

## Audit of emergency theatre utilisation

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### Summary

This audit was undertaken to assess the utilisation of the emergency theatre in University College Hospital, Ibadan. It was also to find out if there was effective use of the emergency theatre space on a daily basis. Data was collected on all patients scheduled for emergency surgery excluding obstetric emergencies between May 1st and July 31st 1999.

A total of 498 patients were booked for emergency surgery during the study duration and out of these, only 198 patients [38%] had their surgery performed. The number of patients booked per day ranged between 1 and 18 (Mean  $\pm$  S.D) [5.4  $\pm$  4.1], while the number operated ranged between zero and 9 (2.2  $\pm$  1.7). The General Surgery Unit had the highest number of cases booked (31.1%) and performed (38.9%). However, all the patients booked by the Gynaecological Unit (4.8% of total) were operated upon. Time interval between time of booking and the beginning of surgery ranged from 30 to 990 minutes (431  $\pm$  296.7), while duration of surgery ranged from 25 to 750 minutes [121  $\pm$  96.5]. Theatre utilisation during this study was between 5 to 50% (mean 26.9%) and the period of maximal utilisation was between 16.00 and 03.00 hours. Reasons why surgery was not performed on all (100%) booked patients included among others "Surgeons did not show up" (62%), "Surgery postponed by surgeons" (18%) and "Patient ill prepared for surgery" (10%). This study showed gross under-utilisation of emergency theatre space with contributing factors mainly human and preventable.

**Keywords:** Audit, utilization, emergency theatre, effective use, deficiency

### Résumé

Cette vérification a été entreprise dans le but d'évaluer l'utilisation de la salle d'urgence ou centre hospitalier universitaire d'Ibadan, ensuite la recherche de l'utilisation effective de l'espace de la salle d'urgence ou jour le jour. Les données ont été recueillies sur tous les patients programmés pour des chirurgies urgentes excluant l'obstétrique urgente entre le 1er mai et le 31 juillet 1999. Un total de 498 malades ont été réservés pour chirurgie urgente au cours de la durée de l'étude et de ceux-ci, seulement 198 (38%) ont subi l'intervention chirurgicale. Le nombre de patients réservés par jour variait entre 1 et 18 (moyenne  $\pm$  S.D) (5,4  $\pm$  4,1), alors que le nombre opérés allait de zéro à 9 (2,2  $\pm$  1,7). Le bloc de chirurgie générale avait le plus grand nombre de cas (31,1%) réservés par le bloc gynécologique (4,8% au total) étaient opérés. L'intervalle de temps entre la prise du rendez-vous et le début de l'intervention chirurgicale allait de 30 à 990 minutes (431  $\pm$  296,7) alors que la durée de l'opération variait de 25 à 750 minutes (121  $\pm$  96,5). L'utilisation de la salle d'opération au cours de cette étude allait de 5 à 50% (moyenne 26,9%) et la période d'utilisation maximale était de 16.00 à 03.00 heures. Les raisons pour lesquelles la chirurgie n'a pas eu lieu sur tous les 100% des réserves comprenaient entre autres "Le chirurgien ne s'est pas présenté" (62%) et enfin "malade non préparé pour la chirurgie" (10%)

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"Chirurgie reportée pour le chirurgien" (10%). Cette étude a montré une grande sous-utilisation de la salle d'urgence avec comme facteur contributif le facteur humain qui est prévenable.

### Introduction

Medical audit has been defined as "A systematic and public examination of factors which affect the delivery of good medical care." [1] The cost of medical care continues to rise [2] and a thorough examination of factors that limit care are necessary in order to improve care with minimal increase in expenditure, i.e. increasing the efficiency of medical services rendered. The costs of under or over utilisation of operating suites are high and are therefore attractive potential targets for cost minimisation. Attempts to measure and eliminate the inefficiency could be financially rewarding [3].

The University College Hospital, Ibadan is an 800-bed teaching hospital with referrals from all over the country. It has a dedicated 24 hours Surgical Emergency Operating Theatre with surgical coverage being provided by a House Officer, a Registrar, a Senior Registrar, and a Consultant from the various surgical specialities and two junior Registrars, a Senior Registrar and a Consultant from the Department of Anaesthesia on a 24 hours basis. The Nursing and support staffs are also provided on 24-hour basis.

Surgical emergencies are booked in the operating theatre by the surgical unit involved. The Anaesthetist subsequently reviews the patient and the Surgeon then prioritises these patients. Surgery is dependent on when the surgeon says the patient is ready.

This audit was undertaken to assess the utilisation of the emergency theatre in the University College Hospital, Ibadan. It was also to find out if there is effective use of the Emergency Theatre space on a daily basis. Areas of deficiency and waste of resources were also examined.

### Methodology

Institutional Review Board approval was obtained to carry out the study. A special form was designed which incorporated time of booking of cases, time anaesthetist was informed, surgical unit in charge of case, proposed operation, and time interval between booking and patient's entrance into theatre. This form replaced the routine emergency theatre booking form which did not incorporate the time that the anaesthetist was informed and the time interval between the time the patient was booked and actual patients entrance into the theatre.

Data was collected for all patients scheduled for emergency surgery excluding obstetric surgeries between May 1, 1999 and July 31st 1999. Data was obtained from the newly designed emergency theatre booking form, operation registers, and anaesthetic records. Data consisting of date, time of booking, time anaesthetist was informed, time the patient enters the operating room, time surgery commenced, time the patient leaves operating room, total number of patients booked per day, total number of patients operated and reasons for not carrying out operations (Table 1) were collected by the resident anaesthetist on call on that day.



Data was analysed using the EPI-INFO 6.0[4] statistical package. Figures and diagrams were drawn using Microsoft Excel 2000.

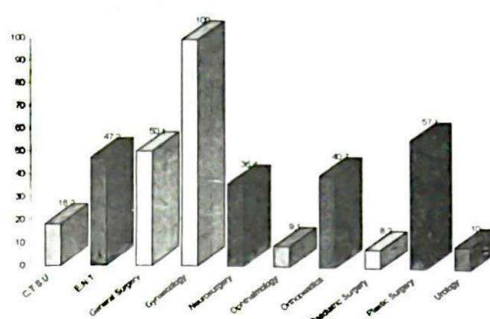
### Results

The study duration was 3 months (92 days). The total number of emergency patients booked during this period was 498. Out of these, 198 patients had their operation performed giving a percentage of 38%. The sex ratio of patients booked was 1.1:1, M: F. The number of patients booked per day ranged between 1 and 18, (Mean  $\pm$  S.D) ( $5.4 \pm 4.1$ ).

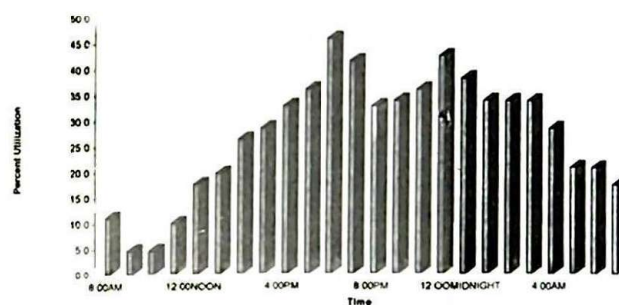
**Table 1** Reasons for not doing surgery

*	Surgeon did not show up
*	Surgery postponed by surgeon
*	Theatre space not available
*	Patient ill-prepared for surgery
*	Patient with financial problems

The number of patients operated upon per day ranged between zero and 9, ( $2.2 \pm 1.7$ ). General Surgery had the highest percentage of patients booked for emergency surgery, 31.1%, followed by Neurosurgery 13.3% and Orthopaedics 10.8%. Cardio-thoracic Surgical Unit (C.T.S.U) had the lowest number of patients booked, 2.2%. (Table 2).



**Fig. 1:** Ratio in percent of operation booked and performed



**Fig. 2:** Theatre utilization

**Table 2:** Number of operations booked and operated on by subspecial

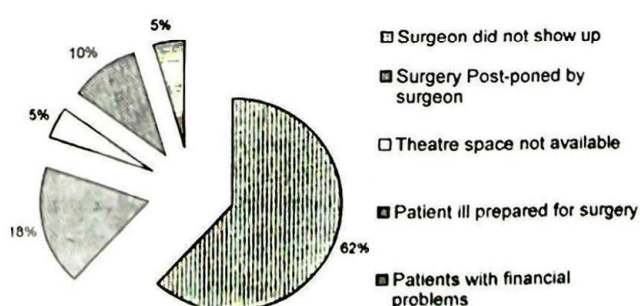
Subspecialty	Number of Patients Booked	Patients booked/total number booked %	Number of Patients operated on	Percentage of total patients operated %	Patients operated on/ booked by subspecialty %
C.T.S.U	11	2.2	2	1.0	18.2
E.N.T.	36	7.2	17	8.6	47.2
General Surgery	155	31.1	79	39.9	50.1
Gynaecology	24	4.8	24	12.1	100
Neurosurgery	66	13.3	24	12.1	36.4
Ophthalmology	33	6.6	3	1.5	9.1
Orthopaedics	54	10.8	22	11.1	40.7
Paediatric Surgery	61	12.2	5	2.5	8.2
Plastic Surgery	35	7	20	10.1	57.1
Urology	23	4.6	2	1.0	10
Total	498	100	198		

General surgery had the highest number of emergency operations performed (39.9%), followed by the Gynaecology and Neurosurgical units, 12.1% each. Urology and C.T.S.U had the lowest number of patients operated upon, 1.0% (Table 1). The surgical unit with the highest ratio of patients booked and actually operated on was the Gynaecology unit with 100%. This was followed by Plastic surgery with 57.1%. The unit with the least ratio was Paediatric Surgery, 8.2%. (Figure 1).

Time interval from time of booking to beginning of surgery ranged from 30 minutes (exploratory laparotomy for ruptured ectopic gestation) to 990 minutes (wound review) ( $431 \pm 296.6$ ). Duration of surgery ranged from 25 minutes (suction evacuation) to 750 minutes (craniotomy), ( $121.8 \pm 96.5$ ).

Theatre utilisation as adjudged by the actual time that the emergency theatre was in use ranged from 5 to

50%, (mean 26.9%). The period of maximal utilisation was between 2 p.m. and 4 am with an average utilisation of 30 %. (Figure 2).



**Fig. 3:** Reason for not doing surgery



Reasons why surgery was not performed on all booked patients were given as "Surgeon did not show up" 62%, "Surgery postponed by surgeon" 18%, "patient ill-prepared for surgery" 10%, "Theatre space not available" 5%, "Patient with financial problems and others" 5%. (Figure 3).

### Discussion

Quality of care has been defined as "Degree to which health services increase the likelihood of desired health outcomes and are consistent with current professional knowledge." [3] This definition presupposes that medical treatment i.e. surgery will be offered as soon as it is deemed necessary. Obvious delays in the provision of surgical care especially in the case of emergency surgery will lead to a reduction in patient benefit.

Our results show that only 38% of emergency booked patients were operated upon during the period of study. This poor result is probably attributed to the fact that patients are booked for emergency surgery despite the fact that the patients have not been adequately worked up for surgery. In addition, some surgical units do not like operating during the night. Therefore, if their emergencies cannot be operated during the day they are postponed till the next day. A few patients did not survive long enough to reach the O.R.

The male female ratio of about 1.1:1 is probably explained by the fact that majority of emergencies are due to trauma and the male sex are more prone to this [6] the number of patients booked probably represents the varying caseload with periods of fluctuating caseload.

The number of patients operated upon per day is directly related to the number of patients booked. The reasons why on days when only a few of the patients booked were operated on are probably due to patient and surgical factors, and not due to lack of theatre space as theatre utilisation was never higher than 50% on any one day.

The mean time from booking until surgery was 431 minutes. This shows that the quality of care is sub-optimal when it is realised that some of these patients have acute life threatening emergencies such as gunshot injuries and head injuries. One of the major causes of delay from patient presentation to presentation in the operating theatre can be traced to individual procedures, activities and work progress. [6] Multi-disciplinary teams can reduce this delay to a minimum by focusing on real time patient routing.

Since the University College Hospital, Ibadan is a teaching hospital and it receives referrals from various parts of the country [7], the highest number of booked and operated on patients belong to the General Surgical unit. Neurosurgery had the second highest number of booked patients. This is probably because the University College Hospital, Ibadan is a centre of excellence for neurosciences and therefore has neurosurgical referrals from all over the country as well as the West African sub region. As expected majority of the cases booked were those of head injury. Orthopaedics which has the third largest number of cases booked probably reflects the high vehicular accident rate in our country. The unit with the least booked cases was the C.T.S.U, probably representing the high mortality that patients with chest injuries suffer in Nigeria with very few of them reaching the hospital alive. The Maxillo-facial unit did not have any patients booked during this period of study. This probably reflects the fact that they do not have acute life threatening emergencies.

Although Neurosurgery has the second highest number of emergencies booked, the gynaecology unit has the second

largest number of patients actually operated upon and in fact has a ratio of 100% for actual operations performed as compared to operations booked. This can be compared to that of General surgery with a ratio of 47% and Neurosurgery with 32%. The high ratio for gynaecology probably reflects the fact that their emergencies are mainly emergency exploratory laparotomy for ruptured ectopic gestations and suction evacuations for retained products. It also probably represents the seriousness the attending gynaecologist view their emergencies. The extremely low ratio of 7% and 8% for Paediatric surgery and Ophthalmology units respectively were probably because during the period of this study there was no supervising Consultant Paediatric surgeon while the Ophthalmic surgeons prefer to operate during the day.

Operating suite (OR) utilisation is defined as the ratio of OR time used to total OR time allocated or budgeted. [8] Our result of 27% utilisation is very poor as this means that over 70% of the time, the operating theatres are empty. Despite this, 66% of the patients booked for emergency surgeries, had their operations postponed.

In this study majority of surgeries (57 %) were performed between 20:00 hours and 08:00 hours. This is despite the fact that UCH runs a dedicated 24-hour emergency theatre. Calder *et al* [9] in their study found out that after converting to a dedicated 24-hour emergency theatre service their emergencies after 22:00 hours fell from 37 to 13.1%. In their study, they also found that utilisation of theatre staff and time during the night was improved.

The commonest reason for not carrying out surgery in this study with 62 % was that the surgeon did not show up. This shows a lack of multi-disciplinary approach to patient's care and lack of communication between members of the health team as typified by the anaesthetist not knowing that the operation had been cancelled or re-scheduled. Other reasons were surgery cancelled by surgeon, 18%, patient poorly prepared for surgery, 10%, again showing lack of multi-disciplinary approach to patient care. 5%, each, for unavailability of the theatre space and patient financial constraints. It is surprising that despite the under utilisation of the emergency theatre space with a theatre utilisation of 27%, theatre space could not be found for these operations. This shows the level of inefficiency of theatre usage. Pertaining to the latter reason i.e. financial constraints, the Federal Government policy is that no patient should be denied emergency treatment because of financial inadequacy. However, to forestall the abuse of this privilege, the hospital required each surgical unit so concerned to write for a waiver on behalf of such destitute patients. This is to be countersigned by the Unit Consultant, with final approval from the Chairman Medical Advisory Committee. This is sometimes laborious and could ultimately result in delaying or rescheduling the surgery. Anaesthetist's excuses for not carrying out surgery in this study did not arise as it was the policy of the Department of Anaesthesia that all emergency surgeries cannot be refused for any reason by the resident anaesthetist and these controversial cases must be referred to the consultant anaesthetist. During the duration of this study no such case was referred to the consultant.

### Conclusion

This study has shown the gross under-utilisation of emergency theatre space. Factors that contribute to this are mainly human. The hospital management should intensify efforts to encourage a multidisciplinary approach to patients' management. Efforts to increase the percentage of emergency cases operated upon during the day would be advantageous to both the patient and the attending physicians.



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