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ORIGINAL ARTICLE

A Survey on Selection and Administration of Perioperative Antibiotics by Anaesthetists

Une Enquete sur la Selection et L'administration Perioperatoire D'antibiotiques par les Anesthesistes

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ABSTRACT

BACKGROUND: **Perioperative antibiotic administration for prophylaxis of surgical site infections can increase the anaesthetists workload. However, timely administration is essential to reduce risks and improve patient outcome.**

OBJECTIVE: **This survey evaluates anaesthetists' opinion concerning perioperative antibiotic therapy and training.**

METHODOLOGY: **Structured questionnaires relating to the study objective were administered to a cross-section of anaesthetists present at a national conference. The 16 question survey focused on the grade of anaesthetists, practice centre, opinion about perioperative antibiotic therapy and anaesthetists´ training regarding use. Data was analysed and presented as percentages of total responses.**

RESULTS: **A total of 82 questionnaires were administered with 66 respondents (response rate- 81.0%); which included consultants 16(24.2%), residents 39(59.1%) and nurses 9(13.6%). Most 58(87.9%) were practicing in teaching hospitals and 62(93.9%) agreed that the surgeon was responsible for preoperative antibiotic selection. The anaesthetist 30(45.5%) and surgeon 26(39.4%) were responsible for preoperative administration, but the anaesthetist assumes responsibility following preoperative omissions 43(65.2%). Confirmation of administration pre-incision was by anaesthetist 31(47.0%) and surgeon 29(43.9%), but repeat administration during prolonged surgery was by former 38(57.6%). Training of anaesthetists in the selection 46(69.7%) and administration 36 (antibiotics was inadequate; and deemed necessary by50(75.8%) and 55(83.3%) respondents respectively.**

CONCLUSION: **Antibiotic selection though exclusively by the surgeon, higher responsibility is placed on the anaesthetist for preoperative administration, confirmation before incision and intraoperative re-dosing during prolonged surgery. Knowledge in selection and administration of antibiotics is inadequate and should be incorporated during the training. WAJM 2013; 32(1): 3–7.**

Keywords: **Perioperative antibiotics, Anaesthetist, Selection, Administration, Training.**

RÉSUMÉ

CONTEXTE: L'administration périopératoire d'antibiotiques à but prophylactique des infections du site opératoire peut accroitre la charge de travail de l'anesthésiste. Toutefois, une administration au bon moment est essentielle à la réduction du risque et à l'amélioration des résultats du patient.

OBJECTIF: Cetteenquête évalue l'opinion des anesthésistes concernant la pratique et la formation sur l'usage des antibiotiques en période périopératoire.

MÉTHODOLOGIE: Un questionnaire structuré relatif aux objectifs de l'étude a été administré de façon transversale aux anesthésistes présents à une Conférence Nationale. Les 16 questions de l'enquête s'intéressaient au niveau des anesthésistes, à leur lieu d'exercice, à leur opinion sur l'usage d'une antibiothérapie préopératoire et à la formation des anesthésistes sur cet usage. Les données ont été analysées et présentées sous forme de pourcentage du total des réponses.

RÉSULTATS: Un total de 82 questionnaires ont été administrés avec 66 réponses (taux de réponse de 81,0%); incluant 16 consultants (24,2%), 39 internes (59,1%) et 9 infirmiers (13,6%). La plus part soit 58(87,9%) pratiquaient dans des hôpitaux universitaires et 62(93,9%) approuvaient l'idée que c'est le chirurgien qui est responsable du choix de l'antibiothérapie préopératoire. L'anesthésiste 30(45,5%) et le chirurgien 26(39,4%) étaient responsables de l'administration préopératoire mais l'anesthésiste assume la responsabilité de toute omission préopératoire 43(65,2%). La confirmation de l'administration avant l'incision devait être faite par l'anesthésiste 31(47,0%) et le chirurgien 29(43,9%), mais une administartion répétée due à une chirurgie prolongée devrait être controlée par l'anesthésiste 38(57,6%). La formation des anesthésistes à la sélection 46(69,7%) et à l'administration 36(54,5%) des antibiotiques était inadéquate, cette formation était estimée nécessaire par 50(75,8%) et 55(83,3%) participants respectivement.

CONCLUSION: La sélection des antibiotiques quoiqu'étant du ressort exclusif du chirurgien, une plus grande responsabilité relève de l'anesthésiste pour l'administration préopératoire, la confirmation avant incision et une réadministartion en cas de chirurgie prolongée. Les connaissances sur la sélection et l'administration des antibiotiques sont inadéquates et devraient être incorporées dans la formation.

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Mots Clés: Antibiotiques Périopératoires, Anesthésistes, Sélection, Administration, Formation.

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Abbreviations: SSC, Surgical safety checklist; **SSI,** Surgical site infection.

INTRODUCTION

Antibiotic prophylaxis is crucial in reducing surgical site infection (SSI), a preventable cause of morbidity and mortalitywhich can be associated with sepsis, increased pain, prolonged hospital stay and increased cost of health [1–4] It is however generally agreed that it is warranted in all procedures (especially the first dose) in the categories of clean-contaminated, contaminated or dirty,[2]with pre operative antibiotics being commonly administered in approximately 80–90% of patients.[1]

Timely and appropriate administration is an important guideline and one of the most effective strategies for preventing SSI, especially if administered within 30 minutes before surgical incision.[3–6] Though such timing of prophylactic antibiotic administration is a patient safety outcome that is recurrently tracked and reported,[7] reports show that compliance is still a challenge.[3–5] Responsibility in timing and administration is also not always clear,[8] but involvement of anaesthetists in the prophylactic administration of these vital drugs can improve compliance in therapy, and contribute to reduction in perioperative risks.[3,4,9,10] This will however lead to an increase in the workload of anaesthetists.[6,8] Furthermore, the administration of drugs which were not prescribed by the anaesthetist may have medicolegal implications especially when associated with drug reactions,[8] this being made worse in instances where there is no institutional protocol for antibiotic use.

This study therefore aims to know the opinion of anaesthetists regarding perioperative antibiotic therapy, their involvement in its use and training requirements.

METHODS

A prospective study was conducted using structured questionnaires related to the study objective.These were administered to a cross section of anaesthetists present at a recent national conference of the Nigerian Society of Anaesthetists′, using a convenience sampling and following ethical clearance from the organizers of the conference.

The 16 question survey focused on practice, theatre coverage, opinion about responsibility for perioperative antibiotic selection and administration, as well as training needs.Data obtained was analysed with the SPSS v. 15 and presented as percentages of total responses.

RESULTS

A total of 82 questionnaires were administered with a response rate of 66(81.0%). Majority of respondents were senior registrars and registrars 39(59.1%), teaching hospitals constituted 58(87.9%) of the practice centre,while theatre coverage was by both consultant and resident anaesthetist in 38(57.6%). (Table 1).

Table 2 shows the anaesthetist's opinion regarding staff responsible for antibiotic selection and administration. Sixty-two (93.9%) agreed that preoperative antibiotic selection was the surgeon's responsibility, while preoperative administration was that of the anaesthetist 30(45.5%), surgeon 26(39.4%) andothers 10(15.1%).

In the event of preoperative omission of antibiotics, anaesthetists were primarily responsibleby 43(65.2%), while surgeons were responsible by 16(24.2%). Preoperative confirmation of antibiotic administration was the responsibility of the anaesthetist 31(47.0%), surgeon 29(43.9%) and the team 2(3.0%). With prolonged surgery, the anaesthetist and surgeon were responsible for intraoperative re-dosing by38(57.6%) and 16(24.2%) respondents respectively.

From Table 3, most anaesthetists were of the opinion that >50% of patients receive preoperative antibiotics in their institutions, while 11(16.7%) were not aware of the percentage who receive them.

Anaesthetists were considered inadequately trained in antibiotic selection 46(69.7%) and administration 36(54.5%); and training in these areas was deemed necessary by 50(75.8%) and 55(83.3%) respondents respectively. (Table 4).

Table 1: Profile of Practice of Respondents

Parameter	Number (%)
Grade of Anaesthetist	
Senior registrar	20 (30.3)
Registrar	19 (28.8)
Consultant	16 (24.2)
AN*	9 (13.6)
Medical officer	2 (3.0)
Total	**66 (100.0)**
Distribution of Centre of Practice	
Teaching Hospital	58 (87.9)
General Hospital	3 (4.6)
Private Hospital	3 (4.6)
Mission Hospital	1 (1.5)
Others	1 (1.5)
Total	**66 (100.0)**
Theatre Coverage by Anaesthesia Staff	
Consultant + Resident	38 (57.6)
Consultant + AN	15 (22.7)
Resident	7 (10.6)
AN	2 (3.0)
Resident + AN	2 (3.0)
All	2 (3.0)
Total	**66 (100.0)**

**Anaesthetic Nurse*

Table 2: Responsible Staff for Antibotic Selection and Administration

Variable	Number (%)			
	Surgeon	Anaesthetist Team	Others*	Total
Preoperative Selection	62 (93.9)	0 (0.0)	0(0) 4 (6.1)	66 (100)
PreoperativeAdministration	26 (39.4)	30 (45.5)	0(0) 10 (15.1)	66 (100)
Preoperative Omission	16 (24.2)	43 (65.2)	0(0) 7 (10.6)	66 (100)
Preoperative Confirmation	29 (43.9)	31 (47.0)	2(3.0) 4(6.1)	66 (100)
Intraoperative Redosing	16 (24.2)	38 (57.6)	0(0) 12 (18.2)	66 (100)

**Responses include the team, ward/theatre nurse, unclear, do not know.*

Table 3: Opinion about Incidence of Antibiotic Administration before Skin Incision

Incidence	Response (%)
Number (%)	
<50	15 (22.7)
60	18 (12.1)
70	6 (9.1)
80	9 (13.6)
90	11 (16.7)
100	6 (9.1)
Don't know	11 (16.7)
Total	**66 (100)**

Table 4: Anaesthetists Opinion About Training in Antibiotic Selection and Administration

Opinion Regarding Training	Number (%)	
	Antibiotic Selection	Antibiotic Administration
Level of Training		
Inadequate	46 (69.7)	36 (54.5)
Adequate	17 (25.8)	27 (40.9)
Do not know	2 (3.0)	0 (0.0)
Not important	1 (1.5)	3 (4.5)
Total	**66 (100)**	**66 (100)**
Training Requirements		
Need training	50 (75.8)	55 (83.3)
Do not need training	12 (18.2)	8 (12.1)
Do not know	4 (6.1)	3 (4.5)
Total	**66 (100)**	**66 (100)**

DISCUSSION

The most frequent respondents were residents and consultants. It is not surprising therefore that teaching hospitals constituted the most frequent practice centre and theatre coverage was found to be majorly by consultant and resident duo: a close relationship typical of a tertiary centre setting. Although participation in a conference of this nature is expected by all cadres of anaesthetists, more academics in training institutions were present.

There was unanimous response that antibiotic selection was mainly by the surgeon. However, regarding pre-operative antibioticadministration and confirmation prior to surgical incision, this study shows that responsibility is not clearly defined as both anaesthetist and surgeon closely shared roles. In other centres, institutional protocols for antibiotic selection have been employed,[9,11,12] Such protocols which can help to establish clear roles and precise choice of agent based on known antimicrobial pattern[8] are not prevalent in our setting. Elsewhere, preoperative antibiotic administration remains an exclusive anaesthetist's role.[3,8,9,10] While other cadres of personnel including the ward and operating room nurse, were also indicated by some as responsible staff for preoperative antibiotic administration; the team approach to pre-incision confirmation of antibiotic administration was not a predominant option.This is of significance, depicting the fact that knowledge of and/or adherence to current surgical safety guidelines[13,14] is not yet prevalent practice. However, responsibility for antibiotic administration following preoperative omissions and when intraoperative re-dosing is required with prolonged surgery, was mainly attributed to the anaesthetist; a finding similar to that by Warters *et al*.[8] These roles preferentially attributed to the anaesthetist have been corroborated in previous studies;[3,8,9,10] and are related to their professional duties whereby proximity to patient, and ability to ensure administration at induction as an IV medication under his control makes it convenient. They have however been associated with various concerns of added responsibility and increased workload, role conflicts, administration of drugs not prescribed by self, and who takes responsibility in the event of a drug reaction and consequent medicolegal issues.[4,8] It is important to note that involvement of anaesthetic nurses with antibiotic therapy is subject to specific instructions by the supervising physician anaesthetist, and where not available, the surgeon. There was a wide variation in the respondent's opinion about the incidence of antibiotic administration. Further studies may be necessary to determine if this is related to the types of surgery in various centres, or a possible indication of poor

monitoring of perioperative antibiotic therapy. Such monitoring of antibiotic therapy will contribute to qualitative patient care, and prevention of untoward pharmacological effects or drug reactions with anaesthetic agents while under anaesthesia.[8]

Most respondents (mainly from training institutions) were of the opinion that anaesthetists do not receive adequate training in both antibiotic selection and administration, and considered that incorporation in the anaesthesia training programme was necessary. Though the curriculum for anaesthesia of the training college in our environment clearly specifies aspects on antimicrobial agents,[15] theseresponses may suggest a need for more emphasis and structured training onantibiotic therapy, with team collaboration involving the infection control unit.

With these findings and from ongoing discussions about perioperative antibiotic practice, apart from the responsibility for selection placed upon the surgeon, the anaesthetist is assumed to be responsible for more tasks relating to drugs he receives little training on. He also plays a key role which can influence surgical outcome, by ensuring appropriate and timely administration of therapy that may not be directly related to anesthesia care.[3] A report from a survey of members of the American Association of Clinical Directors has also confirmed that anaesthetists are not adequately trained in antibiotic therapy and may not be able to make right choices.[8] Indeed, the need for further training in antibiotic therapy has been earlier documented.[16] Though antibiotic therapy is rapidly evolving and regional differences in antimicrobial pattern exist, basic considerations already specified in the existing curriculum,[15] or as part of continuing medicaleducation for anaesthetists[8] should beclearly emphasized, such as guidelines in selection and administration, likely drug interactions,alternatives in allergic situations and safety precautions.

The administration of antibiotics before skin incision has become the standard of care for prevention of SSI,[6] and various institutions have established protocols to resolve this issue and facilitate optimal care of patients concerned, by ensuring timely and appropriate perioperative antibiotic administration.[4] These include quality improvement protocols[9,12] and use of anaesthesia clinicalinformation systems in form of computerized visual or interactive reminders (part of anaesthesia charting system).[3,17] They facilitate timely antibiotic administration and intra-operative redosing when necessary.

Surgery has become an integral part of global healthcare,[13] and though it can be life saving, it is also associated with a considerable risk of complications and death which are likelyto be higher in developing countries.[18] Therefore in 2008, the World Health Organization (WHO) through the World Alliance for Patient Safety Initiative came up with a campaign tagged "SAFE SURGERY SAVES LIVES," with published guidelines targeted at improved safety in surgical care globally. The emphasis is on a team approach involving the entire perioperative team, in the performance of a Surgical Safety Checklist (SSC) at three stages namely; Pre-anaesthesia (*team sign in*), Pre-incision (*team time out*) and Postoperative (*team sign out*).[13,14] The prevention of SSI as one of its 4 objectives is facilitated during Pre-incision checks, and includes confirmation of antibiotic administration. This, involving the entire team, has relevance to the present study, as the anaesthetist is expected to participate in the confirmatory checks and actually administer antibiotics not less than 30 min pre-incision.

Our findings have shown that the surgeon was regarded as being responsible for antibiotic selection, while roles for preoperative administration and confirmation were not clearly defined. The anaesthetist was however considered to be responsible in circumstances of preoperative omissions and intraoperative re-dosing. The team approach wastherefore not common practice regarding preoperative antibiotic administration in many centres, yet teaching hospitals were the most frequent practice centre. As training institutions, they should implement these guidelines for Safe Surgery as they constitute reference points for others.

Without doubt, optimizing delivery of prophylactic antibiotics is an important patient safety goal and teamwork in surgery has been linked to better outcomes.[13,14] The anaesthetist plays a key role in this team work as highlighted earlier during the "team time out." It is therefore needful to begin to put in practice this current guideline targeted atreduction of SSI's, improved safety of surgical patients, and overall reduction in perioperative morbidity and mortality.

CONCLUSION

Integrated "team" approach to preoperative antibiotic check is yet to be established in our setting. Implementation of the surgical safety checks established by the WHO World Alliance for Patient Safety Initiative, with collaboration among the different members of the operating team should begin earnestly. Apart from improving compliance and enhancing patient safety, itwill prevent controversies regarding perioperative antibiotic administration, and facilitate better monitoring of perioperative antibiotic use. Training and monitoring of antibiotic use should also be improved upon as part ofquality improvement efforts.

The limitations to this study include the non-response and the convenient sampling used. These preclude generalisations for a nationwide practice, though more respondents from training institutions were present.

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