

Knowledge, Attitude and Practice towards Surgical Antimicrobial Prophylaxis among Medical Staffs in Surgery Department of Jimma University Medical Center: Ethiopia

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Abstract

Introduction: Rational use of antimicrobials is believed to be one away by which we can reduce prevalence of antimicrobial resistance and surgical site infection. This is determined by professionals' knowledge, attitude and practice; in using surgical antibiotic prophylaxis. However, no study addressed this issue in Ethiopia.

Objectives: The aim of this study was to assess the knowledge, attitude and practice of medical staff in surgery department toward surgical antibiotic prophylaxis use.

Material and Methods: A cross-sectional survey was used with self-administered questionnaire. Data was collected from June 19 to 23/2017 at Jimma University Medical Center, Jimma, Ethiopia, and analyzed using SPSS. Written consent was taken and data was kept secured for confidentiality.

Results: Majority of respondents were male (90.2%), residents (45.9%). All of the participants (100%) have positive attitude toward need for Surgical Antibiotic Prophylaxis (SAP) guideline as well as for hospital antimicrobial stewardship program. Of respondents, 75.4% were knowledgeable. But, their attitude in 82% and practice in 57.6% toward surgical antibiotic prophylaxis use was found to be poor.

Conclusion: Even though respondents had good knowledge, their attitude and practice were poor in majority of them. Knowledge and/ or attitude that guide or determine the way we practice. Failure of one or both of this will lead to poor practice, in turn which might contribute for surgical site infection and antimicrobial resistance as well as extra cost for treating this condition. Therefore, authors believe that this gap area should be given attention to promote rational surgical antibiotic prophylaxis use.

Keywords: Knowledge; Attitude; Practice; Antimicrobial; Ethiopia

Abbreviations: AMR: Antimicrobial Resistance; ASHP: American Society of Health system Pharmacist; FMOH: Federal Ministry of Health of Ethiopia; FMHACA: Food, Medicine and Health Care Administration and Control Authority of Ethiopia; JUMC: Jimma University Medical Center; KAP: Knowledge, Attitude and Practice; MRSA: Methicillin Resistance Staphylococcus Aureus; SAP: Surgical Antibiotic Prophylaxis; SSI: Surgical Site Infection

Introduction

Antimicrobials are often used in the surgical patient in an effort to prevent infection (prophylaxis) or to treat established or suspected infection (therapeutic) [1]. Therefore, surgery is the ward where antimicrobials are used most commonly than other wards [2]. Even though a lot of trails have been done to reduce nosocomial infections, surgical site infections (SSIs) remain an important cause of morbidity, prolonged hospitalization, and death [3-5]. In addition to this, bacteria from clinical and non-clinical settings are becoming increasingly resistant to conventional antibiotics [6,7]. This is the direct indicator of antimicrobial prophylaxis selection should be based on the knowledge of penetration to the site of infection, expected flora, local microbial resistance patterns, drug pharmacokinetics and patient's factors, in turn which relays on the prescriber's Knowledge Attitude and Practice (KAP) of Surgical Antibiotic Prophylaxis (SAP) use [1].

Problem in use of SAP is one of contributing factor for Antimicrobial Resistance (AMR) and SSI. AMR is a long standing situation, though its frequency and severity increases from time to time. Especially those

problems are higher in developing country [8-12]. Overall SSI rate according to publications from 2014 to 2019 was 6.8% (cesarean section), 19.1% (general surgery), to 29.3% (for emergency abdominal surgery) in surgical wards of Ethiopian Hospital, which was majorly contributed by non-adherence to SAP guideline recommendation [13-17]. One way by which we can promote professionals with a standardized approach for rational, safe and effective use of antimicrobial prophylaxis is by having a standard guideline and as well as good knowledge, attitude and practice of surgeons about appropriate SAP [18,19].

The knowledge and practice of SSI prevention by health care professionals were found to be poor in different part of Ethiopian Hospitals [20,21].

Therefore, assessing KAP of doctors toward SAP use is paramount in addressing the gap area. Indeed, collecting data on KAP of surgeons on

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Received February 17, 2019; **Accepted** March 11, 2019; **Published** March 20, 2019

Citation: Tefera GM, Kebede TM, Feyisa BB (2019) Knowledge, Attitude and Practice towards Surgical Antimicrobial Prophylaxis among Medical Staffs in Surgery Department of Jimma University Medical Center: Ethiopia. J Bioanal Biomed 11:155-159.

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SAP use is the first step in managing SSI, inappropriate antimicrobial use and prevention of emerging and alarming antimicrobial resistance, but, no study that addressed in Ethiopia about KAP of surgeon toward SAP use in surgical ward. The investigators, therefore, conducted this study to assess KAP of surgeon toward SAP in Jimma University Medical Center (JUMC).

Materials and Methods

Study area and period

A cross-sectional survey was conducted from June 19 to 23/2017 at Jimma University Medical Center, Jimma, Ethiopia with the aim of assessing KAP of medical staffs in surgery ward. It is, located 345 km southwest of Addis Ababa, the capital of Ethiopia. JUMC is the only medical center in southwest Ethiopia with a bed capacity of 600.

Study design

A cross-sectional survey was employed with structured questionnaires to collect data on KAP of doctors toward SAP use. Which was prepared with slight modification from previous study was used [19].

Populations

Source population: All medical staffs working in JUMC.

Study population: Doctors who were available during data collection period and willing to participate in the study.

Eligibility criteria

Inclusion criteria: All doctors who were willing to participate in the study.

Exclusion criteria: Unwilling prescribers.

Sampling technique and sample sizes

Sixty one participants were included in this study by survey method.

Data collection tool and procedure

Items in this questionnaire include: demographic data and items for knowledge with response of “yes”, “no”, or “don’t know” (5 item related to SAP need based on the Centers for Disease Control and Prevention (CDC) wound class, 8 item related to SAP selection, re-dosing or timing and duration of prophylaxis total of 13 questions). The questions used to assess attitude were 10 items, of which 5 item related to need for SAP guideline and antimicrobial stewardship program for JUMC and the remaining 5 items were related to duration of SAP, SAP versus SSI, SAP versus antimicrobial resistance; the five-point Likert scale with responses that included “strongly agree”, “agree”, “neutral”, “disagree”, or “strongly disagree”. Response for practice questions (9 items) were always, often, sometimes, seldom and never. The self administered questionnaire was filled by surgeons, surgical residents, General Practitioner (GP) in surgery ward and medical interns in surgical rotation, during study period.

Data analysis

All responses in accordance with American Society of Health System Pharmacist (ASHP) SAP guideline 2013, were given a score value of 1 for correct answers to the knowledge questions and when answers for practice questions were “always” for positive question and “never” for negative question respectively, while a score zero was assigned to all other answers. For the attitude questions toward guideline, 5=for

strongly agree, 4=agree, 3=neutral, 2=disagree and 1=for strongly disagree for positive questions and vice versa for negative questions and score above average of mean is considered as good attitude. But, for the remaining attitude questions 1 point was given for correct answer, if it is in accordance with evidence based surgical antimicrobial prophylaxis recommendation while zero for incorrect answers. Before entry to EPIDATA manager version 4 and analyzed using Statistical Software Package, (SPSS) version 20.0 data was cleared, categorized, compiled and coded and also checked for completeness and accuracy. All descriptive statistical tests were performed using SPSS.

Ethical statement

The ethical clearance was obtained from Jimma University; Institute of Health, Institutional Review Board approved the study under protocol number IHRPGQ/103/207. Physicians were requested for written informed consent. Confidentiality of data was secured. The right of the respondents for not being interviewed was respected.

Standard/operational definitions

An antibiotic is a substance that can inhibit the growth or viability of bacteria, so it is equivalent with antibacterial for this study.

Good attitude: Is a person’s favorable feeling towards the evidence based surgical antimicrobial prophylaxis or with overall score of above mean [19].

Good knowledge: Having information about SAP, which is in accordance with ASHP/ WHO guideline as a result of study or experience with total score above means [19].

Good practice: To perform repeatedly or always as recommended by the ASHP/WHO guideline during the use of surgical antimicrobial prophylaxis with a total score of above mean [19].

Results

Socio demographic characteristics of study participants

Sixty six questionnaires were distributed on morning section, of which 62 questionnaires were returned to data collectors, with 3 totally not filled and 2 attitude and practice part is not filled and 1 has no socio-demographic part. On another day during ward rotation 5 questionnaires which were filled by doctors who were not participated on the first day of data collection. Therefore a total of 61 complete questionnaires were available for analysis with the response rate of 75.3%. Majority of respondents were male (90.2%), residents (45.9%) followed by medical interns in surgical rotation (39.3%). Half of respondents fall in the age range of 26 to 30 years and around 71% of them had ≤ 2 years of clinical experience (Table 1).

Over all KAP of medical staff

All of the participants (100%) have positive attitude toward need for SAP guideline for both JUMC and national as well as for hospital antimicrobial stewardship program (Figure 1). Knowledge, attitude and practice were classified as good and poor if they answered above average. The answer of respondent was considered right if it was in accordance with ASHP 2013 guideline. According to this guideline 75.4% were knowledgeable or have good knowledge. But their attitude for SAP use according to evidence based medicine (82% and SAP use related practice (57.6%) were poor in majority of respondents (Figure 1). Knowledge and/ or attitude that guide or determine the way we practice. Failure of one or both of this will lead to poor practice.

Variables	Categories	Frequency	%
Gender	Male	55	90.2
	Female	6	9.8
Age in year	23 to 25	26	42.6
	26 to 30	31	50.8
	31 to 40	4	6.6
Organization working for	Only JUMC	51	83.6
	Private and JUMC	10	16.4
Experience in years	≤ 2	43	70.5
	3-5	14	23
	≥ 6	4	6.6
Practice level	Senior surgeon	4	6.6
	Surgery resident	28	45.9
	Medical intern in surgical rotation	24	39.3
	General Practitioner	5	8.2
Prescription order with antibiotic per last week	Always	23	37.7
	Often	19	31.1
	Sometimes	17	27.9
	Seldom	1	1.6
	Never	1	1.6

N.B: JUMC- Jimma University medical center

Table 1: Socio-demographic characteristic of respondent (medical staff working in surgery department), JUMC, June 19-23, 2017 Ethiopia.

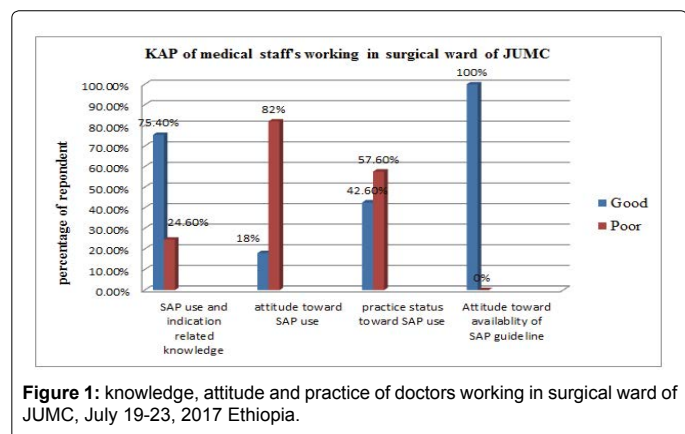


Figure 1: knowledge, attitude and practice of doctors working in surgical ward of JUMC, July 19-23, 2017 Ethiopia.

Knowledge about indication of SAP relative to CDC wound class

Regardless of practice level of medical practitioners, of the respondents, 83.6% correctly answered that clean surgery involving the placement of prosthesis or implant require SAP use, while 65.6% said that no need of SAP for clean non-prosthetic procedure. Likewise, 88.5% responded that SAP is need for clean-contaminated surgery. But, there is a poor knowledge in majority of them regarding the use of antibiotic as treatment and prophylaxis, as evidenced by their response; in 13.1% and 23% correctly responded that SAP is not needed in contaminated and dirt surgery respectively (Table 2).

Knowledge about SAP use (selection, timing and duration)

Of respondents, 62.3% stated that generally cefazolin is considered as a preferred antimicrobial agent for surgical prophylaxis. Less than half of respondents (42.6%) and (45.9%) know that SAP for patients with a history of Ig E-mediated reaction to penicillin is vancomycin or clindamycin and methicillin resistant staphylococcus aureus (MRSA) is resistant to all 3rd generation cephalosporin respectively. In contrast,

	Correct answers by type and level of medical practitioner				N=61 Total n (%)
	Practice level or position				
	N=4 Senior surgeon n (%)	N=28 Surgical Resident n (%)	N=24 Medical intern n (%)	N=5 GP n (%)	
Knowledge related items					
Q1	4 (100)	26 (92.9)	16 (66.7)	5 (100)	51 (83.6)
Q2	3 (75)	20 (71.4)	13 (54.2)	4 (80)	40 (65.6)
Q3	4 (100)	27 (96.4)	18 (75)	5 (100)	54 (88.5)
Q4	3 (75)	4 (14.3)	1 (4.2)	-	8 (13.1)
Q5	3 (75)	8 (28.6)	3 (12.5)	-	14 (23)
Q6	2 (50)	21 (75)	13 (54.2)	2 (40)	38 (62.3)
Q7	3 (75)	13 (46.4)	8 (33.3)	2 (40)	26 (42.6)
Q8	3 (75)	14 (50)	9 (37.5)	2 (40)	28 (45.9)
Q9	2 (50)	15 (53.6)	21 (87.5)	2 (40)	40 (65.6)
Q10	4 (100)	21 (75)	20 (83.3)	2 (40)	47 (77)
Q11	3 (75)	23 (82.1)	17 (70.8)	4 (80)	47 (77)
Q12	3 (75)	23 (82.1)	13 (54.2)	4 (80)	43 (70.5)
Q13	2 (50)	21 (75)	10 (41.7)	4 (80)	37 (60.7)
Practice related items					
Q2a	3 (75)	22 (78.6)	18 (75)	5 (100)	48 (78.7)
Q2b	3 (75)	16 (57.1)	15 (62.5)	4 (80)	38 (62.3)
Q2c	3 (75)	19 (67.9)	20 (83.3)	4 (80)	46 (75.4)
Q2d	4 (100)	25 (89.3)	24 (100)	5 (100)	58 (95.1)
Q3	3 (75)	7 (25)	9 (37.5)	-	19 (31.1)
Q4	3 (75)	8 (28.6)	8 (33.3)	2 (40)	21 (34.4)
Q5	2 (50)	15 (55.6)	7 (29.2)	3 (60)	27 (44.3)
Q6	3 (75)	9 (32.1)	5 (20.8)	4 (80)	21 (34.4)
Attitude related items					
Q6	1 (25)	7 (25)	4 (16.7)	-	12 (19.7)
Q7	2 (50)	4 (14.3)	6 (25)	-	12 (19.7)
Q8	1 (25)	7 (25)	7 (29.2)	-	15 (24.6)
Q9	1 (25)	8 (28.6)	7 (29.2)	-	16 (26.2)
Q10	-	8 (28.6)	8 (33.3)	1 (20)	17 (27.9)
A: List of full questions was provided in annex; GP: General Practitioner					

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Table 2: Correct score for knowledge, practice question and some attitude questions (Q6-Q10) of medical staffs working in surgery department, JUMC, June 19-23, 2017 Ethiopia.

majority of respondents, 65.6%, 77%, 77% and 70.5% know that the preferred antibiotic prophylaxis for patients with urologic surgery is ciprofloxacin than ceftriaxone in the absence of any contraindication; SAP for colonization by MRSA is vancomycin and SAP should be dosed intra operatively if surgery lasts greater than 2 half-life of drug as well as, if blood loss is ≥ 1500 ml during operation without considering the half-life of drug (s) respectively. Beside this, majority of respondents, 60.7% said that there is no evidence based recommendation for SAP to be given for >24 hours post operation for all patients. The remaining percentage (39.3%) is higher, which miss lead those practitioner to prescribe antibiotic for longer period (>24 hours) in the absence of any evidence based recommendation, which need attention (Table 2).

Attitude toward SAP use

It has been demonstrated that majority of respondents had negative attitude for the evidence based SAP use recommendation by evidence

based guidelines, which negatively affect the quality of health care, because attitude that guide our practice. In fact the result of this study also showed that there is poor practice in use of SAP among those medical staffs in surgery department. Accordingly, few respondents strongly disagreed, (19.7%) for SAP should be given for >24 h. post operation for all patients, 19.7% for single dose antimicrobial prophylaxis is less effective in preventing SSI than multiple dose, 24.6% for single dose antimicrobial prophylaxis lead to antimicrobial resistance than prolonged duration, 26.2% for prophylaxis for longer duration is cost effective than treating SSI, which is common during short duration prophylaxis (<24 h) and 27.9% for question that says "I believe that personal experience is better than guidelines" (Table 2).

Practice of those medical staff during SAP use

Since antibiotic is essential in surgery ward, majority of medical staff said that they prescribed antibiotics always (37.7%) followed by often (31.1%) per last week of study time (Table 1). For practice related questions it was considered as correct only for response with always. Even though it was expected for all medical practitioners to practice 100% in line with the most recent evidence based SAP guideline, it is not true in JUMC as evidenced by their response. However, it is acceptable in majority of those respondents, 78.7% preferred timing of the first surgical antimicrobial prophylaxis dosage for intravenous (IV) bolus administration before skin incision to be within 30 to 60 min of skin incision and 31.1% did not preferred timing of the first SAP dosage for IV infusion administration (like vancomycin and ciprofloxacin) to be before 30-60 min of skin incision. Those antimicrobial which need IV infusion require longer duration, because of this should be initiated within 60 to 120 min of skin incision. In addition to timing of IV infusion, other gap area was in determining the duration of SAP; in which only 44.3% preferred duration of SAP to be ≤ 24 h post operation, excluding cardiac, nephrectomy and neurosurgery. Similarly only 34.4% of respondents preferred duration of SAP for greater than 24 hours post operation because of fear of failure (SSI) (Table 2).

Discussion

There was no published study to investigate KAP of medical staff toward SAP use in Ethiopia. Therefore, a cross sectional survey was conducted on 61 medical staffs with the aim of KAP assessment among medical staffs working in surgery department of JUMC. It was identified that even though majority of respondents had good knowledge, their attitude and practice was poor in majority of medical staffs.

As evidenced by research [18,19] one way by which we can promote professionals with a standardized approach for rational, safe and effective use of antimicrobial is by having a standard guideline and as well as good knowledge, attitude and practice of surgeons about appropriate SAP use and good adherence to evidence based guidelines. All of the participants (100%) have positive attitude toward need for SAP guideline for both JUMC or local and national as well as for hospital antimicrobial stewardship program. This indicates the higher need for surgical prophylaxis guideline to improve their practice and should get attention from government as a capacity building.

According to ASHP 2013 guideline recommendations [22], 75.4% were knowledgeable or had good knowledge toward SAP indication and use. But, their attitude for SAP use according to evidence based medicine (82%) and SAP use related practice (57.6%) were poor in majority of respondents. Similar to our study, different studies showed that, there were problems in all three or either of one or two problems with different prevalence. For example, one study among orthopedic surgeon [23] showed, a problem in single- versus multiple-dose regimens use for

prophylaxis which was arise from an experience based approach, they were unsure of current evidence-based recommendations regarding preoperative antibiotic use, so that training should be provided [24].

Other study among thoracic surgeon [19] also revealed that, 70% of surgeons had good knowledge about appropriate SAP. The surgeon's attitude score about the need for local and national guidelines for SAP was 78% and 90% respectively. As revealed by last study, physician's practice with ASHP guidelines regarding timing of the first dosage of SAP was acceptable, even though correct administration of an intra-operative dose was 40% in agreement with the guideline. But, in practitioners of JUMC surgery department only in 31.1% for IV infusion drug (like vancomycin and ciprofloxacin) and up to 78.7% for antimicrobial with IV bolus administration timing was in agreement with evidence based recommendation. Specially using SAP for >24 hours was practiced by majority of respondent for fear of SSI. This is one indicator for irrational use of antimicrobials in study area, which may pave path for AMR and even for development of SSI without adding any benefit for the patient [25].

With current knowledge, the most reasonable way to improve antibiotic prophylaxis is to launch a structured program of improvement with multidisciplinary involvement in hospitals which include clinical pharmacist and infectious disease specialist. Through these multidisciplinary approach, development of local guidelines, with appropriate dissemination, educational programs, workshops, audits and a detailed review of medical curricula to improve rational antibiotic use as well as in service training and behavioral interventions to improve KAP [5,26]. This study might lack externally valid to Ethiopian medical staff in surgical ward; because, the study was done at single center. Self-administered questionnaires for KAP assessment by its nature may not indicate the true practice.

Conclusions and Recommendation

Majority of respondent were knowledgeable or had good knowledge. But their attitude and practice for SAP use according to evidence based clinical practice were found to be poor in majority of respondents. Failure of one or both of this will lead to poor practice which is a determinant factor for irrational use of SAP. Nevertheless, attitude toward national and local surgical antibiotic prophylaxis guideline and antimicrobial stewardship program need was positive among all participants. Therefore authors believe that KAP should be given attention to reduce irrational use of SAP and in turn to reduce development of SSI and AMR. Given the burden of poor attitude and practice of SAP use among medical staff in surgery ward; the Federal Ministry of Health Ethiopia (FMoH), should continue to include training related to SAP use for all medical staff in surgery ward in the form of pre service and/or in service training to improve attitude and practice of those practitioners. The hospital as well as the national evidence-based surgical antibiotic prophylaxis guideline should have been available, for consistent and standardized practice among doctors by Food, Medicine and Health care Administration and Control Authority (FMHACA) and clinicians should change their attitude and practice toward SAP use and should abide with international most recent guideline. For researcher: the reason why physician in surgery ward had poor attitude and practice in the presence of good knowledge in majority of them.

Declarations

Ethics approval and informed consent

The Jimma University, Institute of Health Institutional Review

Board approved the study under protocol number IHRPGQ/103/207.

Data was collected from all medical staffs in surgery department who had given their consent to participate.

Consent for publication

Not applicable

Data availability

All relevant data are within the paper.

Funding

Jimma University funded the research as post graduate research. The funder has no role in design and/ or interpretation of data for this study.

Competing interests

The authors declare that they have no competing interests.

Authors' Contributions

GM and TM conceived the study, and designed the study; GM, TM and BB analyzed the data; GM and BB wrote the final draft; GM and TM reviewed the final draft and all authors read and approved the final manuscript.

Acknowledgments

To JUMC surgery department staffs who have participated in the study.

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