Delays to Operating Theatre Lists: Observations from a UK Centre

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Abstract

The aim was to measure the incidence of delays to operating theatre lists and the reasons behind them. A cost implications analysis was also performed to discover the potential savings to be made from improvement in this aspect of theatre efficiency. Prospective surveys recording start-time delays and total daily delay during 227 multiple-specialty cases were completed over five days in March 2010 in a UK District General Hospital, split over two sites. Information was collected onto a proforma for each case about specialty, procedure, start-time and end-time of the case, with request for an explanation for duration and reason for any delays incurred. An analysis of costs to the Trust was performed using estimated theatre hours lost with average cost of theatre use per hour.Overall 78% of cases started on time, i.e. within 15 minutes of the scheduled time, but orthopaedics and plastics achieved only 69% and 66% respectively. Orthopaedics and plastics also exceed the acceptable total daily delay time of 45 minutes (70 and 66 minutes respectively). Hospital-wide factors were the most common reason for the delays (72%). 48% were due to ward bed issues, 15% due to doctor factors and 13% inadequate pre-operative assessment. Estimated projected cost to the Trust over one year is significant at over £1 million ($1.5 million).During the study period, theatre time was lost for usually multi-factorial reasons, with hospital organisational factors being predominant. Opportunities to improve theater efficiency were identified.

INTRODUCTION

The UK District Audit Commission has described a number of key theatre performance indicators, which include theatre time utilisation and patient flow[1]. Operating theatre efficiency is important to reduce costs to the NHS and to keep patient waiting lists minimised. The key elements in the efficient use of operating theatres are effective management and good communication, trained staff, appropriate facilities, equipment and operational layout. A wide

range of surrounding resources such as pre-operative planning and assessment, bed availability, theatre supplies and staffing levels also influence efficiency. Theatre efficiency is economically important, as demonstrated in the UK by The Productive Operating Theatre (TPOT), a modular improvement programme created by the NHS Institute with aims to improve theatre safety, efficiency and patient care in the UK, saving £7 million ($10.5 million) for an average UK Trust[2]. Cost of consumables increases with the number of operations performed, however, operational cost remains fixed whether one procedure or more are performed, so improving turnover will result in a reduction in the unit cost of surgery.

AIMS

The purpose of this survey is to gain insight into the theatre efficiency and hence cost-effectiveness by the measure of incidence and reason for delays to operating theatre lists.

AUDIT STANDARDS

A number of methods have been used to assess and quantify theatre efficiency, including proportion of available theatre time used for anesthesia and surgery, list cancellation, late running lists and start-time delays. As there is no specific UK NICE guidance on theater delays our standards were derived from the Association of Anaesthetists of Great Britain and Ireland (AAGBI) theater efficiency guide[3] along with US comparative studies[4-6].

START-TIME DELAYS

Start-time delay is a useful indicator of operating theater efficiency. The start time of cases is defined as ‘when the anesthetist takes charge of the patient in preparation for

anesthesia'. Minimal start-time delays reduce the time patients have to wait, maximises the number of cases achieved per session and reduces further cancellations and so waiting lists for the hospital. From comparative studies at least 75% of patient's procedures should start within 15 minutes of the time scheduled. Therefore 15 minutes late is classified as a 'delay' to the list progression. If a case is supposed to start at 9am but the case starts at 9:30am, this equates to a 30 minute start-time delay. This was one of the standards used however it can be noted that the AAGBI propose a more stringent standard that <10% of lists should start >10 minutes late.

TOTAL DAILY DELAYS

A further standard used to compare performance was that delay of the start of scheduled cases should total less than 45 minutes per eight-hour theater day in well functioning units.

METHODS

Prospective National Confidential Enquiry into Patient Outcome and Death questionnaires were requested for completion for every theatre case by the anaesthetist and recovery staff for 5 days from 1 th March to 5 th March 2010 (Monday to Friday). These forms required information on type of operation, start times, type of anaesthetic, time in recovery and details on delays to the list. In total 227 cases were recorded from Broomfield Hospital General and Plastics Theatres and St John's Hospital Chelmsford (for ENT and Gynaecology procedures). The only exclusions were Obstetrics, Day-stay and Paediatrics.

For the purpose of this study we have described the root cause of delays to be either due to theatre practicalities (efficiency and management of lists, staff, recovery, flow of patients); hospital-wide factors (ward efficiency, labs, investigation delays, staff in departments outside of theatres), or external factors (patient delays, supplies not delivered).

RESULTS

Figure 1

Table 1 Delays to Theatre Lists

				Reason		
Specialty	Cases	Delayed	Time lost (hours)	Theatre	Hospital	External
General	33	7 (21%)	2.42	0	5	1
Orthopaedic	49	15 (31%)	5.8	5	11	1
Trauma	26	4 (15%)	1.5	1	2	1
Vascular	7	2 (29%)	1.5	0	2	0
Breast	6	2 (33%)	0.33	1	1	0
Urology	9	3 (33%)	0.833	3	0	0
Plastics	43	14 (33%)	5.5	1	12	0
ENT/MaxFacs	24	2 (8%)	0.5	0	2	0
Gynae	26	1 (4%)	0.25	0	1	0
Total	227	50 (22%)	18.7	11	36	3

Figure 2

Table 2 Root Cause of Delays

Theatre factors (17%)	Theatre and kit preparation (11.5%) IT equipment failure (3.9%) Lack of recovery staff (1.9%)
Hospital factors (72%)	Ward beds (48%): availability (13), transfer of patients (2), preparation of ward patients (8) Doctor/surgeon factors (15%): consent not completed (3), surgeon delayed (2), medication not prescribed (1), other doctor commitments (1), doctor delay (2) Inadequate pre-op investigation (13%) eg group and save not sent, EKG not done Delay due to other hospital departments (2%) Lack of nursing staff (2%)
External factors (7.4%)	Non-attendance Psychiatric cause

Out of the 227 cases there were 50 episodes of delay to the list progression recorded (Table 1).

In total, 78% of cases started on time, which exceeds our standard of 75%. But of note the following specialties did not achieve this: vascular (71%), elective orthopaedic (69%), breast (66%), urology (66%) and plastics (66%).

Regarding total delay time each day, two specialties exceeded the acceptable 45 minutes: elective orthopaedic,

with an average of 70 minutes delay per 8 hour session and plastics with an average of 66 minutes per day. All other specialties including general surgery were under 30 minutes each day.

In 3 out of the 7 general surgical delays, duration of the delay was not documented or clearly calculable from the data collected and so the minimum value of 15 minutes was substituted into the data for graphical purposes. The real delay may therefore have been greater. In 7 out of the 15 elective orthopaedic delays the delay duration could not be derived, so again 15 minutes was used in these 7 cases for analysis of the minimum impact of the delay times. 11 of the 14 plastics delays had no duration specified and 2 of the 4 traumas had no duration, in addition to 1 of the 3 urology, 1 of the 2 ENT and 1 of 1 gynaecology cases. These recording inadequacies make interpretation of delay duration inaccurate and they should viewed as such- maybe an underestimate.

These 1 week figures projected over 52 weeks gives an estimated total of 970 hours or 121 theatre days lost in Broomfield and St John's theatres. Using the estimated theatre running cost of £300-900 per hour [7] this would equates to a loss of £873,000 per year due to delays, and maybe an underestimate of the actual amount due to the reasons discussed above. Alternatively the TPOT estimate of £1,200 per hour gives a total of £1,164,000 ($1,838,538) in losses per year. However the incomplete nature of the data, assumptions and likely seasonal variations in theatre activity limit the reliability of these 12-month projected figures.

The majority of delays are hospital-wide factors (72%) (Table 2).

These hospital-wide factors largely concerned ward beds (48%): availability (13), transfer of patients (2) and preparation of ward patients (8). This was followed by doctor/surgeon factors (15%): consent not completed 3, surgeon delayed 2, medication not prescribed 1, other doctor commitments 1, doctor delay 2. Inadequate pre-op investigation accounted for 13% (e.g. group and save not sent, ECG not done) and delay due to other hospital departments (2%), or lack of nursing staff (2%).

Theatre practicalities were the root cause for 17% of all late cases. These can be divided into: Theatre and kit preparation (11.5%), IT equipment failure (3.9%) and a lack of recovery staff (1.9%).

External factors were the root cause of only 7.4% of late cases, namely due to patient factors (non-attendance, psychiatric cause).

DISCUSSION

This study shows that this unit is achieving good standards in list progression, with 78% of cases starting on time. However, further improvements could save around £1 million ($1.5 million) per year if specific focus on better availability of ward beds and ward pre-op preparation of patients was prioritised. Staff and bed availability on the wards early in the day prior to and during lists therefore has a large impact on theatre efficiency.

The UK NHS Confederation has suggested staggering the start times of theatres to avoid delays, and greater use of weekends for elective work[8]. This could ease the early morning rush to get so many patients ready for the same start-time and also allow a more steady demand on bed availability. All-day theatre lists have also been suggested that could help prevent the build-up towards the end of each day. Another aspect is whether scheduling too many elective procedures causes this disruption.

One method worth considering, used by Wright et al that brought great improvement locally, is to include the multidisciplinary team in debrief about start-times and reasons for delays and to assemble operating room staff each morning to provide feedback about start-times[6]. TPOT implementation at the Trust could have great impact in this sense.

CONCLUSIONS

The extent to which operating theatres are used and managed efficiently and effectively is a key issue in the overall use of hospital resources in the NHS. From the literature it is clear that the predominant cause of delays varies greatly between hospitals, making the need for regular local audit so important to improve the operating theatre efficiency of a Trust.

RECOMMENDATIONS

- An emphasis on pre-operative bed management to improve the efficiency of the patient pathway-nurse and ward bed availability early in the day or staggered lists, with education of ward staff about patient preparation.
- Briefing junior doctors during induction as to the pre-op preparation required including surgical consent to be done in advance, and a review of pre-

operative assessment clinic.

- Daily multidisciplinary debrief in theatres for feedback on start-times and delays; implementation of TPOT

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