Ann Ig 2021; 33(1): 100-102 doi:10.7416/ai.2021.2411

LETTERS

Operating Room Efficiency measurement made simple by a single metric.

Misurare l'efficienza di utilizzo della sala operatoria: proposta di un indicatore unico

Sir:

Operating room (OR) efficiency is a hot topic in OR management studies. Benefits of OR efficiency maximization include financial savings, improved patient safety, greater satisfaction for patients and health workers, and increased productivity. However, how to measure the efficiency of an OR suite still remains a pending question. Many performance indicators have been developed (1) and one of the most frequent approaches consists of choosing a set of indicators to create a dashboard for the monitoring of surgical activities. Macario proposed a scoring system based on eight performance indicators (2). A similar approach was used in The Canadian Paediatric Surgical Wait Times Project (3). Although the use of dashboards and scoring systems allows for a wide and in-depth understanding of the numerous factors that contribute to efficiency, it may also raise problems. The use of multiple indicators involves gathering large amounts of data that are not routinely available in every context and are subject to different interpretations if metrics show divergent trends. Moreover, it is not possible to properly establish relative weights among metrics. We propose a different approach, based on a single and overall indicator that can be used as a proxy for OR efficiency. We considered four elements as a minimum set for composing our indicator: raw utilization (RU), turn-over time (TT), preparation time (PT) and case cancellation (CC) (4). RU formed the basis for our considerations, as it is one of the most common and widespread performance indicators. RU represents the percent of time that patients spend in OR during resource hours.

We identified three critical issues regarding RU if it were to be used as a stand-alone indicator to measure OR efficiency.

Firstly, as Strum et al. (5) pointed out, RU does not adequately discriminate the quality of OR utilization as it fails to recognize underutilization and overutilization. RU can potentially exceed 100% when overutilization occurs, making the calculation meaningless. The RU score would be higher for ORs performing more overtime procedures, even if overtime mode is recognized as more costly and stressful for staff and therefore less efficient (Fig. 1, case n. 1).

Secondly, RU cannot be used for benchmarking purposes if the ORs to be compared have different organizational and/or structural features. RU mainly relies on the time of entry and exit of patients from the OR. This time could vary depending on the availability of an induction room to perform anesthesiologic procedures. ORs with an induction room can anesthetize patients outside the room, thus decreasing RU, as opposed to ORs without an induction room. Therefore RU cannot be used to directly compare ORs with different features (Fig. 1, case n. 2).

Lastly, RU was not designed to take into account CC. Consider two ORs with the same pattern of utilization (Fig. 1, case n. 3). Room A performs all procedures as scheduled and no procedure needs to be cancelled. Instead, Room B originally scheduled three procedures within block time. However, inaccurate planning results in the first two procedures occupying the entire block time, inducing the postponement of the third scheduled procedure to the next day. The RU would score the same for Room A and Room B, since they performed the same number of procedures with equal duration, but our argument is that CC is to be considered a source of inefficiency, due to direct and indirect associated costs. A calculation of efficiency should therefore take into account CC.

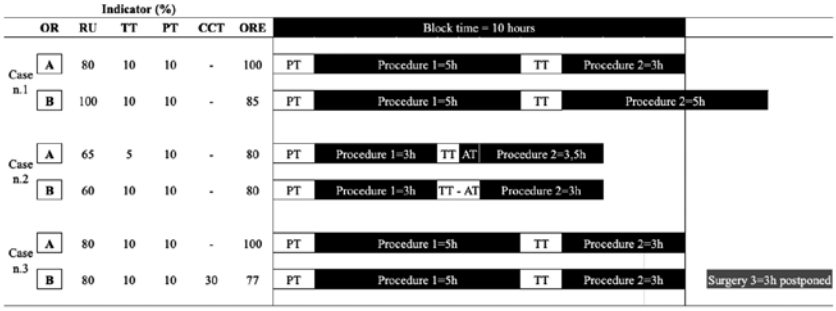

Fig. 1 - The use of ORE as a performance indicator.
(ORE = Operating Room Efficiency; OR = Operating Room; RU = Raw Utilization; TT = Turn-over Time; PT = Preparation time; CCT = Canceled Case Time; AT = Anesthesia Time.)

In order to solve these three critical issues, we propose a new indicator, defined as Operating Room Efficiency (ORE):

$$\text{Operating Room Efficiency} = \frac{Preparation\ Time\ (PT) + Utilization\ Time\ (UT) + Turnover\ Time\ (TT)}{Block\ Time + (Overrun\ Hours * 2) + Canceled\ Case\ Time} \times 100$$

PT is defined as the amount of time from OR opening to the entry of the first patient to be operated. UT represent the total amount of time which patients spend inside the OR. Turnover Time (TT) represents the total amount of time between the exit of a patient from the OR and the entry of the next one. Block time is the amount of OR time reserved for a given service. Overrun hours represent the amount of time of OR utilization after scheduled OR closure. Cancelled Case Time (CCT) is the estimated duration of the cancelled procedure.

The ORE formula provides a solution to aforementioned RU-related problems.

Overrun hours were included in the calculation, so that efficiency would score lower with longer overtime procedures; they were multiplied by two to weight their cost against the cost of routine activities, as suggested by other authors (2).

Case time of canceled procedures was also included in the formula in order to account for the inefficiency of CC.

TT and PT were added to the calculation in order neutralize any difference due to different features of ORs and enable comparison between different hospitals. As TT and PT could include delays or other unproductive times, values that exceed 60 minutes should be excluded from the calculation.

We believe that ORE could be easily calculated with a relatively small amount of data, making it readily applicable to many contexts for monitoring and planning purposes. It could provide simple and intuitive feedback for professionals and managers, who in turn should be able requires validation before its use to directly influence this metric through their own activity. However, this indicator requires validation before its use for scientific purposes.

Therefore, while we are already involved in the field validation procedure of this indicator, we would be very interested in having other teams that would simultaneously do the same.

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