OPERATING ROOM TURNOVER TIME: DEFINITIONS AND FUTURE RESEARCH NEEDS

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One aspect of healthcare efficiency is operating room (OR) turnover time. OR turnover time is an area of high interest to hospital administration, however, limited Human Factors research exists on turnover time. The current paper describes OR turnover time and describes variables involved (e.g., tasks, procedures, personnel, and others). Next, research topics related to OR turnover time are described. This includes measuring turnover time, parallel processes, workflow layout, teamwork, and several other areas. Research gaps in these areas are discussed.

INTRODUCTION

Medicine has evolved immensely since the first surgery. Research and trial-and-error methods have brought us the cutting-edge medical knowledge, procedures, equipment, and techniques currently used today. Despite the centuries of progress, much work remains on procedural issues that, although indirect to patient care, are key elements that hospitals may face dozens of time per day and thousands of times each year. One of those elements is operating room turnover time. This one factor impacts a variety of other factors within a hospital. If turnover time is managed properly, the hospital runs smoothly and efficiently. If turnover time is mismanaged, this can cause a chain reaction that may affect the hospital for days and ultimately results in lost money and reduced patient care (Machovec & Ushakumari, 2017). The purpose of the current paper is to define and describe operating room turnover time, discuss human factors related issues, and present topics of needed research.

Operating Room Turnover

Operating room (OR) turnover time is defined as the time between one patient exiting surgery to the time at which the next patient enters the room to begin surgery (Ninan, et. al., 2017). During that time, workers perform a series of essential tasks to clean and prepare that room for the next surgery (Ninan, et. al., 2017).

Basic tasks/procedures. As the patient comes out of anesthesia, personnel disconnect the patient from monitors and other machines, transfer the patient to a mobile gurney, and roll the patient to recovery. Personnel clean the room, restock supplies, and prepare the OR for the next patient/surgery.

Personnel. Numerous people are involved in the operating room turnover process. The processes involve surgical techs, operating room nurses, anesthesiologists, surgeons, nurse assistants, anesthesia nurses, and many more (Arakelian, Gunningberg, & Larsson, 2011).

Patient handoff. One important step in OR turnover is when personnel receive the patient after surgery. Also known as the recovery team handoff, it depends on the recovery team being ready and present to take responsibility for the patient care. This post-surgery patient handoff impacts turnover time as the patient can remain in the OR until the recovery team is ready.

Operating room vs. staff turnover. A point of confusion in the literature is that operating room turnover time tends to get lumped in or overshadowed with staff turnover rate. Specifically, the term "turnover time/rate" can be used when discussing workforce turnover, as opposed to OR turnover.

Variety of facilities. With the large variety of hospitals, centers, and offices providing surgery, diverse issues with respect to OR turnover exist. These include out-patient care facilities, trauma centers, cancer treatment centers, cardiac centers, children's hospitals, and many more. Each of these

facilities operate differently, yet all facilities have similar goals: quality patient care while maintaining efficiency.

Current Research and Gaps

In examining the related research, topics include measurement, turnover processes, teamwork, unforeseen patient circumstances, staffing, and scheduling. This section of the paper provides examples of each topic and discusses research gaps.

Measuring turnover time. The research reveals that a variety of interrelated measures for turnover time exist. Concepts include patient turnover rate and operating room turnover (Ninan, et. al., 2017, Riopelle, 2005), as well as the time it takes to proceed through multiple parts of the surgery (McLaughlin, 2012). In reading the articles, it can be difficult to discern whether these represent similar measures or are actually different measures. Furthermore, while there has been a considerable amount of related research done, most do not include measures of turnover time. This may indicate difficulty in definition and measurement.

Parallel processes and turnover time. Interestingly, a common misperception among surgeons is that increased workload is inherent to decreasing turnover time (Cendan & Good, 2006). In contrast to this view, research indicates that streamlining the process by implementing new techniques such as parallel processing, can help make the transition easier and more time efficient (Ninan, et. al., 2017). The technique of parallel processing eliminates the whole surgical team interacting with an incoming patient at once, and instead they break up the task by seeing the patient one at a time, while the prior surgery is going on (Ninan, et. al., 2017). This process keeps the flow moving, while also not disrupting an ongoing procedure.

Workflow layout on turnover time. One research opportunity in turnover time may be to investigate the effect of surgical workflow layout on turnover time. A study was conducted at a tertiary care center, a university-based teaching hospital (Cendan & Good, 2006). This study was conducted for two months with four surgeons. The results indicated that with improved workflow layout, three out of the four surgeons showed an improvement in caseload. Also, the resulting turnover time was as short as 16–25 minutes (Cendan & Good, 2006). Future research is needed to examine generalizability of this technique.

Teamwork and turnover time. Teamwork can be an indicator for the effectiveness of operating room turnover (Erestam, Haglind, Bock, Erichsen-Andersson, & Angenete, 2017). For example, Arakelian, Gunningberg, & Larsson (2011) measured efficiency amongst the surgical staff. Their research found seven factors that explained OR competency and included "doing what must be done to achieve good workflow" and "performing parallel tasks" among others. Both of these variables would likely be related to turnover time, but more research is needed.

Unnecessary instruments. Other research has examined reducing the number of unnecessary instruments used in the OR, and this may also improve turnover time. Farrelly et al. (2017) focused on eliminating unnecessary and barely used instruments from the surgical tray. This approach was used to cut costs, including the associated labor needed to count, decontaminate, and pack surgical trays. Based on this research, elimination of certain surgical trays from rotation appears to have potential to cut operating room turnover time, along with the decreased manhours used to sterilize the unused instruments.

Unforeseen patient circumstances. There are plenty of unforeseen circumstances that can arise before during and after surgery, and these events can have a waterfall effect which, in turn, can impact the turnover time following surgery (Copenhaver, et. al., 2017). This includes unknown, patient pre-existing conditions as well as complications from other causes. A prior condition can cause surgical complications that can lengthen the surgery, especially if the surgeon is not prepared for it to manifest itself (Ang, Sabharwal, Johannsson, Bhattacharya, & Gupte, 2016). Whether it be cardiac arrest and needing a dose of epinephrine or having an artery blow and having to stop the bleeding, both situations put the surgery on hold. In turn, this can impact turnover time by not having instruments or equipment needed at the time of the incident, causing delays and inefficiencies

during a surgery (Ang, Sabharwal, Johannsson, Bhattacharya, & Gupte, 2016).

Inadequate staffing. Another issue that can impact turnover time is having inadequate staffing (Yuqing, Kiesler, & Fussel, 2014). Not having the number of surgeons, anesthesiologists, and nurses needed to conduct a surgery causes commotion and delays. Hospitals are often understaffed (Yuqing, Kiesler, & Fussel, 2014). Conducting a surgery is a highly interdependent team task, and if all necessary personnel are not ready and able to perform their tasks the team cannot move forward with the intended goal, which is surgery. This impacts turnover time by delaying the surgery. For example, if the OR is not ready due to nurses not having the room prepped (Yuqing, Kiesler, & Fussel, 2014). Other examples are if the room is ready, but the patient is not fully prepped and cannot be in brought into the room.

Checklists. Another interesting area is the effect of checklists on turnover related variables including teamwork and OR procedures. While some work has been done in this area, the results are not indicating a high level of success. For example, the World Health Organization developed a checklist that aimed to improve operating room teamwork. In the end, it was discovered that even with the checklist being implemented there were still failures in teamwork (Erestam, Haglind, Bock, Erichsen-Andersson, & Angenete, 2017).

Another checklist evaluated was the surgical safety checklist, also developed by the World Health Organization. This checklist resulted in staff checking off boxes but not fully understanding what was being required of them or the checklist not being fully completed (Koopman, 2018). Research is needed to determine if a successful checklist approach could impact OR turnover time.

Scheduling conflicts effects on turnover time. Scheduling conflicts arise frequently in hospitals. Most surgeries are scheduled weeks to months in advance. When emergencies occur and incoming traumas arrive, operating rooms that had been scheduled for a patient with a non-life-threatening surgery get rescheduled to be used for the emergency cases. When rescheduling for emergencies occurs, it can also mean inappropriate patient preparation for surgery, as well as congestion in the post-anesthesia care unit following surgeries (Cendan & Good, 2006). Congestion in post-anesthesia care unit can mean delays in moving other surgical patients from their ORs, which also impacts turnover time. Furthermore, having congestion in the post-anesthesia care unit can cause charts to get put with the wrong patient, and in general, patients not receiving the care that they deserve.

SUMMARY AND CONCLUSION

OR turnover time is of high interest to hospital administrators. Unfortunately, the existing research on this topic is somewhat lacking with many interrelated issues clouding the results. Fortunately, many ideas exist for future research. These range from examining process and workflow to teamwork and checklists. The future is ripe for Human Factors and Ergonomic research to assist in this area.

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