

## SHORT REPORT

## Bringing efficiency into practice: A quality improvement initiative to reduce operating room turnaround time

Hasanat Sharif, Noman Shehzad, Joveria Farooqi, Sana Karim, Sana Akbar

### Abstract

Operating room (OR) turnaround time (TAT) is the minimal essential time required for cleaning of OR and preparation for the next case. The TAT inversely affects OR efficiency. Several factors related to personnel, equipment and scheduling have been identified as causes of increased TAT. We conducted the study to identify factors that affect OR TAT and to propose recommendations for its reduction. The retrospective study, conducted at Aga Khan University Hospital, Karachi, comprised TAT records related to March 2014. Of the 88 cases, 22(25%) showed a delay. Upon Pareto analysis it was found that in 8(36.6%) cases there was a delay of 70% related to scheduling of OR list and 5(22.7%) related to movement of patients from wards to OR. As such, improvement in these two broad areas can take care of majority of delays. We also recommend documentation of all processes as part of continuous improvement.

**Keywords:** Operating room, Turnaround time, Quality improvement, Shewhart cycle.

### Introduction

Operating room (OR) turnaround time (TAT) is the duration from the time that the last patient is wheeled out of OR till the next patient is wheeled in.<sup>1</sup> This is the minimal essential time required for cleaning of OR and preparation for the next case. The importance of TAT lies in the fact that it is also the time when the OR is not being utilised for service. Thus the TAT inversely affects OR efficiency; greater the cumulative TAT, lesser is the time available for surgery, that is OR utilisation, and thus lower is the efficiency.

It plays a pivotal role in improving patients' and workers' satisfaction, increasing hospital revenue and decreasing the cost of care.<sup>2</sup>

Several factors related to personnel, equipment and scheduling have been identified as causes of increased TAT.<sup>3</sup> Examples of several initiatives to reduce OR TAT are available and have proven successful in improving overall

Department of Pathology and Surgery, Aga Khan University Hospital, Karachi.

**Correspondence:** Noman Shahzad. Email: drns01@hotmail.com

OR efficiency as well as patients' and workers' satisfaction. Children's Hospital Colorado published a report on improving paediatric otolaryngology procedure TAT and proposed recommendations.<sup>2</sup> Another hospital achieved 32% reduction in OR TAT in a quality improvement project, with a potential impact of \$617,000 in possible financial gains.<sup>3</sup>

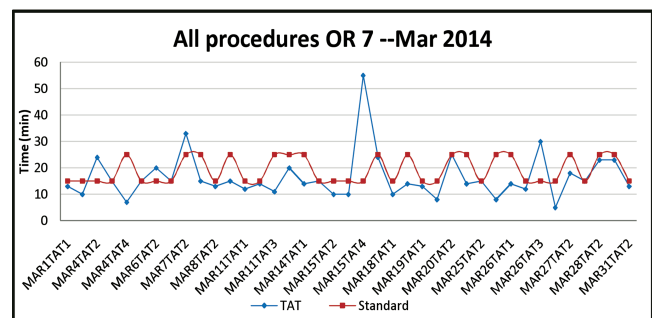
Aga Khan University Hospital (AKUH), Karachi, has a standing policy on TAT which includes recording causes of delay.

The current study was planned to identify factors that affect OR TAT and to propose recommendations for its reduction.

### Methods and Results

The retrospective study was conducted at AKUH and conducted record of Main OR numbers 7 and 14 that are Otolaryngology and General Surgery ORs respectively. Consecutive sampling technique was used for data collection. The data was assessed to determine baseline compliance with AKU OR policy by plotting a Run Chart. All the potential causes recoded for delay were noted. Pareto Analysis was conducted using 70-30 rule on the data.

Of the 88 TATs recorded, 22(25%) showed delay. Run charts were plotted separately for the two ORs (Figures-1 and 2). There were 5(22.7%) delays beyond the standard TAT in OR 7 and 17(77.3%) in OR14. In 1(5.8%) OR 14 case, only the presence of delay and its cause were mentioned. Information on causes of delay was found to be missing in 3(13.7%) cases; all (100%) related to OR 14.



**Figure-1:** Run Chart of turnaround times (TAT) in operating room number 7 (ENT Surgery).

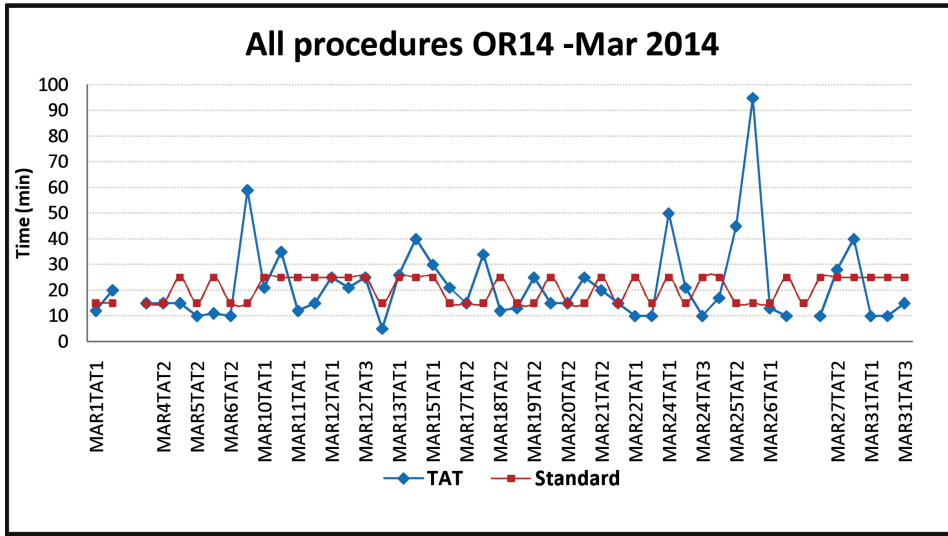


Figure-2: Run Chart of turnaround times (TAT) in operating room number 14 (General Surgery).

We conducted brainstorming sessions to identify the causes of delay in OR TAT. All possible causes were classified into five broad categories: Man, Method, Measurement, Material and Machine. These categories

were based on the quality improvement concept of inputs in any process. A cause-and-effect diagram (Figure-3) was formulated to elaborate outcome.

Once the causes were jotted down, Pareto rule was applied to identify the "vital few" reasons for delay. According to the data collected, the major areas that contributed to delay in most of the cases were related to either scheduling or patient movement (Figure-4).

**Conclusion**

Our results showed that 70% of delays were related to scheduling of operating room

list and movement of patients from wards to OR. Many steps are involved in both of these processes. There are many stages of making and finalising OR schedule,

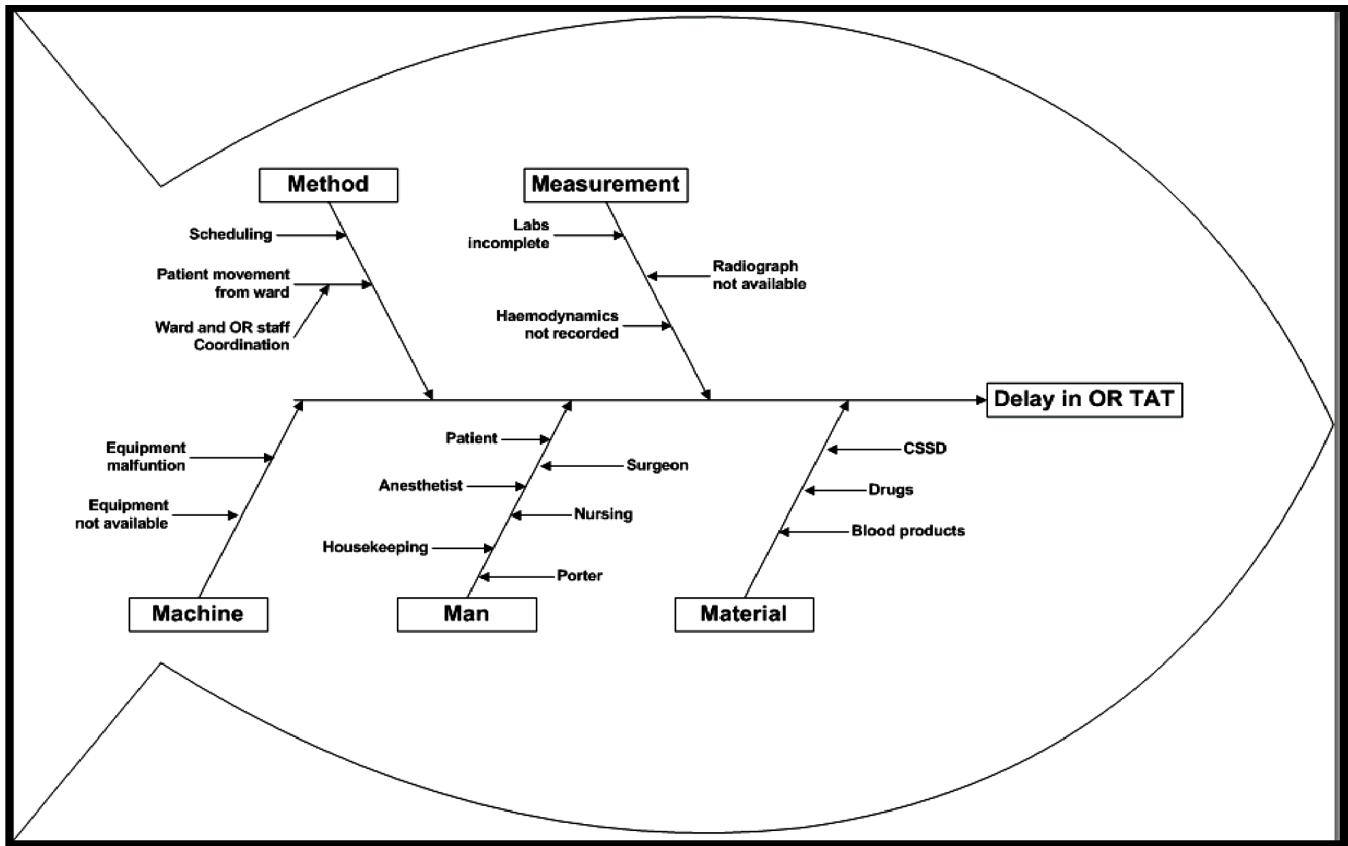
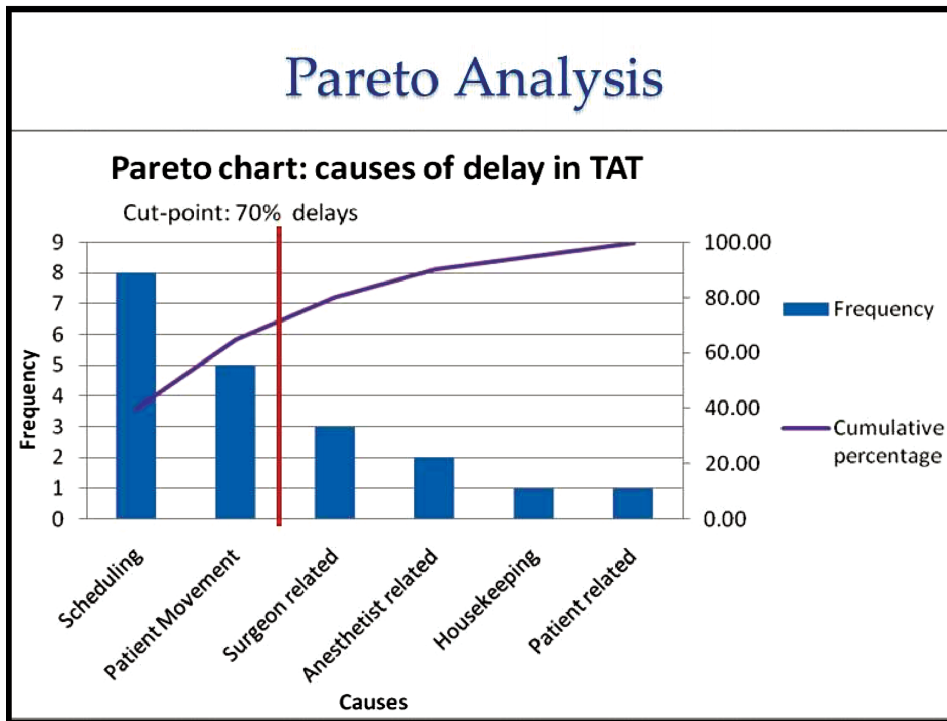


Figure-3: Cause-and-effect diagram.



**Figure-4:** The 'Vital Few' reasons for delay.

including online booking of patients, confirming the willingness from patients a day before the operation to avoid unnecessary slot allocation and appropriate allocation of slots with logical sequence in ORs in consultation with the operating surgeon. Same is true for movement of patients from wards to OR. It involves giving call for the patient, availability of porter and patient pre-operative preparation in wards.

Having a plan to improve these two broad areas, we can expect to take care of 70% of delays based upon our results.

We recommend interventions in the following potential areas of weakness to take care of the delays.

We also recommend consultation with all those involved in the processes, and input from internal and external customers' needs to be incorporated in the final improvement plan.

### Scheduling

Add-ons are those patients who are added to the elective list once the list is finalised. Ideally all the cases which are to be operated upon the next day should be in the information of the scheduler. It is via online booking system. If the scheduler is not informed of any case planned for later in the day, the case will not be included in the final list and will be considered an Add-on case. To

avoid this situation, we recommend booking of electively planned cases in time by the surgical team.

Also, OR schedule is disturbed if there are coinciding academic or clinical schedules of the operating surgeons or anaesthetists. A policy needs to be devised for way forward in case of coinciding schedules; and the scheduler needs to coordinate before finalising the list, especially regarding Outpatient Clinics, academic or non-academic meetings, and emergency on-call.

Simultaneously running more than one theatres for a single consultant surgeon sometimes causes schedule disturbances. The consultant surgeon may not be available for the second theatre for critical steps at

some point in time and this in turn increases TAT. Policy needs to be devised regarding conditions when more than one theatre can be run by a single consultant surgeon and a limit needs to be defined for the maximum number of theatres that can be run by a single consultant surgeon at a given point in time. We recommend no more than two theatres at a time and the second theatre may overlap only after the critical steps of previous procedure is over and adequate team is available.

### Patient Movement

Porters are staff responsible for physical transportation of patients from wards to OR. Number of porters should be adequate. In order to improve coordination among porters, supervisory role needs to be assigned by the nursing staff. This can help reduce delays arising as a result of intra-porter lack of coordination.

For efficient management of movement of patients from wards to OR, coordination among surgeon, OR staff and nursing staff is of paramount importance. Surgeons need to inform the OR staff at an appropriate time to give call for the next patient. Coordination between OR staff and wards staff should be efficient so that when the porter is in the ward, the patient is ready to be moved to OR.

Delays can arise in case some patient is not ready for surgery once his/her turn for surgery has arrived. This

is multi-factorial. To avoid this, we recommend that pre-operative anaesthesia evaluation in anaesthesia clinics should be encouraged well before the day of surgery. In case it is not feasible as is true for patients visiting from far-off places, it should be ensured that this evaluation is done at least a day before the operation when the patient is admitted. Pre-operative medications need to be ordered and administered in time.

### **Documentation**

As part of continuous improvement, we highly

---

recommend documentation of all the events involved in these two processes. Data regarding sub-causes, as shown in Figure 3, need to be maintained so that further analysis is made possible at a later date.

### **References**

1. Garner P. Complexities in the Operating Room. Proceedings of the 2012 Industrial and Systems Engineering Research Conference G.
2. Perkins JN, Chiang T, Ruiz AG, Prager JD. Auditing of operating room times: a quality improvement project. *Int J Pediatr Otorhinolaryngol* 2014; 78: 782-6.
3. Adams R, Warner P, Hubbard B, Goulding T. Decreasing turnaround time between general surgery cases: a six sigma initiative. *J Nurs Adm* 2004; 34: 140-8.