Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/burns

Operating efficiency of an emergency Burns theatre: An eight month analysis

Arvind Mohan *, *Christopher Lutterodt*, *Jorge Leon-Villapalos*

Chelsea & Westminster Hospital, 369 Fulham Road, Chelsea, London SW10 9NH, United Kingdom

ARTICLE INFO

Article history:
Accepted 19 April 2017

ABSTRACT

Background: The efficient use of operating theatres is important to insure optimum cost-benefit for the hospital. We used the emergency Burns theatre as a model to assess theatre efficiency at our institution.

Methods: Data was collected retrospectively on every operation performed in the Burns theatre between 01/04/15 and 30/11/15. Each component of the operating theatre process was considered and integrated to calculate values for surgical/anaesthetic time, changeover time and ultimately theatre efficiency.

Results: A total of 426 operations were carried out over 887 h of allocated theatre time (ATT). Actual operating time represented 67.7%, anaesthetic time 8.8% and changeover time 14.2% of ATT. The average changeover time between patients was 30.1 min. Lists started on average 27.7 min late each day. There were a total of 5.8 h of overruns and 9.6 h of no useful activity. Operating theatre efficiency was 69.3% for the 8 month period.

Conclusion: Our study highlights areas where theatre efficiency can be improved. We suggest various strategies to improve this that may be applied universally.

1. Introduction

At a critical time when the National Health Service (NHS) in the UK is facing the biggest challenge in its history—to find £15–20bn in efficiency savings, the need to improve quality and deliver care more efficiently has never been greater. Nearly seven million operations are performed each year in the NHS [1] and it is estimated that approximately 40% of patients discharged from hospital have undergone surgery [2]. In the 2014/15 financial period, the annual budget for main theatre departments in the UK was £1.46 billion [3]. As such, hospital theatres have been highlighted as an area for potential cost reduction and efficient use of this costly resource is therefore economically desirable not only in the UK but around the world. In addition, the efficient running of a theatre has general benefits for both patients and staff. However, unlike elective operating lists, emergency theatres have an inherent unpredictability in terms of workload and patient pathology necessitating an ever greater need for stringent process to ensure high levels of efficiency.

The process of operating on an individual patient can be broken down into a number of separate steps. This includes transporting the patient from the ward to the theatre complex, then the operating theatre, induction of anaesthesia, the surgery itself, and finally transfer to the recovery unit. Each of these steps has the potential for delays that concurrently has an impact on theatre efficiency.

* *Corresponding author at*: Flat 3, 130 Junction Road, London, N19 5LB, United Kingdom.
E-mail address: arvind_383@hotmail.com (A. Mohan).

http://dx.doi.org/10.1016/j.burns.2017.04.023
0305-4179/

A number of studies have attempted to define 'surgical operating list efficiency'. Efficiency encompasses a number of factors, including utilisation rates, over-running of lists and cancellation rates to name but a few. Chelsea & Westminster runs a dedicated Burns Emergency Theatre with dedicated staff Monday to Friday with patients booked onto it using a diary dependant on clinical need. This theatre caters for the treatment acute burns only and not elective/later stage reconstructive procedures or dressing changes. The aim of this study was to assess the efficiency of this emergency theatre, with a view towards identifying issues that may improve theatre utilisation and hence improve patient care, the use of hospital resources and save money.

2. Methods

Data was collected retrospectively from the PICIS system which is an electronic system that records all operative procedures undertaken at the hospital. Data is inputted into the system by theatre staff during each procedure. A week long prospective review prior to data collection showed timings to be accurate. All procedures carried out in the emergency Burns theatre over a period of eight months between 01/04/15 and 30/11/15 were analysed. Prior to April 2015, data was not collected on the PICIS system in the Burns theatre.

From the data obtained, we recorded a number of time points for each patient. This included, time in anaesthetic room, time on operating table, time of surgery start and finish and time into recovery. This data was entered into a Microsoft Excel spreadsheet. It was then possible for us to calculate surgical time, anaesthetic time and changeover time between operations. Patient transfer and positioning, line insertion and completion of the WHO checklist (completed at the start and finish of each procedure) were included within surgical time due to difficulties in differentiating these time points.

The emergency list is due to run from 0830h to 1700h on Monday and 0830h to 1330h Tuesday to Friday. When the workload becomes too great and the number of patients requiring surgery is high, a scheduled extension to the list is organised. Patients are booked onto the burns emergency list using a diary and according to clinical need. Late start times for each session were calculated. Any time a theatre commenced early, a negative value was recorded. As well as the overrun time, a value for no useful activity was calculated. This represented time where a theatre list finished early.

By comparing all of the above variables with the total allocated theatre time, a value for operating theatre efficiency was calculated (Table 1).

3. Results

The results of our study are displayed in Table 2. During the study period, 426 operations were carried out over 174 operating days with a total of 887 h of allocated theatre time. In every operative case, the computer records were complete and hence all procedures were included for analysis.

On average, theatre lists started 27.7 min after the scheduled start time and a total of 80.4 h of theatre time was wasted on late starts over the 8-month study period. On only 45 occasions (34.9%) did a list start early or on time. On 14 occasions (10.9%) a list started over 30 min late.

The total surgical time (583 h) represented 67.7% and total anaesthetic time (78 h) 8.8% of total allocated theatre time (ATT). Total changeover time (126 h) represented 14.2% of ATT. The average changeover time between each patient was 30.1 min.

During the eight months, there was a total of 46.5 h of overrun time and 76.6 h of no useful activity. This led to an operating theatre efficiency of 69.3%. Table 2 displays the results for each month of study.

4. Discussion

4.1. *Late start time*

The definition of operating list start time varies between different institutions. However, Koenig et al. [4] demonstrated

Table 1 – Definition of terms.

Definitions for terms used in this study	
Surgical time (ST)	Time from first incision to time when last incision closed
Anaesthesia time (AT)	Total time spent in operating theatre minus ST. Includes time taken for patient to enter recovery
Changeover time (CT)	Time from which one patient enters recovery to the next patient entering anaesthetic room
Allocated theatre time (ATT)	Time from scheduled start time to scheduled finish time of a theatre session
Actual start time (AST)	Time at which first patient enters anaesthetic room
Actual end time (AET)	Time at which final patient enters recovery
Late start time (LST)	Difference between AST and time theatre list scheduled to begin
Overrun time (OVT)	Difference between AET and time theatre list scheduled to finish
No useful activity (NUA)	Amount of allocated theatre time not used by early finishes. Difference between AET and time theatre list scheduled to finish.
Operating theatre efficiency	[(Surgical time + Anaesthesia time) – Overrun time]/ATT) × 100