

Original Article

Operating Room Drugs and, Consumables Distribution Systems: Knowledge, Attitude and, Practice among Operating Room Workforce in a Tertiary Hospital in the Developing World

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Article Metrics

Date submitted: 29/1/2021

Date Accepted: 08/03/2021

Date Published: 6/7/2021

 <https://doi.org/10.46912/wjmbs.38>



ABSTRACT

Drug and consumables distribution system in the operating room is key to the smooth running of the operating room in any hospital. Technological advancements have led to the development of newer and more efficient distribution systems. We aim to assess the knowledge, attitude and, practice of drug and consumable distribution systems among operating room workforce of a tertiary hospital in Nigeria. The study was a questionnaire-based cross-sectional study among the various categories of professionals of the operating room workforce. Two sets of questionnaires with structured questions on the knowledge, attitude and practice of operating room drug and consumables distribution system were administered one after the other on the operating room personnel. 282 of 363 operating room workforce consented and responded to the questionnaires. The workforce is made up of surgeons 198 (70%), physician anaesthetists 28 (10%), nurse anaesthetists 25 (9%) and, perioperative nurses 31 (11%). Their mean age was 42.61±8.74 years, 175 (64%) aged between 30 and 49 years with male to female ratio of 2.9:1. The majority 243 (86%) of respondents did not know the meaning of an operating room drug and consumable distribution system. After explanation, it was discovered that 228 (81%) had experienced the individual prescription order system with its associated wastages 195 (69%), medication errors 130 (46%), and, delay or scheduling of cases 183 (65%). This study revealed poor knowledge of drug and consumables distribution system among operating room workforce in our institution. The study centre uses individual prescription order system with significant untoward effects. We recommend improved awareness of the theatre workforce on drug and consumable distribution systems.

Keywords: Prescription order, Bulk theater stock system, Unit dose system, Medication errors system.

INTRODUCTION

Drugs and consumable distribution systems in a tertiary hospital is made up of all the steps that occur between the prescription of a drug or consumable and the administration of the drug or consumable to the patient.¹ There must be a drug and consumable distribution system in any hospital to supply the medication prescribed for each patient. Notwithstanding, the many varieties of drug distribution systems, they all aim at the same goal which is to ensure that each dose of drugs or consumable administered to each patient is exactly that which was intended by the physician.

In the operating room, the workforce which is made up principally of the surgeons, physician anesthetist, nurse anesthetist and perioperative nurses administer drugs on patients and make use of consumables in the course of surgical operations. The various steps between the prescription of these drugs and consumables and their administration on the patient constitutes the operating room drug and consumable distribution systems. These distribution systems play a critical role in the provision of anesthesia and surgical services in any hospital. It has been implicated as one of the main causative factor for anesthesia medication errors, anesthesia drug wastages, rescheduling of duly booked elective surgical cases, wound dehiscence, delay in commencement of surgery and other critical incidences in the operating room.^{1,2}

Four basic types of drug and consumable distribution systems exist. These includes the bulk theater stock system, individual prescription order system, the unit dose system and the automated medication dispensing system which is the Gold standard. Each of these systems have their advantages and disadvantages with hospitals sometimes using variations and or combination of more than one of these systems. The importance of the knowledge, perception and practice of the workforce that is involved in the implementation of any drug distribution systems cannot be overemphasized.²

In a quantitative comparative cross-sectional study comparing two hospitals that used different drug distribution systems for their pharmaceutical services for

patients in Gaza, M. AL Adham *et al.*² demonstrated that operating room workforce in the hospital using the unit dose system had more positive perceptions than those in hospital using the ward stock system as it regards to time spent during medication administration. Also, they were more satisfied with their drug distribution system and showed greater desire to continue with its use. The occurrence of medication errors was also higher in the ward stock system than in the unit-dose system. This is in conformity with other literature which indicated that the unit-dose drug distribution system is safer, more economic and the workforce more favourably disposed to using it.³

The drugs commonly administered in the operating room are anaesthetic drugs. These drugs have been classified as “high alert” or “high risk” drugs because in doses used during anaesthesia, if not administered appropriately can cause intra operative mortality.⁴⁻⁸ The National coordinating council for medication errors reporting and prevention defined a medication error as any preventable event that may cause or lead to inappropriate medication use or patient harm, while the medication is in the control of health care professional, patient or consumer.⁴

In an audit of medication errors by anaesthetist in North Western Nigeria Nwasor E.O *et al*⁴ demonstrated that 56% of anaesthetists admitted to ever having a medication error. Seventy- nine percent (79%) of them attributed the medication error to problems with drug labelling from manufacturer using similar labels for different drugs. Untoward sequelae resulted in 44% of the patients that were affected by these medication error and these range from cardiac arrest to delay recovery from anaesthesia. This is common in the individual prescription order and bulk theatre stock distribution systems and rare in unit-does or automated distribution systems. Similarly, Dilip K *et al* advocated for the automated medication dispensing system with features such as single-issue drawer and bar code scanners as a way of promoting safe drug administration during anaesthesia.⁹

Another issue of great concern in connection with drug

and consumable distribution system in the operating room is the issue of drug and consumable wastages. In a resource poor setting such as ours, hospitals must strive to adopt a drug and consumable distribution system that minimizes or if possible completely eliminates wastages. In a prospective observation study of drug consumption and wastages during anaesthesia in a tertiary hospital using the individual prescription order, Amucheazi *et al*,¹⁰ observed a high level of wastage of anaesthetic drugs. There were huge leftover amount of ketamine, lignocaine, with or without adrenaline. They also noted that propofol was the most wasted drug by volume. Wastages of other drugs were as follows; atracurium 38%, morphine 26%, pethidine 23%, pancuronium 10% and diazepam 10%. It was noted that leftovers were wasted because each patient provided all the drugs needed for surgery mostly on the basis of out-of-pocket payment. They recommended that efforts should be made to improve efficiency as regards drug prescription and administration by anaesthetists. Wake-up Safe is a quality improvement initiative aimed at reducing medication errors through improved drug distribution system. The initiative observed that many of the errors were entirely preventable through the use of pre-filled medication syringe and bar coding at the point of medication administration.^{11,12}

Also, in an effort to create a more effective and sustainable method of reducing medication error during anaesthesia, the university of Washington department of anaesthesia developed the anaesthesia medication template (AMT), which has proven effective in combination with the unit dose or automated drug dispensing system to reduce medication error during anaesthesia.¹³ The adoption of the appropriate drug distribution system that will ensure maximum benefits and less adverse effects to the patient should be vigorously pursued by any hospital to ensure effective drug and consumable management in the operating room. We therefore set out to assess our local knowledge, attitude and practice of operating room workforce in our hospital in relation to drug and consumable distribution systems.

MATERIALS AND METHODS

Study area: The study was a questionnaire based observational cross sectional study of the knowledge, attitude and practice of drug and consumables distribution system among the various professionals that make up operating room workforce of Alex Ekwueme Federal University Teaching hospital Abakaliki (AEFUTHA), southeast Nigeria The hospital is of 720 bed capacity with 112 consultant surgeons, 145 resident surgeons, 6 consultant physician anaesthetists, 25 resident physician anaesthetist, 27 nurse anaesthetists and 48 perioperative nurses with ten operating suites (theatres). The professionals that make up the workforce were surgeons (all sub specialties of surgeons including obstetricians and gynaecologists), physician anaesthetists, nurse anaesthetists and perioperative nurses. It is the only tertiary hospital in the state serving the whole state and neighbouring states. Ethical approval for the study was obtained from the hospital's Research and Ethics Committee.

Study design: Two sets of questionnaires were developed for the study. The first questionnaire sought to assess the knowledge of what a drug and consumables distribution system means, while the second questionnaire was on the attitude and practice of drug distribution system. The questionnaires were administered and collected one after the other the same day on consenting operating room workforce. The questionnaires were administered separately because the second questionnaire that sought to assess more of the attitudes and practices of the operating room workforce in relation to drugs and consumables distribution system contains explanation of the different drug and consumables distribution systems. This would have made those who had no knowledge of what drug and consumables distribution means to answer to the contrary in the first questionnaire if both were together. Two hundred and eighty-two respondents gave consent for the study. They were administered on them mainly on the venue of their departmental clinical meetings. Theatre potters, anaesthetic technician and those who did not give consent

for the study were excluded.

Data collection and analysis: Information on respondents' socio demographic factors, years of practice in their respective specialties and their knowledge, attitude and practice of operating room drug and consumables distribution systems was collated with the questionnaire. The results were analysed with statistical software for social sciences (SPSS) version 20 and presented in tables and figures.

RESULTS

Three hundred and sixty-three of the operating room staff were eligible for the study out of which 282 gave consent and responded by filling and returning the questionnaires (Response rate of 77.7%). The majority of respondents were within the age bracket of 30-39 years, 90(33%), followed by 40-49 years (31%) and then 50-59 years (23%). The age distribution of operating room workforce is shown in Table 1. The mean age of respondents was 42.61 ± 8.74 years. There were more male respondents 205 (74%) than female 71 (26%) in the ratio of 2.9:1 (Table 2). Operating room workforce response rates were: Surgeons 198(70%); Perioperative nurses 31(11%); Physician anaesthetists 28(10%) and, Nurse anaesthetists 25(9%) Table 3. Only 17 (6%) of respondents were able to mention at least one of the drugs and consumable distribution systems.

Following the explanation of the various types of drug and consumables distribution systems in the second questionnaire, 228 (81%) of respondents had experienced the individual prescription order system while 127 (45%) had experienced a combination of individual prescription order system and theatre stock system. Only 6 (2%) and, 3 (1%) of respondents have worked under the unit dose and automated dispensing systems, respectively. Eighty percent (226)) of respondents have experienced the wrong drug or consumables being brought to the theatre under the individual prescription order system while 28 (10%) of respondents said they have had the same experience with the theatre stock and unit dose system

respectively. The majority of respondents 195 (69%) have experienced drug wastage mainly under the individual prescription order system. Rescheduling of surgery and delay in starting surgery due to unavailability of drug and consumables, and medication errors were more in the individual prescription order system. Also, the majority 195 (69%) of respondents believed that the drug and consumables distribution system currently in practice is not the best for our hospital.

Table 1: Age distribution of operating room workforce of Alex Ekwueme Federal University Teaching Hospital Abakaliki

Age Range	No of Respondents	Percentage
20- 29years	22	8%
30 – 39years	90	33%
40 – 49years	85	31%
50 – 59years	63	23%
60 – 69years	13	5%
Total	273	100%

* Nine respondents did not fill in their age.

Table 2: Gender distribution of respondents of Operating room (theatre) workforce

Gender	No of Respondents	Percentage
Male	205	74%
Female	71	26%
Total	276	100%

Six respondents did not fill in their gender

Table 3. Categories of theatre workforce of Alex Ekwueme Federal University Teaching Hospital Abakaliki

Professionals	No of Respondents	Percentage
Physician Anaesthetists	28	10%
Surgeons	198	70%
Nurse Anaesthetists	25	9%
Perioperative Nurses	31	11%
Total	282	100%

Table 4: Years of practice of respondents in their specialties:

Range in years	No of respondents	Percentage
1 – 9 years	136	50%
10 -19years	81	30%
20 – 29years	38	14%
30 – 39years	11	4%
40 – 49years	5	2%
Total	271	100%

Eleven respondents did not fill in their years of practice.

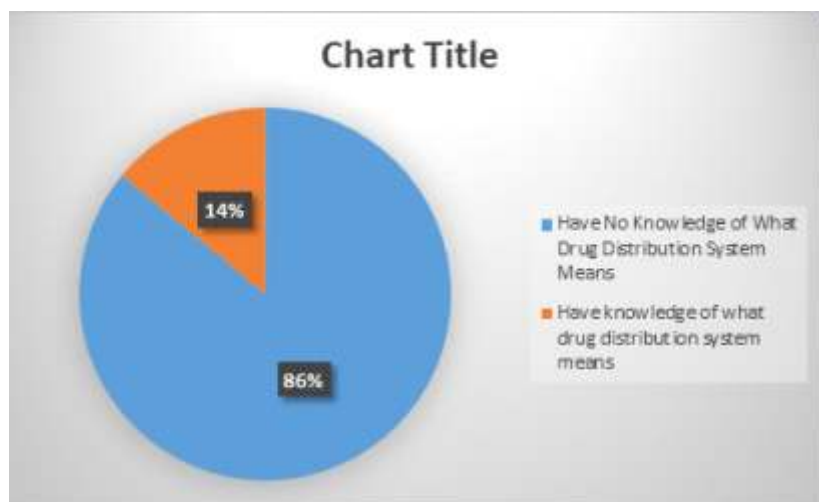


Figure1: Knowledge of drug distribution systems among operating room workforce

Eighty six percent 243 (86%) of the respondents did not know what a hospital or operating room drug and consumables distribution system means (Figure 1).

DISCUSSION

The age distribution characteristics in this study showed a mean age of the operating room workforce of 42.61 ± 8.74 years with a modal age group of 30-39 years with male preponderance. These findings are similar to the report by Al adham *et al*² in Gaza. The male preponderance may be a factor of choice of profession among the males in the society generally. The gender distribution in our study is also similar to the gender distribution in the study of gender variations among medical doctors working in public health care institutions in Bayelsa state, Nigeria by Ikenna *et al*.¹⁴ In terms of operating room professional, surgeon constituted the majority of the operating room workforce 198(70%), while there were only 28 physicians anaesthetists (10%). This highlights the low number of physician anaesthetists in the study area. Our hospital is the only hospital that enjoys the services of physician anaesthetists in the state with an estimated population of 3 million. The ratio of physician

anaesthetists to the population is therefore less than 1 per 100,000. This ratio is a far cry from the minimum ratio of 4 per 100,000 needed to achieve a reasonable standard of healthcare,¹⁵ and, may have being a major contributor to the low knowledge of the drug and consumable distribution systems observed in the study. Physician anaesthetist have a critical role to play in adoption and implementation of the appropriate drug distribution system since most of the medications prescribed and administered in the operating room is done by them. The small proportion of nurse anaesthetists may be acceptable as the study centre is a teaching hospital requiring more of physicians than nurse anaesthetists. The nurse anaesthetists' services are usually more pronounced in secondary healthcare centres.

Our study revealed that a large proportion of respondents (86%) did not know what hospital or operating room drug and consumables distribution system means. Even among those that indicated they knew what it meant only (6%) were able to mention any of the different types of drug and consumables distribution system. From when it was developed more than 50 years ago, the unit dose drug distribution system has increasingly spread to become standard practice in many parts of the world because it reduces medication wastages and error,^{2,3} yet only 2% of

respondents in this study had experienced it. All these, show that there is paucity of knowledge of the various innovations in drug and consumables distribution system among operating room workforce in the study centre. In other aspects of clinical practice, technological advancements have led to improved clinical practice. This has occurred largely due to understanding, adoption and implementation of these innovations by clinicians, thus acquiring the knowledge of these technological innovations is the first step to its implementation. It can therefore be said that the paucity of knowledge of drug and consumables distribution system among operating room workforce as shown in this study could have hindered their eagerness to seek to adopt improved drug distribution systems such as the unit dose system or automated dispensing system.

Majority of the respondents (81%) had experienced the individual prescription order system; this is not surprising given the fact that this is the main drug distribution system in our hospital. This system comes with many setbacks which includes a high propensity for medication errors, drug and consumables wastages.^{1, 2} This was collaborated in this study which showed that majority of respondents (69%) have experienced drug wastages, medication errors (46%), rescheduling of surgery and delay in starting surgery due to unavailability of drugs and consumables (65 %). Wastages occur mainly because leftovers were given back to the patient who purchased them on the basis of out-of-pocket payment. Delay in commencement or rescheduling of surgery occurs when caregivers fail to purchase the drugs needed for surgery. When patients purchase drugs outside the hospital, drugs from different manufacturers are brought to the operating room with conflicting colour codes, packaging and labelling predisposing to medication errors. In our institution, the individual prescription order is the main drug distribution system with only few items on theater stock hence these setbacks are prevalent. Despite these setbacks we have continued to practice this system due to lack of awareness of the availability of better drug and consumables distribution systems.

Regrettably, the above-mentioned setbacks which

occurred more with the individual prescription order system of drug and consumables distribution will lead to increase in hospitalizations cost to our patients which is obviously not good for a low-income country such as ours. Acquiring the requisite knowledge and implementing newer drug and consumables distribution system such as the unit dose and automated medication drug dispensing system will go a long way to improve services in our operating rooms and reduce overall hospital costs to our patients.

CONCLUSION

There is poor knowledge of operating room drug and consumable distribution systems among the theatre workforce of the study centre. The hospital uses the individual prescription order system even with its overt disadvantages.

Recommendation

There is need for improvement on the knowledge of operating room workforce on drug and consumable distribution system. This will enable the workforce embrace more efficient drug distribution system in the operating room, and by so doing, enhance quality of services while reducing hospitalization cost.

Limitations

This is a single centre study. A multicentre study may be required to draw far more reaching conclusions.

Conflict of interests

The authors have no competing interest.

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