MEASURING KEY PERFORMANCE INDICATORS FOR OPERATING ROOM MANAGEMENT

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The methodology proposed in [1] was applied to generate a set of indicators to measure the performance of operating rooms in Chile. Following this methodology, the process was analyzed through a Value Stream Map (VSM); the most critical problem was analyzed through an Ishikawa Diagram (ID). Also, as proposed in the methodology, an activity-based costing (ABC) system was developed to improve the analysis, and time-based indicators were defined to decrease the costs and time of the activities.

In the first stage, three macro-processes were established that characterize the surgical units, namely (a) pre-operative processes, (b) intra-operative processes, and (c) post-operative processes. Then, in stage 2, it was defined that: the pre-operative process seeks to prepare patients and verify their admission conditions to guarantee the success of the surgical procedure, according to the type of surgery; the intra-operative process seeks to remedy (repair or replace) the patient's condition through surgery; and the post-operative process seeks to ensure the beginning of the patient's recovery after surgery [2].

In stage 3, the processes were standardized by observing and measuring them in the field and interviewing the staff involved. All this information allowed the generation of flow charts and the dictionary of activities for the cost model.
In stage 4, the indicators based on costs obtained from the application of ABC and indicators based on time measurements were established. For the latter, a VSM and an ID were built with the information collected.

The cost indicators focused on establishing the costs of activities and the total and unit costs of the services delivered. Twelve activities accounted for 66% of costs, more than half of which were concentrated in three activities: providing intravenous anesthesia, performing post-operative nursing care, and monitoring vital signs [1]. Once the total and unit costs were calculated at the level of services delivered, cholecystectomy, with or without surgical cholangiography, proved to be the most expensive as a unit cost. The most frequent and most expensive service at the total cost level is extracapsular phacoeresis with intraocular lens implantation, considering the prosthesis [1]. This information is valuable because it pointed out to the unit manager, where he should focus efforts to develop better mechanisms to carry out these activities in order to achieve significant impacts in terms of productivity.

Three VSMs were performed, one for each macro-process [3]. For the pre-operative process, the bottleneck was shown to be the operating room preparation activity [1]. A significant problem that was detected, through the methodology and the interviews with health personnel, is the cancellation of surgeries, which has direct effects on the surgical scheduling and the loss of resources, particularly the time of the surgical team. The analysis of the problem of surgical cancellations

using the ID concluded that the leading causes of cancellation were the failure of patients to present on the stipulated date and prolonged use of the operating room; these causes accounted for more than 25% [1].

#	Macroprocess	KPI	Measurement January 2018 (average)	Standard or target
1	Preoperative	Patient transfer time to OR	30 minutes	20 minutes
2	Preoperative	Percent of patients that attend surgery in the right condition	75.20%	Over 85%
3	Preoperative	Time to prepare OR	21 minutes	10 minutes
4	Intraoperative	Start time of the first duly surgery	8:00 AM	8:47 AM
5	Intraoperative	Patient waiting time to be transfer to post-surgery	20 minutes	5 minutes
6	Intraoperative	Surgery duration	Depends on each surgery	
7	Postoperative	Time spent on the post-surgery according to complexity of the surgery	Depends on each surgery	
8	Postoperative	Patient waiting time to be transfer to clinical service	40 minutes	10 minutes

Table 1. KPIs measurement and their comparison with standard or target

Based on the analyses proposed by the adopted methodology, 12 indicators are proposed to measure the performance of operating rooms [1]. Administrators selected 8 of the above-mentioned indicators that were applied and measured in one of the hospitals that participated in the study. Table 1 presents the indicators and the respective goals or standards that were proposed by the administrators based on the information provided by the application of the methodology. These indicators were measured in January 2018, and it was concluded that the processes associated with indicators 1, 2, 3, 5, and 8 should be improved. However, the distribution of time during each surgery depends on the technique performed by each surgical team, which makes it difficult to standardize the associated times. Finally, an intangible result is that the post-measurement workplace climate improved because it brought together the criteria of the clinical teams in the search for more focused solutions to the problems detected.

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