International Surgery Journal
Musbahi A et al. Int Surg J. 2019 Aug;6(8):2704-2707
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20193311

Original Research Article

A sub-specialised emergency general surgery on call can improve theatre utilisation

Aya Musbahi[1], Peshang Abdulhannan[2]*, Milind Rao[1], Bussa Gopinath[1]

Department of Surgery, [1]University Hospital North Tees, Stockton-on-Tees, [2]Royal Victoria Infirmary, Newcastle, UK

Received: 01 July 2019
Accepted: 15 July 2019

***Correspondence:**
Dr. Peshang Abdulhannan,
E-mail: peshang.abdulhannan@nhs.net

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Theatre efficiency and delivery of a safe emergency general surgery service are important topics in the current climate of limited funding and resources. No studies have examined the impact of restructuring a general surgery emergency on call system on theatre utilisation and efficiency.
Methods: Data was collected for twelve months prior and twelve months after the introduction of a sub-specialised on call system on operating minutes, out of hours operating and which procedures were done after 10 PM using a prospectively maintained database. Theatre utilisation was calculated and compared using a paired T test.
Results: In 2012, between 8 AM and 5 PM, 993 emergency procedures were done in 2012 compared 1300 in 2015 corresponding to 34585 and 90311 minutes of operating respectively and 17.5% and 45.8% of total theatre time available ($p<0.05$). 160 procedures in 2012 were performed after 10 PM and 106 in 2015 corresponding to 16457 and 9341 minutes respectively ($p<0.0001$).
Conclusions: A sub-specialised emergency general surgery on call system can improve theatre utilisation.

Keywords: Theatre utilisation, Emergency operating, Theatre efficiency

INTRODUCTION

Theatre utilisation and the delivery of an emergency surgery service are important topics in the current climate. A recent report from the Royal College of Surgeons of England suggests that hospitals are currently not equipped or staffed enough to deal with emergency general surgery and 80-90% of deaths in surgery involve emergency general surgery. Additionally, in National Health Service (NHS) trusts across England, emergency admissions have increased by 25%, whereas the workforce has only increased by 8%.[1,2] This has led to an increased interest in restructuring of the emergency surgery provision with introduction of dedicated emergency general surgeons and also the introduction of subspecialty on calls such as lower GI/upper GI.

In addition to this, with limited funding, operating theatres are an increasingly expensive and precious resource.[3] A decade ago, the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) recommended the introduction of fully staffed emergency theatres on weekdays to cater for emergency operating and reduce nocturnal operating after 10 PM. The information collected by NCEPOD indicated that scheduled emergency operating sessions are essential for good patient care, and that Trusts should address the obstacles to the proper use of these facilities.[4-7] The Audit Commission more recently reviewed the efficient use of scheduled theatre time for emergency theatres. Based on their findings, scheduled general emergency operating sessions were used for between 38 and 63% of the allocated time it specified an arbitrary target of 60% utilisation for these sessions.[8]

A small body of literature has been produced in recent years looking at ways of improving overall theatre efficiency using parallel processing or by reducing time taken for non-operative tasks through process redesign.[9,10] The application of these techniques to Emergency Surgery operating theatres is limited and understudied but may improve patient care.[11] No studies as yet have examined the impact of a restructuring of the general surgery on call system on emergency theatre utilisation and theatre efficiency.

In this single centre retrospective study, we aimed to analyse the effect of the introduction of a sub-specialised on call system on theatre utilisation and on out of hours operating.

METHODS

The study involved a single centre, large district general hospital serving a population of 400,000. The general surgical department provides a twenty-four-hour emergency general surgery service excluding vascular, led by twelve consultants on a rolling roster. Prior to 2013, the general surgical on call involved a single on call team consisting of one consultant, one middle grade registrar (SPR), one senior house officer (SHO) and one foundation grade doctor responsible for seeing the emergency admissions and emergency operating. In June 2013, the on call system was changed to a sub-specialised system which consisted of a 'first on call' of one specialty (upper GI or lower GI) team made up of one consultant, one registrar, one SHO and one foundation doctor seeing the emergency admissions and a separate 'second on call' team from the other speciality (upper GI or lower GI) made up of one consultant, one registrar and one SHO for the emergency operating between 8 AM and 5 PM Monday to Friday (Figure 1). Operating out-with these times was done by the first on call team.

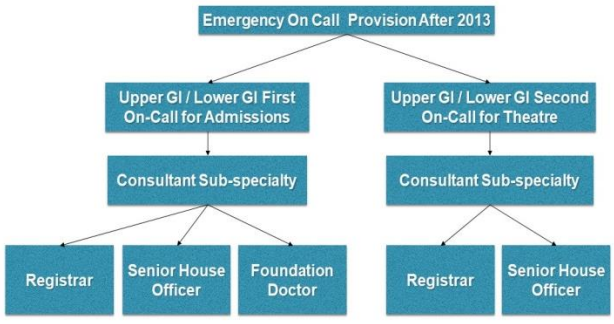

Figure 1: Restructured on-call system.

All operating was done in a dedicated NCEPOD theatre and was shared with emergency gynaecology, emergency urology and emergency anaesthetic procedures such as central lines. It was rarely used by orthopaedics if their own theatre was unavailable. There were no changes to the structure of the gynaecology and urology team on calls during this period.

Data collection

Data were retrospectively collected from a prospectively maintained database 'Theatreman' (Trisoft, Chesterfield, UK), which is a theatre and day surgery management system on which all operative episodes are recorded and scheduled. Theatreman was searched to identify the entire dedicated emergency NCEPOD for two twelve-month periods. One twelve-month period was before the induction of the sub-specialised on call system (January 2012 to December 2012) and the other twelve-month period was after the induction of the system (January 2015 to December 2015).

Specific data collected included the number of operating minutes, which included anaesthetic time, between 8 AM and 5 PM, between 5 PM and 10 PM and after 10 PM. The number of minutes utilised by general surgery, gynaecology, urology and other procedures was further subdivided. For procedures after 10 PM, data relating to the name of the procedure carried out was also recorded.

Data analysis

Data were collated on an Excel Spread sheet. Statistical analysis was carried out using a paired T test on Graph-pad. This test was used due to presence of one measurement variable and two nominal variables. A p value of <0.05 was considered to be statistically significant.

RESULTS

Detailed breakdown of results and operations are summarised in Table 1, Table 2 and Figure 2.

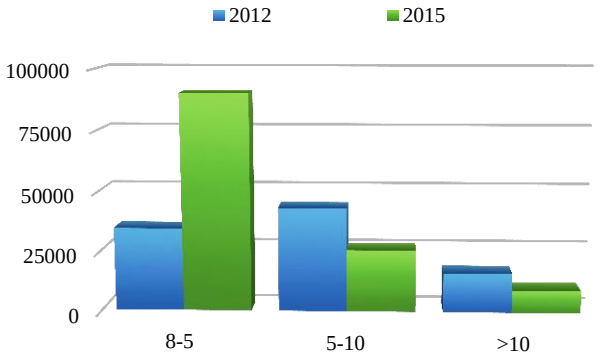

Figure 2: Ratio of operating minutes between 2012 and 2015.

Operating 8 AM-5 PM

In 2012, between 8 AM and 5 PM, 993 emergency procedures were done in 2012 compared 1300 in 2015 corresponding to 34585 and 90311 minutes of operating respectively and 17.5% and 45.8% of total theatre time available ($p<0.05$) (Figure 2) (Table 1).

Table 1: Comparison of operating time before and after two-tier on call system.

Operating time		2012	2015	P value*
8 AM-5 PM	No. of procedures	993	1300	
	Operating minutes	34585 (17.5%)	90311 (45.8%)	<0.05
5 PM-10 PM	No. of procedures	531	318	
	Operating minutes	43385	25947	<0.05
After 10 PM	No. of procedures	160	206	
	Operating minutes	16457	9341	<0.0001
Total	No. of procedures	1684	1724	
	Operating minutes	94427	125599	<0.001

*Data analysed using paired T test.

Table 2: Classification of out of hours (after 10 PM) operating in 2012 and 2015.

	2015	2012
Abscess drainage (perianal, pilonoidal, abdominal wall, breast)	24	13
Appendix	22	21
C- section	1	2
Carpal tunnel release	1	-
OGD	0	7
Central line insertion	-	5
Diagnostic laparoscopy	8	16
Examination under anesthesia	2	4
Evacuation retained products of conception	6	10
Incarcerated hernia (femoral, inguinal, incisional)	8	14
Fasciotomy	1	-
Laparotomy	23	39
Joint washout	0	1
Scrotal exploration	4	6
Salpingectomy	3	7
Cholecystectomy	-	1
Other	3	14
Total	106	160

Out of hours operating

160 procedures in 2012 were performed after 10 PM and 106 in 2015 corresponding to 16457 and 9341 minutes respectively (p<0.0001), see Table 1 for out of hours procedures done.

DISCUSSION

Operating theatres comprise 30% of national healthcare costs, with emphasis on reducing costs of running operating theatres in healthcare trusts by 10%.[12] National confidential enquiry into patient outcome and death guidelines for urgent surgery recommends a fully staffed emergency operating theatre and restriction of 'after-midnight' operating to immediate life-, limb- or organ-threatening conditions. A sub-specialised daytime on call emergency surgery system implemented in our unit, staffed by 12 consultants, improved theatre utilisation to 45.8%. Although this is short of the arbitrary 60% figure, it represents an improvement from the pre-change figure of 17.5%.

Further to the NCEPOD guidelines, Barlow et al, Ramesh et al, and other studies, have found that the fully staffed emergency operating theatre, though reduced out of hours emergency operating, was not being utilised effectively or efficiently and lacked consultant presence.[13,14]

The emergency operating team at our unit included a consultant, registrar and SHO team on a twelve-week rolling rota, with responsibility to deliver emergency operating in a designated emergency operating theatre, shared with emergency urology and gynaecology with a separate sub-specialty on call team seeing emergency admissions. Hence, we feel that this team was devoid of stressful distractions and fresh every day to carry out emergency operating between 8 AM and 5 PM. As two specialties were on call, specialist advice and help were available from the lower GI team regarding colorectal emergencies or help was available when emergency upper GI procedures were needed.

The database used does not include operations that may have been added onto elective lists and also does not include operations that were cancelled or postponed as this would affect theatre utilisation. It also does not include days where there may not have been a second on call team due to sickness or absence. The reduced number of laparoscopic cholecystectomies after the introduction of the second on call system could reflect the pressure to do a greater number of other emergency operations before 5 PM. All teams had consultant presence. A possible limitation or confounding factor could be the fact that two new consultants were recruited to replace two who had left during this time frame of the study.

Further research is needed to see if a second on call theatre system can improve theatre utilisation if provided after hours (after 5 PM). It would also be interesting to investigate direct effects on mortality and morbidity figures of a sub-specialised system and to compare this to units who have a separate emergency general surgery

specialty. Further research is also needed to see if this model can be extrapolated to larger units and tertiary centres. Anecdotally, there is also an improvement in quality of registrar and SHO training using this model. Further work is needed to analyse logbook evidence to see if this is the case. In addition, the cost of employing an additional on call team, may not offset the cost gained from improved theatre utilisation.

CONCLUSION

A sub-specialty based on call system in addition to a designated emergency operating theatre improves theatre utilisation and reduce out of hours operating.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Barlow AP, Wilkinson DA, Wordsworth M, Eyre-Brook IA. An emergency daytime theatre list: utilisation and impact on clinical practice. Ann R Coll Surg Engl. 1993;75(6):441-4.
2. Symons NRA, McArthur D, Miller A, Verjee A, Senapati A. Emergency general surgeons, subspeciality surgeons and the future management of emergency surgery: results of a national survey. Colorectal Dis. 2019;21(3):342-8.
3. Heng M, Wright JG. Dedicated operating room for emergency surgery improves access and efficiency. Can J Surg. 2013;56(3):167-74.
4. Devlin HB. Findings of the NCEPOD report for 1990. British J Hospital Med. 1991;47(10):723-4.
5. NCEPOD Report 1993/94. Provision of 24-hour emergency operating. NCEPOD, Nov 1996. Available at: https://www.ncepod.org.uk/1994report/1993_4sum.pdf. Accessed on 15 July 2017.
6. NCEPOD Report 1995/96. Who Operates When? NCEPOD, Sep 1997. Available at: https://www.ncepod.org.uk/1996report/1995_6sum.pdf. Accessed on 15 July 2015.
7. Who Operates When? II. NCEPOD Report 2003. Available at: https://www.ncepod.org.uk/2003wow.html. Accessed on 10 April 2016.
8. The NCEPOD Classification of Interventions. NCEPOD, Dec 2004. Available at: https://www.ncepod.org.uk/classification.html. Accessed on 15 June 2016.
9. Friedman DM, Sokal SM, Chang Y, Berger DL. Increasing operating room efficiency through parallel processing. Ann Surg. 2006;243(1):10-4.
10. Harders M, Malangoni MA, Weight S, Sidhu T. Improving operating room efficiency through process redesign. Surgery. 2006;140(4): 509-514
11. Archer T, Macario A. The drive for operating room efficiency will increase quality of patient care. Curr Opin Anaesthesio. 2006;19(2):171-6.
12. Munoz E, Tortella BJ, Jaker M, Sakmyster M, Kanofsky P. Surgical resource consumption in an academic health consortium. Surgery. 1994;115(4):411–6.
13. Ramesh S, Dehn TC, Galland RB. A traumatic deterioration in general surgeons access to emergency theatre. Ann R Coll Surg Engl. 1997:79(2):66-7.
14. Scriven MW, Pye JK, Masoud A, Crumplin MK. The use and impact of a daily general surgical emergency operating list in a district general hospital: a prospective study. Ann R Coll Surg Engl. 1995;77(3):117-20.

Cite this article as: Musbahi A, Abdulhannan P, Rao M, Gopinath B. A sub-specialised emergency general surgery on call can improve theatre utilisation. Int Surg J 2019;6:2704-7.