, through the application of scientific methods, aims to solve the most diverse problems with a different approach, pointing out ways to facilitate and bring practicality to services, bringing together leaders and frontline workers to identify and solve problems<sup>(9)</sup>. The challenge is to point and follow the AEs, to devise methods to treat them through the tools used by the Lean and, consequently, to improve the quality.

In this study, from the collection of data and visits to the study site, some nonconformities were detected and, with the "5 whys" method, eight root causes were identified that justify the obstacles in the nutritional therapy process enteral. These obstacles negatively interfere with the provision of care, compromising the patient's clinical evolution, interfering with the practices of the professionals involved, and generating wastes that burden the system as a whole.

The first root cause listed here refers to the lack of adherence of the team to the institutional protocols of enteral diet therapy. In this respect, the Lean Healthcare philosophy is able to promote awareness and encourage a sense of responsibility in all involved, generating safer processes and disciplines in the workplace<sup>(4)</sup>. According to Pinto<sup>(15)</sup>, factors such as commitment and effective leadership are essential to sustain the changes that occur both in the short and long term.

Within this context, it is known that the nursing record is the means through which communication occurs between the team and the understanding of the care offered to the patient and of all the procedures performed for their benefit. The deficient notes, the second root cause detected in this study, besides leaving gaps that block the process, burden the institution on the used inputs that will no longer be billed for not being included in the medical record<sup>(16)</sup>. Regarding nutritional therapy, Resolution 453/2014 of COFEN (*Conselho Federal de Enfermagem*) states that "it is incumbent upon the nursing technician to record the actions performed, in the patient's file, in a clear, precise and timely manner". In this way, it is necessary to understand this and to establish an internal routine that includes the records as

a practice that increases the quality and efficiency of the service rendered<sup>(10)</sup> and it is believed that, because the collaborators who participated in the research were (68% from 21 to 31 years), and from 0 to 5 years of work (78%), as mentioned in table 1, the proposed changes may be more accepted and adhered to in order to improve the process. years of professional practice can significantly influence the process of professional learning, and at the beginning of the career, employees may find themselves more enthusiastic for the work<sup>(17)</sup>.

The health services must have tools of records that group information related to any and all procedures performed, however, from the documentary analysis, another root cause that addresses the complexity of the recording tool related to enteral diet therapy, becoming a barrier in communication between the teams involved in the process. The use of logging tools with clear layouts and objectives encourages accurate and instant annotations, preventing important data from being lost in the process. Thus, visual management, which is one of the tools that are part of the Lean philosophy, contributes to the resolution of both technical and procedural problems by organizing through signals, tools arranged in a logical, accessible and coherent way<sup>(9)</sup>.

Another important point is the use of equipment for the infusion of the enteral diet which, according to Cervo<sup>(18)</sup>, is a device whose purpose is to guarantee the continuous flow of the administration of the volumes in a constant and regular way. Any change in its functioning compromises the achievement of caloric goals and leads to waste. This could be detected from the participant observation and the application of questionnaires, whose answers pointed out frequent problems with the operation of the infusion pumps.

It is vital to understand that managing resources is not only tied to financial issues. Procedural waste, for example, indicates failures in the system as a whole and may be related to inadequate structures, which in this study could be observed due to the non-achievement of the caloric goal of  $\geq 80\%$  established by the institution and not achieved in good part of the cases. Implementing the Lean concept means avoiding any action, be it assistance or bureaucratic, that is not commensurate with the client's needs<sup>(4)</sup>.

According to the Lean Healthcare philosophy, relatively simple techniques such as value stream flow mapping, streaming, visual management, service level agreement and resource management, make it possible to achieve more favorable results in the service capacity of an industry, bringing results better than those usually obtained<sup>(6)</sup>. Irregular and inconstant infusion times observed by the investigators during the observation period demonstrated that noncompliance with prescribed actions regarding enteral therapy in the pre-established time, as well as constant changes at these times, may interfere with the patient's nutritional supply and generate wastage. In this way, it is possible to contribute, through the Lean, establishing fixed schedules for the accomplishment of the mapped procedures, according to their relevance and promoting awareness about the commitment of each one of the involved ones.

Most AEs are related to discontinuation of diet for other procedures<sup>(16)</sup>. This reality was also observed in the studied sector being treated as one of the root causes that contribute to the occurrence of errors in care. It is important to understand that

most of the problems and failures that occur, such as the AEs encountered, are problems in the process that could be corrected with Lean philosophy techniques, and that it is not just human failure. Understanding the process and constructing barriers to error is more effective and lasting than penalizing a professional for failure, leaving the door open for error to occur again<sup>(4)</sup>.

Although the Fugulin scale is filled and serves to adjust the sizing of employees according to the patient's clinic<sup>(14)</sup>, it is not applied, inappropriately distributing the assignments to each employee. Inadequate staffing can lead to overload and lead to possible procedural errors, evidenced here as one of the causes that hamper the provision of qualified assistance. It is known, therefore, that the nursing team, whose practical action implies directly in the majority of events occurred, are the workers found in greater numbers within the health institutions, performing different functions. Encouraging the practice of these professionals, in an autonomous and balanced manner, as proposed by Lean Healthcare, allows greater interaction between the managerial, care and administrative plans that compete with the nurse. Acting in these several layers that make up the whole of the service delivery in health enables nurses and technicians to stay close to the patient, the main focus of attention, and easily identify within the context all the bottlenecks that impede the flow of processes.

It is essential to understand that diet therapy is fundamental for the patient and also for the institution, since it interferes not only in the evolution of the clinical picture, but also increases the length of hospitalization and the costs related to it. In this context, the nurse acts as a protagonist within the multidisciplinary team, since it promotes communication among the sectors, besides being directly linked to the procedures of installation, administration and maintenance of the diet<sup>(19)</sup>. The undervaluation of enteral diet therapy should be worked through continuing education activities that raise awareness about the relevance of this therapeutic mechanism as important as medicine therapy.

The lack of a flexible management model, which seeks continuous improvement, as the ultimate goal in any and all actions taken, can create obstacles that encapsulate the system as a whole. This can paralyze the processes, leading to a series of consecutive and exhausting AEs, as well as causing damage to all levels of assistance delivery. Thus, resistance to changes by professionals in adhering to a model from the industry increases the chances of AEs occur, especially when it comes to a complex institutional setting, such as health<sup>(7)</sup>.

In view of the above, it was possible for the researchers to propose countermeasures that promote improvements in each of the root causes listed in this discussion, which will be implemented in a second stage of the project. They are: establishing fixed and viable schedules for all procedures; develop a program of preventive and periodic maintenance in infusion pumps; to implement visual management in the flasks of the diets with labels in the red and green colors, indicating patients with achieved goal and with insufficient target; build a lean checklist at the bedside, making it easier to record data; promote changes in the infusion map layout of the enteral diet by simplifying it; to fix a flowchart of the process in the badge of the involved ones in order to clarify possible doubts; in addition to seeking innovative activities that promote interaction and continuing education.

## Study limitations

The study presented limitations on the availability of theoretical frameworks, because it is a relatively new philosophy and with few researches related to the application of Lean Healthcare in enteral diet therapy. Another limitation found here is the size of the sample, which, being restricted to only one sector of a single institution, was greatly reduced in view of the magnitude and relevance of the study.

## Contributions to the sector of Nursing

The Lean Healthcare philosophy represents a tool strategically designed to promote functionality and quality in all aspects involving a healthcare institution, improving processes and developing personalized care, meeting the specific needs of the client in focus. Enteral diet therapy involves a range of procedures that are intrinsic to the process as a whole and which may compromise the effectiveness of this process if they are not well performed. Thus, using Lean Healthcare as a management strategy results in a radical transformation that brings benefits, unblocking the process flow, optimizing time, avoiding waste and qualifying the service, ensuring the infusion of the diet, without harm to the patient, reaching established goals, reducing costs for the institution. However, for this to actually happen, factors such as commitment and effective leadership become essential to breaking down resistance, sensitizing and sustaining changes that occur both in the short and long term. In this sense, the nursing professional, leader in the hospital environments, must be committed to the whole process of implementing improvements

using Lean. He must understand the importance of his role in this process and be willing to learn new tools to learn to see the wastes to eliminate them and seek continuous improvement, focusing on the patient.

## CONCLUSION

This study allowed us to use principles of the Lean Healthcare philosophy in order to detect the nonconformities of the process of enteral diet therapy along with the workers as philosophy advocates. Finding the eight root causes in the process, allowed us to conclude that the use of Lean thinking, understood as an evolutionary process, continuous and infinite, potentially capable of overcoming any challenge, can be a solution to diagnose the health problems of the units.

Nurses have a great role in solving these problems by leading the nursing team and thus being able to apply the Fugulin Scale correctly, to continue education with nursing technicians in order to comply with the institution's protocols, in addition to to promote the grouping of activities so as not to interrupt the infusion of the diet.

Due to the relevance and impact of the Lean Healthcare philosophy in health institutions, it is suggested to expand it in other services and focus on other care and management processes, in order to expand the knowledge of a philosophy that comes from industry and today applied to health.

## FUNDING

Project financed by the Fund to encourage Research-FIP from Pontifícia Universidade Católica de Minas Gerais under paragraph 075432/2016.

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