ORIGINAL ARTICLE

AN ASSESSMENT OF THEATRE EFFICIENCY IN AN AFRICAN TEACHING HOSPITAL

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ABSTRACT

Background: Operating theatre or operating room (OR in the US) is a designed facility where surgical operations take place. With an estimated 234 million operations performed yearly, and about half of its complications, of avoidable events, theatre efficiency is essential. Simple data collection from theatre users can serve as a platform for audit, research and an instrument for change that can reduce rate of cancellations, cost and waiting time. As no consensus exist on ways of evaluating operating theatre management decision, this article serves as a bridge. **Objectives:** This study will serve as a platform for theatre reforms with the aim of improving efficiency; it is also an instrument for surgical audit. **Methodology:** Structured questionnaires containing 20 questions with each comprising 5 optional response: Strongly agreed, agreed, neutral, disagree, strongly disagree were distributed. We investigated the efficiency of the University of Maiduguri Teaching Hospital (UMTH) theatres as perceived by users. **Results:** The results reveals 80.59% agree that operation list do not start on time and 56.8 % suggest that surgeons don't come on time, but disagreement that the theatre room is conducive and comfortable has the highest commonality of purpose at 92.53%. **Conclusion**: Our study findings suggest that general disagreements outweigh the agreement in most variables studied. This study reveals a long turnaround of patient (68.18%) who also stays long at the reception (69.64%). There is a general disagreement on reliable quality equipment, comfortable rest room, comfortable and adequate support for day care with 70.14%, 74.24%, 68.18%, and 72.72% respectively.

Keywords: Assessment, Efficiency, Theatre, teaching hospital

INTRODUCTION

Operating theatre is a facility where surgeries are carried out and patients, only add little to the volume of traffic when compared to the number of theatre users, particularly in training hospital were students and residents add to the aggregate. Team work by various specialties is a cornerstone for efficiency and the result of efficiency in our theatre is dependent on the overall input of all users. Team work in surgery is linked to improved outcome with a significant decrease adverse event in highly functional team, by a growing body of evidence.[1] The perception of how the theatre is run, may differ from specialty to specialty. Our operating theatre suites are shared across various department and specialties of surgery and Obstetrics and gynaecology (O/G).

Increase in the number of performed operations over time, can be achieved by increasing the utility of manpower and material resources.[2] However, this is a challenge in our developing nation as late start of operating theatre list and delay in turnaround time are some examples. The period of turnaround time is when the patient is taken off the theatre table with placement of the next that get anaesthesized[2] while between such period is the act of cleaning the theatre suite between cases and the writing of operation notes.[2,3] The multiplier effects of theatre inefficiency are unnecessary cancellation of theatre list, increased cost of healthcare to

patients, decrease in hospital revenue, poor productivity and increase waiting list.

There is no consensus by operating theatre management on ways of evaluating management decision, from the eyes of the personnel or those affected by such decision, as gaps do exist.[4] This adds a great psychological and financial burden on the patient as well as their relation who has to forfeit their business or work place to stay with their sick loved ones.

The objectives of this study are to ascertain the efficiency of the operating theatre in UMTH, to investigate the perception of various specializations using the theatre facility and to suggest ways of improving theatre usage.

MATERIALS AND METHOD

This is a cross sectional study of theatre users, at University of Maiduguri Teaching Hospital (UMTH) in Nigeria. Sixty eight (68) structured questionnaires were distributed to various specialty users and 67 responded, from May 2011 to June 2011. The questionnaires were blinded using designations as SD, GD, N, A to denote surgery department, gynaecology department, nursing (Scrub), anaesthesia and issued separately to each respondent. Twenty (20) itemized questions were asked and a space for remark provided for criticism or comments. The questionnaires also assess in part, the applicability of suggested protocols by Alex Macario,[5] with modification for our theatre to triumph over some challenges faced by a developing nation. Institutional ethical clearance was obtained.

Each question was answered based on 5 options: strongly agreed, agreed, neutral, disagreed, and strongly disagreed. For the purpose of this study, agreement denotes both strongly agreed and agreed, while disagreement denotes both strongly disagreed plus disagreed. Now, since a neutral option exist in this study, anything out of it, is considered an objective divide of an "all or none" (Strongly disagreed and disagree concludes a disagreement and similarly strongly agreed and agree concludes an agreement).

Inclusion criteria were surgeons, gynaecologist, anaesthetist and scrub nurses.

Exclusion criteria were porters and cleaners. Their exclusion is on the account that their level of education may not connect with the technical concept of the questionnaire despite our recognition of their enormous role in theatre efficiency.

RESULTS

Each study parameter is presented in the respective charts and table below – Fig 1, 2, 3 & 4 and table 1 respectively, using Microsoft excel 2007, while descriptive statistical analysis was done using SPSS version 16.0.(SPSS, Chicago, Ill, USA). A total of 68 questionnaires were distributed, while 67 responded and were retrieved, making a 98.52% response rate.

For data simplification during analysis, the 20 questioned were grouped into four (4) categories in a content related fashion, as follows: Timing (Fig 1, tables 1); theatre environment / facilities (Fig 2); personnel, conduct and communication (Fig 3); and preparation (Fig 4).

Fig. 1: Timing

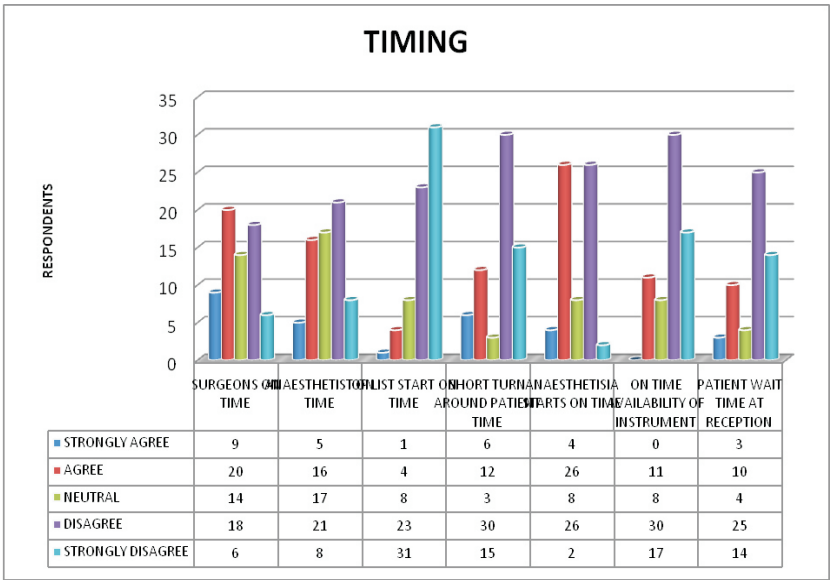
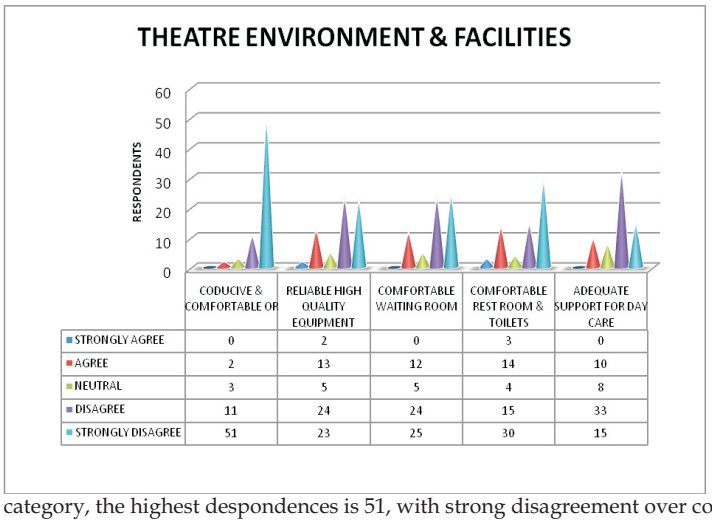


Table 1: Timing

	Surgeons on time	Anaesthetist on time	operation (OP) list starts on time	Short turn around patient time	Anaesthetisia starts on time	On time availability of sterile instrument	Patient wait a minimum time at reception
Agreement	29(9+20) 43.23%	21(5+16) 43.23%	5 (1+4) 7.46%	18(6+12) 27.27%	30(4+26) 45.45%	11(0+11) 16.67%	13(3+10) 23.21 %
Disagreement	24 (6+18) 35.82%	29 (8+21) 43.28%	54(31+23) 80.59%	45(15+30) 68.18%	28(2+26) 42.42%	47(17+30) 71.21%	39(14+25) 69.64%.

Fig. 2: Theatre Environment & Facilities



For this category, the highest despondences is 51, with strong disagreement over conducive and comfortable operating room with no response on its strongly agree.

Fig. 3: Personnel, Conduct And Communication

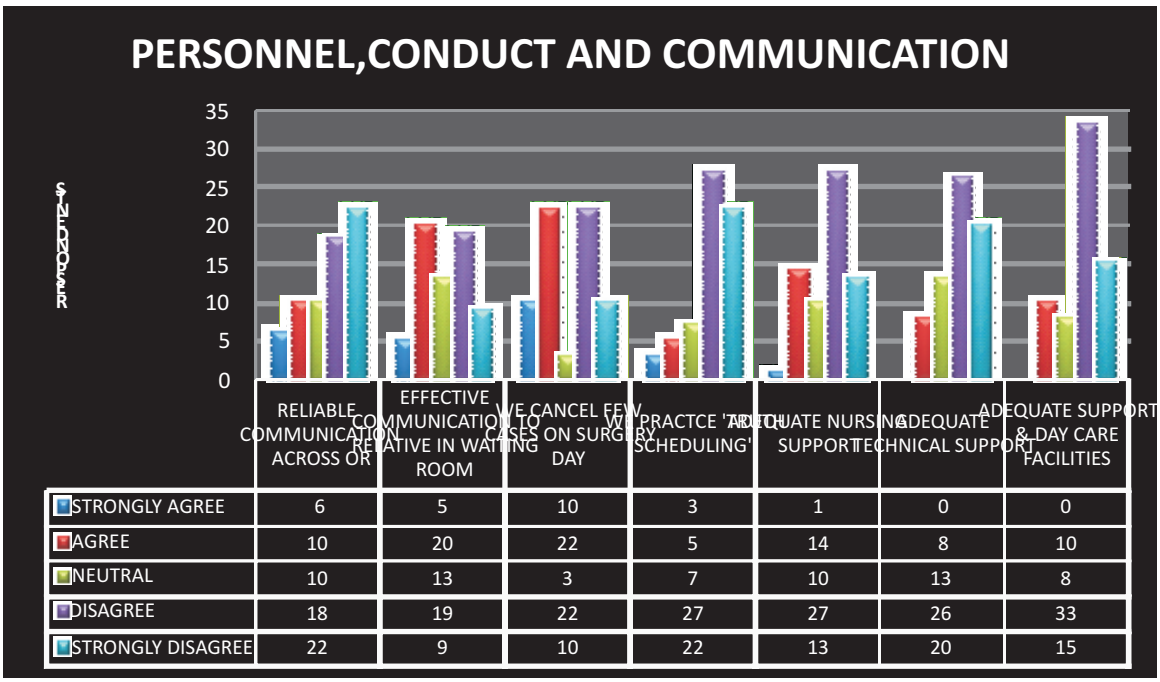
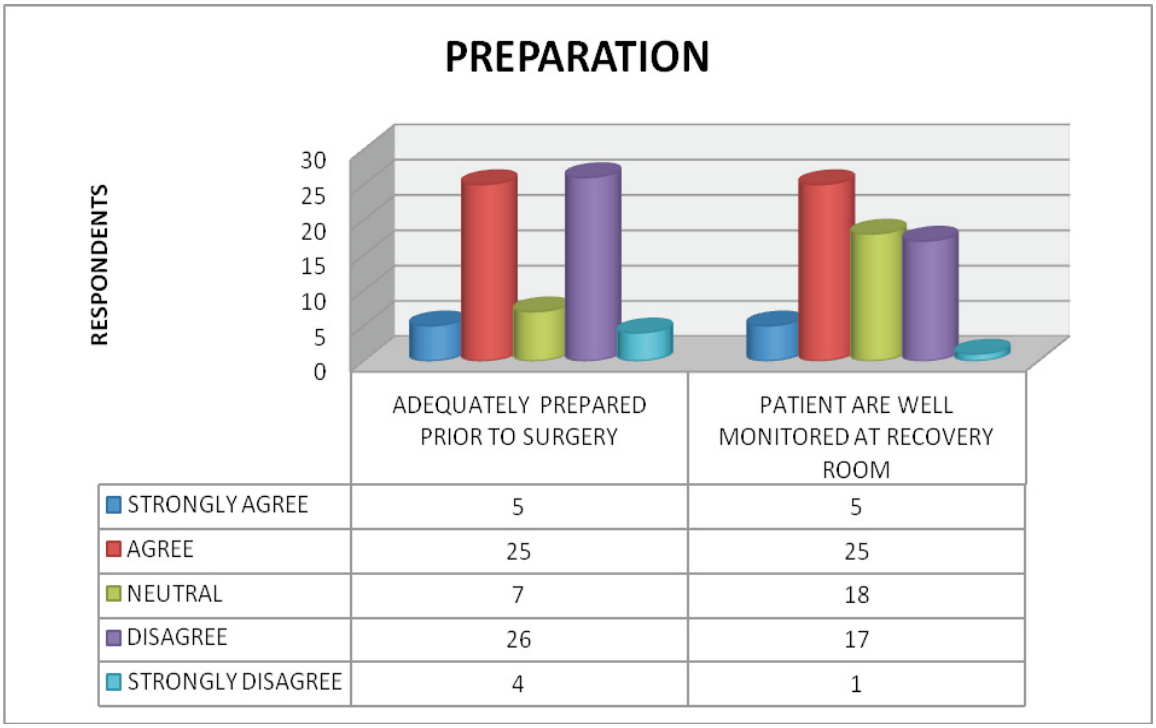


Fig. 4: Preparation



DISCUSSIONS

A lot can be deduced from the above charts and tables. But, it's important to know that efficiency can be defined on the basis of cost reduction without compromising quality, and productivity.[6]

Timing- If we consider the respondents for surgeon on time, the mean respondents (Table 1) is 13.4 (9+20+14+18+6 ÷5 =13.4) with a standard deviation of 5.89915 and for anaesthesia starts on time, it is (4+26+8+26+2 ÷5=13.2) with standard deviation (SD) of 6.65582 , Such mean, will be more helpful when we compare similar studies repeated in the centre over time. About 43.2% of respondents agree that surgeons are on time. But, Mpyet [2] studies in ophthalmic theatre suggest that surgeon's late arrival was the commonest cause of delay accounting for 37% of total delay time while electricity power shortage accounted for about 34.6% of delay start of operating list. For orthopaedic theatre timing, Ricketts et al[3] found that 21% was used for turnover time and 60% for elective list time. Also, no useful activity was seen in 19% of scheduling time, but surgeons spent 74% of the operating time with 26% accrued to awaiting turnover during which operation notes were written.[3]

Our focus is therefore, targeted at responses that can translate to meaningful change or further analysis now, and can also serve as a platform for future comparison. Disagreement is a pointer to areas of most concern. The highest respondent rate related to timing is 31 (Fig 1); with strong disagreement that operation (OP) list starts on time, while only 1 respondent strongly agreed to the same variable. In the same variable, 23 and 4 respondents disagree and agreed respectively. Thus, 54 (31+23) respondents have reached disagreement that operation list start on time (Fig.1 and Table1) representing 80.59% of respondents (the highest percentage on issues relating to timing)[mean13.4 ;SD12.97305], while 5 (1+4) shows agreement denoted at 7.46% (the lowest percentage on issues relating to timing). This now forms a clear platform for clinical audit needing action and change. In a review of 21,357 morning first operations in German hospitals by Schuster et al [7] , delay in incision time was noticed in 70% of cases in general, trauma and orthopaedic surgery, with less in ENT and gynaecology. But, when these delays are extrapolated to eliminate smallest delay of 10 min, then such percentages fell to 20% to 40%.

One factor that may delay start of operating list in our environment is the availability of instruments on time. (Fig 1, table 1). Disagreement over 'on time availability of instrument' is 47(17+30) representing 71.21% of respondents in the variable and can be supportive of the argument. The agreement is 11 (0+11) as 16.67%. There is a disagreement at 68.12% that there is a short turnaround time. Soliman[6] et al in their prospective studies found a reduction of 12 min per case (averagely) which gained them an extra hour of operating time in a typical day operation list.[8]

Theatre environment and facilities – There is a 92.53% disagreement that the theatre room is conducive and comfortable against 2.94 %[mean13.4 ;SD21.43129]. Clearly, the theatre users are dissatisfied. There is a general disagreement on reliable quality equipment, comfortable rest room, comfortable and adequate support for day care as 70.14%, 74.24%, 68.18%, and 72.72%. The high disagreement on reliable quality equipment in our study may be supported by the US food and Drug administration suggestion, which says that poorly, designed medical instruments account for about half of unintentional patient injury in the estimated 1.3 million cases yearly.[9]

Personnel conduct and communication - An interesting tie is seen on the issue of cancellation of few operating list on the day of surgery [mean =13.4; SD=8.35464], with both agreement and disagreement having a 47.76% apiece. Also 72.72% are in disagreement that there is adequate support and day care facility. This can delay journey of patients and turnaround time. Delay in patients journey in the theatre are preventable and can be curtailed by interventions that involves collaboration and effective communication among various team.[8] Hsiao et al[9] reported a shorter time from the time of entering the theatre room to anaesthesia induction between dedicated minimally invasive surgery suite than a traditional induction room, however operating theatre efficiency was not profoundly affected. They also

acknowledge an explanation that may not be unconnected with inability to control dedicated or undedicated operating theatre personnel.

Preparation- Another tie is seen in respondents that patients are adequately prepared prior to surgery [mean=13.4; SD=11.10405] with 44.77% (Fig 4). Thus, the neutral account for 10.46% may act as the swing on further evaluation. Incomplete patient evaluation and documentation, absent of anaesthesia personnel and transport of patient to the operating theatre were organizational causes of theatre inefficiency.[7] For 'Patient are well monitored at recovery room', (30) 45.45% and (18) 27.27% are in agreement and disagreement respectively.

With an estimated 234 million operations performed yearly, surpassing child birth and with about half of its complications, of avoidable events, surgery is an integral part of global health care.[10] This buttress the need to enhance efficiency in the theatre and its management that must have a wide scope in tackling challenges beyond their respective specialization; since a risk manager will be more interested with the percentage of patients without injuries (wrong side operation) while a nurse manager will vest interest on disposable supplies cost per patient or having reserve capacity for emergency or add on cases.[5] A holistic approach of stakeholders perception with implementation of evidenced based decision is a surest way of breaking the cycle of theatre inefficiency.

Unnecessary delay in the patients transport, patient preparation, absent of gowns, light out before or during operation, water shortage and on time availability of personnel's could all have effect in the early start of operation list. We operate a centralized theatre consumables policy were patient items are processed as the patient is brought into the theatre; this can lead to delay in operation list starting on time. This is a platform for our theatre user committee [TUC] to look into.

CONCLUSION

Our study findings suggest that general disagreements outweigh the agreement in most variables studied. This study reveals a long turnaround of patient (68.18%) who also stays long at the reception (69.64%), while 80.59% of respondence acknowledges that operation list starts late. There is a general disagreement on reliable quality equipment, comfortable rest room, comfortable and adequate support for day care with 70.14%, 74.24%, 68.18%, and 72.72% respectively.

There is a need for punctuality among theatre user at individual level and the management on a collective basis, should provide quality instruments, improve the theatre environment by providing air conditioning, good sofa, provision of snacks/drinks, and regular meetings with all stake holders. Setting target to improve theatre efficiency with weekly submission and deliberation of data is needed. The use of scores to appraise theatre users can boost commitment, while the less cancellation of cases, means more hospital revenue and less patient undue additional cost.

We recommend decentralizing items (sutures, drains, gauze) to individual theatres under guidance of the scrub nurse and sufficient manpower with allocation of a circulating nurse during each surgery could enhance speed, safety and assist in the overall efficiency utilization.

Finally, data collected from theatre users should serve as a platform for audit, research and above all, be implemented as an instrument for change.

REFERENCES

1. Haynes A B, Weiser T G , Berry W R, Lipsitz S R, Breizat A S, Dellinger E. P,et al. A surgical safety checklist to reduce mortality and morbidity. *N Engl JMed* 2009; 360:491-499.
2. Mpyet CD. An audit of the use of ophthalmic theatre time. *Community Eye Health* 2002; 14 (44): 63.
3. Ricketts D, Hartley J, Patterson M, Harries W, Hitchin D. An orthopaedic theatre timing survey. *Ann R Coll Surg Engl* 1994; 76:200-204.
4. Adejumo AO, Adejumo PO. Theatre personnel's perception of operating room allocation. *Afri. J Med Sci.* 2009;38(2):163-71
5. Macario A. Are your operating rooms being run efficiently? *Medscape anaesthesiology*. Posted 04/07/2010 .Accessed 19/04/2010. Available from http://www.medscape.com/ viewarticle/719542?src=mp&spon=17&uac=117756HN .
6. Agnoletti V, Buccioli M, Padovani E, Corso RM, Perger P, Pirracini E,et al. Operating room data management: improving efficiency and safety in a surgical block.BMC Surgery 2013,13:7 available from http://www.biomedcentral.com/1471-2482/13/7.
7. Schuster M, Pezzella M, Taube C, Bialas E, Diemer M, Bauer M. Delay in starting morning operation list- an analysis of more than 20,000 cases in German hospitals. *Dtsch Arztebl int* 2013; 110 (14):237-43. DOI:10.3238/arztebl.2013.0237
8. Solimon B.A.B, Staton R,Sowter S, Rozen WM,Shahbaz S. Improving operating theatre efficiency: an intervention to significantly reduce changeover time. *ANZJ Surg* 2013; 83:545-548. DOI:10.1111/ans.12013
9. Hsiao K.C, Machaidze Z,Pattaras JG. Time management in operating room: An analysis of dedicated minimally invasive surgery suite. *JSLS* 2004;8:300.
10. Haynes A B, Weiser T G , Berry W R, Lipsitz S R, Breizat A S, Dellinger E. P,et al. A surgical safety checklist to reduce mortality and morbidity. *N Engl JMed* 2009; 360:491-499.