

A quality improvement cycle of the care process in a general surgery hospitalization ward

Ciclo de mejora del proceso asistencial en una sala de hospitalización de cirugía general

Ma. del Carmen Azorín-Samper*, José Aguilar-Jiménez, Benito Flores-Pastor, and José L. Aguayo-Albasini

General and Gastrointestinal Tract Surgery Department, Hospital Morales Meseguer, Murcia, Spain

Abstract

Background: There could be important failures in clinical data and plan records that potentially influence the surgical care process. **Objective:** To complete a quality of care improvement cycle on the surgical care process in the General Surgery ward rounds. Structured quality criteria were measured, in order to identify major deficiencies, to implement improvement measures and to reassess the quality of surgical care process. Furthermore, we'll value the viability the implementation of a structured registration system and nutritional assessment method. **Method:** Comparative quality study (n = 60) before-after the setting of several improvement measures derived from the analysis of the surgical care process. Evaluated criteria were the information received by the patient, adequate recording of the clinical course and plan of care established by the surgeon in the Electronic Health Record, recording of patient's weight and size and nutritional assessment. Informative sessions, subjective, objective, assessment, plan notes on the electronic clinical record and a nutritional assessment test were implemented. **Results:** There was a significant improvement in all measured criteria (information, data records and nutritional assessment). **Conclusion:** Simple organizational measures allow a significant improvement in the information process, clinical records and malnutrition risk detection in a surgical ward.

Key words: Quality of health care. Nutritional status. Attending rounds. Electronic health records. Clinical decision-making.

Resumen

Antecedentes: Podrían existir carencias en el registro de datos relevantes del proceso asistencial de hospitalización quirúrgica. **Objetivo:** Completar un ciclo de mejora de la calidad del proceso asistencial quirúrgico en una planta de cirugía. Mediaremos unos criterios de calidad estructurados, identificando las principales deficiencias, implementando medidas de mejora y reevaluando la calidad del proceso asistencial quirúrgico. Además, se valora la viabilidad de la implantación de un sistema nemotécnico de registro de actividad y de un método de evaluación nutricional. **Método:** Estudio comparativo (n = 60) antes-después del establecimiento de medidas de mejora basadas en el análisis del proceso asistencial quirúrgico. Los criterios evaluados fueron la información recibida por el paciente, el registro de la evolución clínica y el plan de cuidado establecido por el cirujano en la historia clínica, el registro de peso y talla, y la valoración nutricional. Se realizaron sesiones informativas e implementación electrónica de la nota SOAP (subjective, objective, assessment, plan) y de un test de valoración nutricional. **Resultados:** Hubo mejoría significativa en todos los criterios medidos (información, registro y evaluación nutricional).

Correspondence:

*María del Carmen Azorín-Samper

Avda. Ramón y Cajal, s/n

C.P. 46520, Sagunto, Valencia, España

E-mail: mcazosam@gmail.com

Date of reception: 28-01-2019

Date of acceptance: 24-07-2019

DOI: 10.24875/CIRUE.M20000114

Cir Cir (Eng). 2020;88(2):172-181

Contents available at PubMed

www.cirugiaycirujanos.com

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Conclusión: Algunas medidas sencillas permiten una mejoría importante en la información, la evaluación nutricional y el registro del proceso asistencial en una planta de cirugía.

Palabras clave: Calidad asistencial. Estado nutricional. Pases de visita. Registros electrónicos de salud. Toma de decisiones clínicas

Introduction

The practice of quality care is a fundamental pillar in the correct development of clinical medicine¹. The care of patients admitted to the hospitalization ward of a general surgery department is a complex decision-making and care management process that depends on the knowledge and experience of responsible surgeons, on patient clinical situation and on the capacity of the healthcare team for the provision of measures that are deemed appropriate².

Correct registration of data that are relevant to this process and of the action plan itself is of great importance for communication between healthcare professionals³, particularly when there are different surgeons (and other health professionals) responsible for the provision of care, which in many cases is hampered by time availability, workload distribution within the team, electronic record systems and lack of adequate systematization in data collection⁴.

Other authors have evaluated the documentation process and have observed significant deficits, which even fail to comply with the requirements of regulatory authorities⁵. Some studies have been published in our milieu on the quality of surgery department discharge reports^{6,7}, but to the best of our knowledge, there are no publications regarding the surgical care documentation process in a hospitalization ward.

The purpose of our study is to complete one cycle of surgical care process quality improvement in a hospitalization ward that includes the incorporation of the so-called "SOAP note" (subjective, objective, assessment, plan) in relation to the concept of "problem-oriented history"⁸, the Mini Nutritional Assessment (MNA)⁹ and improvement of information available to the patient on his/her care process.

Method

Study design

A comparative study of the level of quality before-after implementation of quality improvement measures through an analysis of the care process was

carried out at the general surgery department hospitalization ward of Morales Meseguer Hospital, in Murcia (Spain). This department has 20 surgeons and 48 hospital beds. Siemens™ Selene® program was used as electronic health record (EHR).

Sample size

A sample size of 53 patients was calculated to estimate, with 95% confidence and an accuracy of 14 percentage units, a population percentage that was expected to be around 60% to meet the correct patient progress record variable, which groups the variables measured in the study. Loss to follow-up was estimated at 10%¹⁰.

Study subjects and periods

During the study, two assessments were carried out, consecutively including 60 patients admitted to the general and gastrointestinal surgery ward at each study period, assuming a total of 120.

Initial evaluation was carried out during a week of May 2015 and, after implementing the improvement measures in June 2015, a second assessment was carried out during a week of November 2015.

The inclusion criteria were: being patients admitted to the surgery department, both due to surgical and medical illness. The exclusion criterion was: being patients with a hospital stay of less than 1 day.

Improvement cycle

The assistant surgeon responsible for the project and the main author developed and defined the criteria, their dimensions, types and data source (Table 1), and a compliance evaluation form that was collected by the main author. The evaluated components were the information received by the patient, the clinical evolution record (subjective and objective) and the care plan established by the surgeon in the EHR during the previous 7 days, and nutritional assessment. A cause-effect diagram was developed (Fig. 1). After this initial analysis, different

Table 1. Criteria, dimensions, types and sources of evaluated data

Indicator	Clarifications	Exceptions	Type of indicator	Studied dimension	Rationale	Data source	Indicator origin
Responsible physician: the patient knows the doctor responsible for his/her case	It will be considered positive providing that the patient indicates the name or surname of the surgeon responsible for his/her case. For example: "Dr. Lucas" or "Dr. López"		Process	Satisfaction quality	Measurement of the indicator will allow assessing if the patient is well informed, if he/she knows who his/her responsible surgeon is or who is in charge of the general surgery department, which will assess the quality of information received by the patient	It will be obtained through a survey conducted by the main author of the study in patients admitted to the surgery department ward, for surgical or medical reasons, through an interview	Own creation through the formulated questionnaire
Procedure: the patient knows the procedure or the purpose of the intervention	It will be considered affirmative if the patient knows the reason for his/her admission or the purpose, without being a necessary condition that he/she describes it with technical words. For example: "They removed my gallbladder because I had stones"		Process	Satisfaction quality	Measurement of the indicator will allow measuring if the patient is well informed on the reason for his/her admission, the quality of information provided to the patient by the medical staff will be evaluated	It will be obtained through a survey conducted by the main author of the study in patients admitted to the surgery department ward, for surgical or medical reasons, through an interview	Own creation through the formulated questionnaire
Activity registration: process description	Any descriptive narrative of current situation, where the diagnosis must be explicitly expressed in all examined days, within a period of 7 days, will be considered affirmative. For example: "acute appendicitis 2 nd postoperative day"	The indicator will not be considered valid if descriptions such as "First postoperative day" or "X hospitalization days" are found if the diagnosis is not explicitly expressed, even in just one out of the 7 examined days.	Process	Scientific-technical quality	Measurement of the indicator will allow assessing the quality of care		
Activity registration: patient subjective status	Any narrative that indicates patient subjective status will be considered affirmative. For example: "Pain, nausea, other symptoms", "asymptomatic", "good general condition"	The indicator will not be considered valid if the description of patient subjective status is not found, even in one of the 7 examined days.	Process	Scientific-technical quality	Measurement of the indicator will allow assessing the quality of care		

(Continues)

Table 1. Criteria, dimensions, types and sources of evaluated data (Continued)

Indicator	Clarifications	Exceptions	Type of indicator	Studied dimension	Rationale	Data source	Indicator origin
Activity registration: patient objective status	Any narrative necessarily including the record of vital signs (temperature, blood pressure, heart rate) and surgical wound or site status will be considered affirmative. For example: "Afebrile, vital signs within range, wound in good condition, no inflammatory signs, unproductive drainage"	The indicator will not be considered valid if the description of patient objective status is not found, even in one of the 7 examined days	Process	Scientific-technical quality	Measurement of the indicator will allow assessing the quality of care		
Activity registration: action plan	It will be considered affirmative if an action plan or reason for hospitalization is described. For example: "Astringent diet, antibiotic treatment is maintained, drains are removed."		Process	Scientific-technical quality	Measurement of the indicator will allow assessing the quality of care		
Weight and height registration	It will be considered affirmative if patient weight and height are described in the Selene computer program.		Process	Scientific-technical quality	Measurement of the indicator will allow assessing whether patient data registration is correct and this way fluid and antibiotic therapy can be calculated. It is a measure of quality of care		
Nutritional assessment with Mini Nutritional Assessment (MNA)	MNA will be used, whereby patient nutritional status assessment will be obtained: 12-14 points (normal nutritional status), 8-11 points (risk of malnutrition), 0 points (malnutrition)	The indicator will not be considered valid if obtaining the information from the patient or his/her relatives is not possible	Process	Scientific-technical quality	Measurement of the indicator will allow patient nutritional status to be assessed. It is a measure of quality of care	It will be obtained by MNA-screening of all patients admitted to the surgery department ward for surgical or medical reasons	Obtained from Nestle Nutrition nutritional assessment questionnaire

improvement measures were designed and implemented. After that, compliance was measured after the measures were implemented, and a before-after comparison was carried out.

Nutritional assessment

The MNA test was used, which collects weight, height and an assessment on six sections: 1) loss of

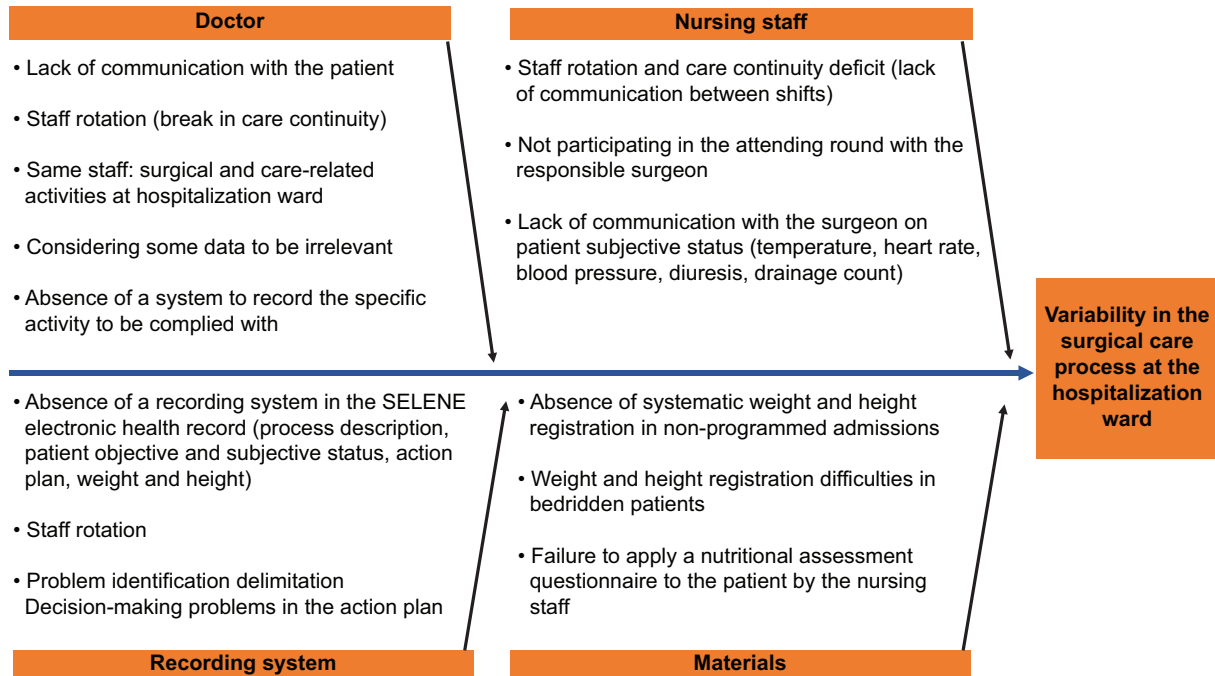


Figure 1. Ishikawa's diagram. Analysis of causes and sub-causes of care process registration variability.

appetite within the previous 3 months; 2) weight loss within the previous 3 months; 3) mobility; 4) acute illness or stress within the previous 3 months; 5) problems of dementia or depression; and 6) body mass index. MNA classifies patients as well nourished, at risk of malnutrition, or with established malnutrition.

Analysis of causes and proposal of measures for improvement

A cause-effect diagram was created (Fig. 1). After the analysis, the group promoting the improvement cycle gathered and defined the following corrective measures:

- General information session for the department surgeons, where the main aspects susceptible to improvement that were detected (importance of effective communication by the responsible doctor and adequate records) and the proposed measures were highlighted.
- SOAP note implementation as a system for recording patient progress in the EHR during hospitalization attending round by two assistant surgeons and a surgery resident (and SOAP logo on the computers used for the attending round at hospitalization ward).

- MNA performance every Tuesday (with informative posters and nursing staff training).
- Weight and height recording on EHR at admission, and weight weekly, (with informational posters in the surgery department ward, and recorded by the nursing staff).

Statistical analysis

SPSS statistical program, version 20, was used. A descriptive study of each series was carried out, with comparisons being made when necessary (Xi² for contingency tables). A before-after graphical comparison was made by constructing Pareto diagrams. A statistically significant result was considered with a p-value < 0.05.

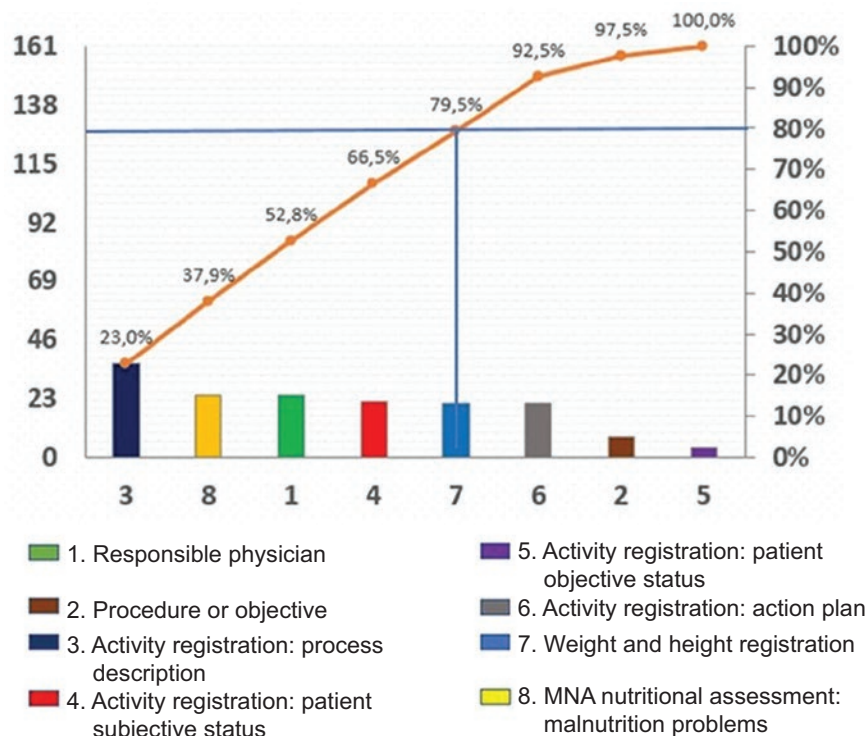
Results

Initial measurement

Table 2 shows the comparison of results (compliance) before and after the intervention. In addition, it should be noted that, in 61.7% of patients hospitalized in the surgery department ward, the description of the care process was not documented in the patient progress records; in 36.7%, subjective status was not

Table 2. Comparison of compliance with criteria before and after improvement measures implementation

Criteria	Compliance before % (95% CI)	Compliance after % (95% CI)	p
1. Responsible physician: the patient knows the doctor responsible for his/her case	60 (47.6-72.4)	73.3 (62.1-84.5)	0.07
2. Procedure: the patient knows the procedure or purpose of the intervention	86.7 (78.1-95.3)	100 (0-0)	0.01
3. Activity registration: process description	38.3 (26-50.6)	93.3 (87-94.6)	0.001
4. Activity registration: patient subjective status	63.3 (51.1-75.5)	90 (82.4-97.6)	0.001
5. Activity registration: patient objective status	93.3 (87-102.6)	100 (0-0)	0.08
6. Activity registration: action plan	65 (52.9-77.1)	96.7 (92.2-101.2)	0.001
7. Patient weight and height registration	65 (52.9-77.1)	91.7 (84.7-98.7)	0.001
8. MNA nutritional assessment: patient without nutritional risk	60 (47.6-72.4)	83.3 (73.9-92.7)	0.01

**Figure 2.** Pareto chart with the frequencies of non-compliance with criteria at initial measurement.

described; in 35% the action plan was not found; in 35%, weight and height were not documented; and 40% of the patients did not know their responsible physician. Differences were found between patients admitted for medical reasons (not operated on) and those admitted for surgical reasons; among the patients admitted for medical reasons, 70% did not know the surgeon responsible for their case, while among those admitted for surgical reasons, 30% did not identify him/her ($p = 0.034$). Unidentified risk for malnutrition was observed in 40% of patients admitted to the

surgery department. Figure 2 shows the compliance failures ordered according to the Pareto chart.

Final measurement

An absolute improvement was observed for all criteria except for “Knows his/her responsible physician” and “Patient status objective description”, with the difference not reaching statistical significance, going from 161 initial non-compliances to 43 after improvement measures implementation. There is a significant

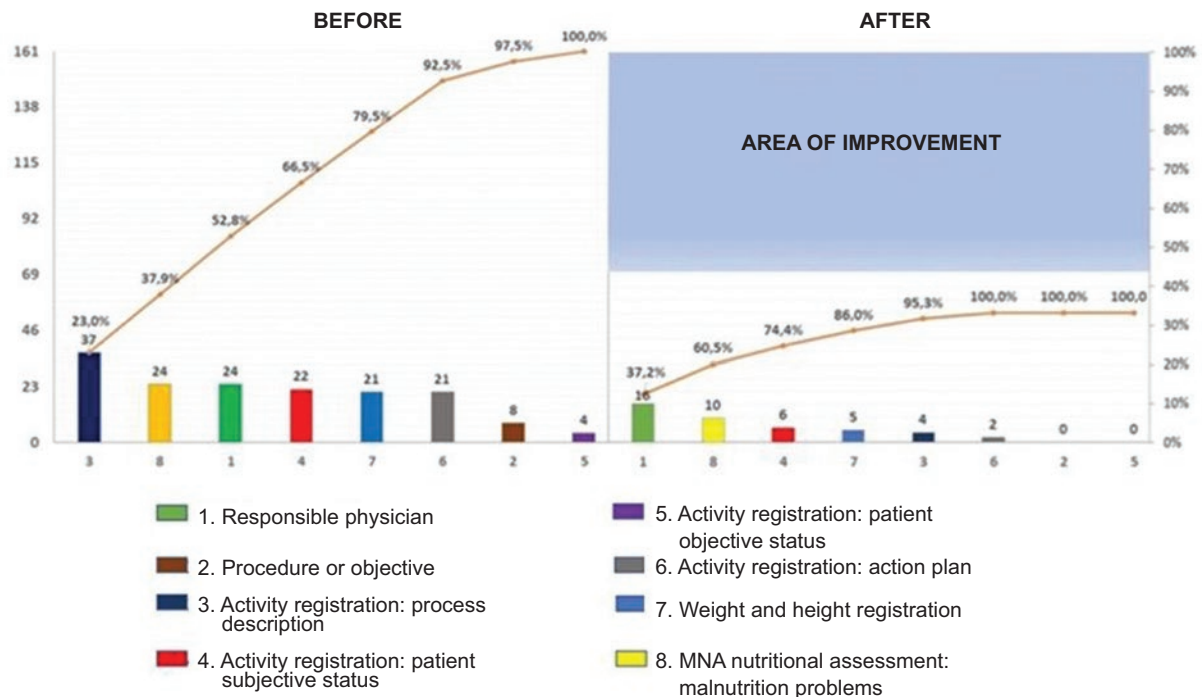


Figure 3. Before-after Pareto chart.

Tabla 3. Contenido de la nota SOAP

S	Subjective: subjective data obtained from the patient and other people close to him/her (symptoms, ailments, degree of comfort, etc.)
O	Objective: objective data obtained through observation, physical examination (including vital signs), diagnostic tests, etc.
A	Analysis: summary of the patient and assessment of his/her condition through analysis of the problem, possible interaction of problems, and changes in the status of problems
P	Plan: making explicit the care plan that will be carried out for patient diagnostic-therapeutic process and with regard to previously identified problems

improvement (Fig. 3) in activity registration, in the information received by the patients and in the detection of patients with malnutrition problems.

Discussion

In healthcare activity, it is essential to perform a structured and standardized data collection in order to obtain the best efficiency in identifying possible active problems and in establishing care plans, as well as to avoid errors in patient follow-up and clinical evaluation. This is particularly relevant in settings where the

physician responsible for patient care changes with relative frequency (work shifts, assignment of specific tasks, on-call duties, etc.), with a deficit in proper recording of these data in different areas having been documented⁵. In this sense, tools that allow better systematization of data collection in the healthcare area have been developing, with the development of two concepts on which this work has been based standing out: problem-oriented medical record and the SOAP note.

Problem-oriented medical record was described by Weed in 1964⁸. Its main components are the establishment of databases, preparation of complete lists of problems based on this database, and generation of a plan for each one of the identified problems. All this flow of information is centered on a SOAP-formatted patient progress note.

The SOAP note (Table 3) is a highly effective method for data collection¹¹, which focuses on four fundamental aspects of hospitalized patient care. This type of patient progress or assessment note is used in many health care settings with the purpose to ensure correct documentation of clinical care, thus allowing an appropriate exchange of information between specialists, as well as the teaching and evaluation of professionals in training and a

systematic analysis of healthcare problems, since it is a less purely narrative record than the usual “free” notes on patient anamnesis or progress. Integrated use of problem-oriented medical record in the EHR, particularly ordered problem lists, and the SOAP format for patient progress notes, have become widespread¹¹⁻¹³.

The decision-making process in the surgical care setting in a hospitalization ward is complex, since it is subjected to constant changes, dynamic interactions and marked ambiguity. It is always based on clinical data obtained from the patient, which require a systematic approach for their acquisition and registration that allows an adequate exchange of information between professionals². These systematized records, such as the one introduced in our study, are also considered highly useful for medical education¹⁴⁻¹⁶, since they allow students and residents to learn and be trained to confront the care process, a situation always linked to high rates of variability and, therefore, difficult educational transmission¹⁷, with good results published in various studies^{3,18}. Furthermore, integrated use of these concepts in the EHR has enabled improving quality of care and efficiency, and it is even proposed as a mechanism to reduce medical errors by linking them to strategies related to patient safety¹⁹ and healthcare expenditure. Not less important is clinical data adequate registration (procedures, complications, comorbidity, etc.) for adequate coding of medical discharges⁶ and for correct compliance with other types of clinical documentation⁷. The significant improvement in the recording of data obtained in the attending round at the ward through the design and implementation of a formalized ad hoc data collection sheet (pro forma) has been published by other authors²⁰. In our study, a substantial improvement is appreciated in all the studied parameters with regard to data recording, especially in clinical evaluation (patient process description) and in patient-reported aspects (a “subjective” dimension that includes present symptoms, such as pain, nausea, mobility, etc.), which clearly can increase the implementation of care or therapeutic measures correctly oriented by patient needs and clinical description of his/her disease.

On the other hand, a correct process in the doctor-patient relationship and responsible physician assignment during medical practice is an essential component of comprehensive medical care, and constitutes a requirement that must be met in every

doctor-patient interaction, although this is highly demanding for effective implementation in clinical practice²¹. In the process of care at the surgery department hospitalization ward, this adequate doctor-patient relationship (which starts since admission) should be respected and continued in order to achieve good quality care, informing patients and making them participate in their care process, which not only increases satisfaction with the provided clinical care, but is also essential in order for humanized and safe care to be attained. In our study, the percentage of patients who refer not knowing the surgeon responsible for their care (40% before the improvement measure) or the procedure they are undergoing or going to undergo (20%), may appear unjustifiably high, but other studies also offer similar figures²¹. The improvement measure designed in our study produced a considerable improvement in these parameters, particularly with regard knowledge about the surgical procedure.

Finally, as the third dimension assessed and addressed in our improvement cycle, between 30 and 50% patients admitted to a hospital are known to present with malnutrition or likelihood of developing it, and this is known to be associated with an increased risk of complications after surgery, including an increase in hospitalization and recovery days²². For this reason, nutritional risk identification is considered to be extremely important, and this can be accomplished using different tools and decision algorithms^{23,24}. To that end, MNA was used for nutritional assessment due to its simplicity and effectiveness, since it allows to estimate in, a simple, easy and quick form, the nutritional situation of patients²⁵, especially geriatric patients^{9,26}, which has a proven value in terms of perioperative morbidity and mortality prognosis. Implementation of the improvement measure through a personal interview with the patient by the nursing staff of the surgery department ward enabled for a routine for systematic evaluation of this risk to be established, which resulted in a 50% decrease in the percentage of patients with nutritional risk identified in our before-after implementation cross-sectional study. Similarly, the measure achieved a significant improvement in the recording of basic parameters in this context, such as patient weight and height, which is not only useful in terms of nutritional aspects, but also for medication dose, fluid therapy, etc. adjustments.

As limitations of the study, the fact that a standard “improvement team” was not established

stands out; instead, it was promoted by the study authors, and the group of professionals could therefore not get sufficiently involved. Furthermore, the implementation of a problem-focused medical history aimed at identifying clinical problems beyond SOAP was not further investigated, and neither could it be adequately integrated with the formal recording system (electronic forms) in the programming of the EHR that is currently being used in our hospital (Selene®, Siemens), the adaptation of which, as other authors have published⁴, is not always flexible or free of cost. In addition, the effect of the measures may be biased by a Hawthorne effect, and lastly, ideally, it should be the subject of a monitoring program (continuous quality improvement program).

Conclusion

In our study, identification and categorization of various opportunities for patient care improvement during hospitalization in a general surgery department stand out due to their importance, and include the absence of a systemic approach to data collection or problem identification (with high rates of flexibility and randomness in activity recording at initial measurements), difficulties in the registration of relevant aspects in the EHR tool that was used, absence of an objective nutritional evaluation system and some marked weaknesses in the informed consent process, such as simple identification of the physician responsible for the provision of care. Implementation of a quality improvement cycle through simple measures, such as a training session with the surgeons, identification and objective communication at patient admission and during hospital stay, integration of a mnemonic registration system of surgeon's activity at the ward (SOAP note), weight and height recording in all patients admitted to the surgery department ward upon admission and weekly, and, finally, a nutritional evaluation project through MNA weekly application by the nursing staff, have been shown to be highly efficacious for quality improvement on different healthcare dimensions in this specific field.

Funding

The present investigation has not received specific aid from public or commercial sector agencies or non-profit entities.

Conflict of interests

The authors declare that they have no conflicts of interest that may affect the submitted work.

Acknowledgements

The authors would like to thank María del Carmen Hernández Ferrandis (surgery department ward supervisor) and the rest of the surgical hospitalization nursing staff for their contribution to enable for this work to be performed, and José Aguilar for his great dedication and enthusiasm to carry out the study, because without him it would have not been possible.

Ethical disclosure

Protection of people and animals. The authors declare that no experiments were performed on humans or animals for this research.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained informed consent from the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

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