Antibiotic prophylaxis compliance for clean-contaminated wounds in a district hospital Jakarta

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Abstrak

Latar belakang: *Insidens infeksi luka operasi (ILO) masih menjadi masalah namun kejadiannya dapat dikurangi dengan tindakan pencegahan yaitu antara lain dengan pemberian antibiotik profilaksis. Penelitian ini bertujuan untuk menilai kesesuaian penggunaan antibiotik profilaksis pada pasien bedah bersih-terkontaminasi.*

Metode: *Penelitian potong lintang di sebuah rumah sakit umum daerah (RSUD) di Jakarta pada periode 1 Januari sampai 31 Desember 2013. Data berasal dari rekam medik pasien dewasa yang menjalani pembedahan dengan kriteria kelas luka bedah bersih-terkontaminasi kecuali bedah sesar. Analisis data dilakukan secara deskriptif. Sebagai standar penggunaan antibiotika digunakan Permenkes RI No. 2406/2011 tentang pedoman antibiotik nasional dan pedoman standar internasional untuk profilaksis bedah.*

Hasil: *Sebanyak 626 subjek diikutsertakan dalam penelitian dengan bedah ginekologi (49,5%) dan genitourinari (32,6%) merupakan tindakan bedah terbanyak dan lebih dari 80% bedah elektif. Jenis antibiotik yang paling umum digunakan baik preoperatif maupun postoperatif adalah seftriakson (49,8%), ampisilin/sulbaktam (11,7%) dan sefuroksim (8,3%). Keseluruhan ketepatan antibiotik profilaksis diketahui 96,8% tepat indikasi prosedur bedah, 21,5% tepat obat dan hanya 2,3% tepat waktu pemberiannya 60 menit sebelum operasi.*

Kesimpulan: *Kepatuhan antibiotik profilaksis untuk bedah bersih-terkontaminasi di suatu RSUD Jakarta belum sesuai dengan pedoman nasional dan standar internasional.* ***(Health Science Journal of Indonesia 2015;1:57-62)***

Kata kunci: *antibiotik, bedah, bersih-terkontaminasi, kepatuhan, profilaksis.*

Abstract

Background: The incidence of surgical site infection (SSI) is still a problem, but its occurrence can be reduced by preventive action such as the provision of antibiotic prophylaxis in surgery. This study aimed to describe the compliance of antibiotic prophylaxis in clean-contaminated wounds.

Methods: This cross-sectional study design was conducted in a district hospital in Jakarta during period of January 1 to December 31, 2013. The data came from medical records of adult subjects who underwent surgery with criteria clean-contaminated wound except caesareans. The standard for antibiotic based on Indonesian Ministry of Health Decree No. 2406/2011 for national antibiotics guidelines and international standard guidelines for surgical prophylaxis.

Results: A total of 626 subjects were included in the study. Gynecological (49.5%) and genitourinary surgery (32.6%) were the most frequent of surgeries performed. More than 80% of the surgery were elective. Most commonly administered antibiotic preoperatively as well as postoperatively was ceftriaxone (49.8%), ampicillin/sulbactam (11.7%) and cefuroxime (8.3%). Overall antibiotics prophylaxis appropriateness showed 96.8% in surgery procedures, 21.5% in choice of antibiotic and only 2.3% in time administration that given 60 min before first skin incision.

Conclusions: The compliance of antibiotics prophylactic for clean-contaminated wounds in a district hospital Jakarta has not been in conformity with the national guideline and international standards. ***(Health Science Journal of Indonesia 2015;1:57-62)***

Keywords: antibiotic, clean-contaminated, compliance, prophylaxis, surgery.

Nosocomial infection is a major cause of increased mortality and morbidity among hospitalized patients. Surgical site infection (SSI) is an infection that occurs in the area of surgery and is one of the highest manifestations of nosocomial infections. In Indonesia, the incidence of nosocomial infections in surgical ward was 5.8%-6% and the number of nosocomial infection due to surgical wound was 2.3%-18.3%.[1] A point prevalence survey results in 2003 from a hospital in Jakarta conducted by Directorate General for Development of Medical Care and PERDALIN showed the incident of SSI was 18.9%.[2]

Surgical antibiotic prophylaxis (SAP) is administration of antibiotics before, during, and up to 24 hours post-surgery. The indication of SAP is for cases without any signs of infection with the aim to prevent SSI.[3] Prophylaxis are indicated for medical treatment with high infection rate and 30-50% usage antibiotics in hospitals is intended for surgical prophylaxis.[4,5] Appropriate SAP can reduce the risk of SSI, but the misuse and overuse of antimicrobials can reduce its benefits and increasing both cost and emergence of antibiotics resistant.[6]

Decree No. 2406/Menkes/Per/XII/2011 from Ministry of Health of the Republic of Indonesia (MOH RI) is a national guidelines in decision for the use of antibiotics in public as well as private hospitals and other health care facilities, The SAP is one example of usage of antibiotics that was regulated in the decree with focus in clean-contaminated wounds, limited to clean wounds and recommend the use of antibiotics from first and second-generation cephalosporin.[7]

Non-compliance between routine practice and guidelines of SAP was found in a variety of surgical procedures in various countries and institutions. The level of conformity of SAP with the guidelines were ranged from 0-71.9%.[8] Imprecision use of SAP is generally caused by over prescriptions, inappropriate choice of antibiotic, or prolong antibiotics.[8,9] The study on SAP compliance in Indonesia is still limited. A study conducted at the Dharmais National Cancer Hospital in Jakarta showed inappropriateness of SAP is caused by inaccuracy in the choice of antibiotic, timing and duration for more than 24 hours.[10]

A district Hospital (RSUDs) in Jakarta is a type B non-academic hospital that provide basic services such as elective surgery and emergency services. It also serve as a referral hospital for primary care clinics, however, SAP evaluation in this hospital has not been conducted. Therefore, in this study aimed to assess the compliance of SAP in the district hospital.

METHODS

This cross sectional study used medical records data in a district hospital in Jakarta during the period of January 1 to December 31, 2013.

The subjects consisted of in-patients aged 18-70 years who had clean-contaminated wounds surgery and a prescription of SAP. The subject who had incomplete record of surgery and antibiotic administration and patients who had cesarean and clean wounds were excluded for this study.

Data were extracted by trained data-collectors using standardized data extraction-form. Data collected were patient's gender, age, type of surgery, antibiotic type, dose and timing of antibiotic.

Age was grouped into two categories (≤ 40 and > 40 years) based on risk factor to develop SSI.[11] Surgical procedure was grouped into head and neck, digestive, genitourinary and gynecology. The American Society of Anesthesiologists (ASA) physical status was grouped into two categories (score I and II). Urgency was grouped into two categories (emergency and elective procedures). Antibiotic type was grouped into two categories (single or combinations) and based on their classes. Dose and timing antibiotic administration was grouped into two categories (single dose prior and within skin incision/surgery, and single dose after skin incision/surgery).

Assessment of the appropriateness of SAP based on the decree of MOH RI No. 2406/2011 mainly.[7] Scottish intercollegiate guidelines network (SIGN)[3], American society of health-systems pharmacists (ASHP)[12] and American Urological Association (AUA)[13] were used as additional guidelines for specific surgical procedure and recommend alternative regimen. Data of surgical and antibiotics were assessed for their appropriateness by at least two independent assessors. Third independent assessor were involved when consensus was not reached. The following aspects of SAP were assessed:

- Surgical procedure: application based on clean-contaminated wounds. Clean-contaminated wounds was elective opening or incision through the oral or pharyngeal, respiratory, gastrointestinal, biliary or genitourinary tract with minimal spillage not encountering infected urine or bile; minor technique break.[3,7,12]
- Choice of antibiotics: antibiotic choice for patients with or without allergy, recommended to use first and second-generation cephalosporin's; in certain

cases involving suspected anaerobic bacteria can be combined with metronidazole.[3,7,12,13]

- Dose: single dose prophylaxis was recommended.[3,7,12,13]
- Timing of administration: at a fixed time before incision (within 60 minutes prior to skin incision).[3,12,13]

For analysis, the appropriateness of each aspects SAP was categorized into appropriate and not appropriate. Appropriate was defined when surgical procedures, choice of antibiotic, dose or timing when prophylaxis was used as recommended in the fourth guidelines.[14,15] Thus, compliance of SAP were analyzed by sum of appropriateness of surgical procedures, choice of antibiotics, dose and timing prophylactic administration.[8]

This study was approved by Health Research Ethics Committee (KEPK), National Institute of Health Research and Development (NIHRD), MOH RI.

RESULTS

This study included 626 medical records of surgical patients (217 men and 409 women) who had surgical antibiotic prophylaxis (SAP). Most of the patients were female above 40 years-old. Gynecology (49.5%) and genitourinary (32.6%) were the most frequently performed surgical procedures. More than 80% patients underwent elective surgeries and 14.9% were emergency procedure.

Single antibiotics prophylaxis were given to 565 (90.2%) of the patients. Antibiotics that was mostly used was ceftriaxone (49.8%) followed by ampicillin/sulbactam (11.7%). All preoperative antibiotics were given intravenously, except ciprofloxacin that was administered orally (Table 1).

Assessment between SAP practice in hospital and prophylaxis guidelines found 96.8% (606) subjects were appropriate for surgical procedure, while inappropriate procedure came from 16 cases of head and neck and 4 cases of genitourinary surgery (Table 2). Furthermore, it showed that inappropriate selection of antibiotic (78.5%) and antibiotics were administered too early and after surgery (97.7%) were factor of noncompliance with the recommended guidelines.

DISCUSSION

This study has limitations. Among others, unavailability patterns of antibiotic resistance in surgical ward and interviews with physicians about medical consideration were not conducted. Furthermore, the results from this study came from one hospital, so the result might not be valid for other hospitals in Jakarta. However, the study gave a real example of SAP compliance in type-B (district) hospitals.

Table 1. Overview of demographics and surgical antibiotic prophylaxis in district hospital Jakarta (n = 626)

Characteristic	n	%
Age		
≤ 40 years	231	36.9
> 40 years	395	63.1
Gender		
Men	217	34.7
Women	409	65.3
Surgical Procedure		
Head and Neck	17	2.7
Digestive	95	15.2
Genitourinary	204	32.6
Gynecology	310	49.5
ASA Score		
I	519	82.9
II	107	17.1
Urgency		
Emergency	93	14.9
Elective	533	85.1
Antibiotic Type		
Single antibiotics		
Ciprofloxacin	9	1.4
Cefoperazone	20	3.2
Cefotaxime	37	5.9
Cefuroxime	52	8.3
Ampicillin/ sulbactam	73	11.7
Ceftriaxone	312	49.8
Other antibiotics*	62	9.9
Combination antibiotics		
Cefoperazone + others antibiotics	4	0.6
Ceftriaxone + others antibiotics	18	2.9
Ceftriaxone + cefoperazone	28	4.5
Other combinations	11	1.8
Overall compliance†		
Yes	3	0.5
No	623	99.5

Note:

* Included others β-lactamase/β-lactamase inhibitors; fosfomycin; and metronidazole.

† The compliance was referred to as the sum of indicated surgical procedures and administered with appropriate choice, dose, and timing administration.

Table 2. Assessment appropriateness antibiotics prophylaxis in district hospital Jakarta

Appropriateness	Inappropriate		Appropriate	
	n	%	n	%
Surgical Procedure (n=626)				
Head and Neck	16	94.1	1	5.9
Digestive	0	0.0	82	100
Genitourinary	4	2.3	169	97.7
Gynecology	0	0.0	293	100
Type of antibiotics* (n=606)				
Second-generation cephalosporin	0	0.0	52	100
Third-generation cephalosporin†	450	100	0	0.0
Aminopenicillins	2	2.5	77	97.5
Quinolone	5	83.3	1	16.7
Other antibiotics‡	19	100	0	0.0
Timing antibiotic administrations§ (N=130)				
Single dose prior and within skin incision/surgery	20	87.0	3	13.0
Single dose after skin incision/surgery	107	100	0	0.0

Note: Classified as appropriate when either procedures or drugs were accordance with the recommended guidelines that used in this study, remaining classified as inappropriate.

* Type of antibiotics were assessed based on appropriate in surgical procedures.

† Both single and combination antibiotics.

‡ Includes carbapenems; fosfomycin; and metronidazole as single antibiotics.

§ Timing antibiotic administrations was referred to appropriate in type of antibiotics selection.

This study revealed that less than 5% of SAP given to the patient were not in accordance with the surgical procedures. The result was similar with other studies conducted in the Netherlands and India which showed that the appropriate selection of antibiotics for surgical procedure was above than 80%.[16]

Furthermore, this study revealed that more than 96% of subjects received SAP as single prescribed antimicrobial drugs. In contrary the results in a study in Iran showed 835 patients whom a single antibiotic was indicated, 595 patients (71.3%) received 2 or more combination antibiotics.[17] Although the combinations antimicrobial in some cases were more effective than a single administration, inaccuracy in selecting combinations of antibiotics can increase the risk of antibiotic resistance, allergies and cost of treatment.[9] More than a quintiles of our subjects were given the right medication SAP as recommended in the guidelines and less than 10% received a second-generation cephalosporin (cefuroxime). A review of SAP compliance reported inappropriateness on antibiotics selection as one of the common failings in antimicrobial prophylaxis guidelines adherence. The compliance rate was less than 70%.[8] The results showed a lower proportion in the choice of antimicrobial drug appropriateness compared with previous studies in Jakarta which showed a prevalence of 54.8%.[18] However, the number were similar to several studies conducted in the United States, Brazil, and Israel. In average, the appropriateness of antibiotics in those study were 75% .[8]

None of our subject of head and neck surgery and more than half of our subjects undergoing gynecological and genitourinary surgery were not given recommended antibiotics. A previous study in India among genitourinary surgery showed 97% (n = 100) of the antibiotics used were appropriate.[19] Variations in incidence of inappropriateness SAP may be caused by different study designs, patient characteristics, and the definition of inappropriateness itself.[20]

Based on this study findings, a broad-spectrum antibiotics were given as SAP to surgical patients in our hospital. The antibiotics includes ceftriaxone (49.8%) which was considered as not appropriate according to decree MOH RI and other guidelines assessment. Third-generation cephalosporin was not recommended as prophylaxis SSI since it had less active against *S. aureus* and Streptococcus compared to cefazolin. In addition, even their pharmacokinetic

profile were the longest compared to all generation cephalosporin, third-generation of cephalosporin were expensive.[3,7,8]

In order to achieve the appropriate dose levels and effective concentration in any particular tissue all antibiotics should be administrated within 1 hour before incision. In this study, only 3 out of 130 patients (2.3%) received timely appropriate antibiotics before incision. These results were very low compared with other studies that had a compliance rate from 22.3% to 100%. Antibiotic prophylaxis that was administered too late or too early reduces the efficacy of the antibiotic.[3] Furthermore, maintaining the concentration of antibiotics after the surgery, recovery post-anesthesia or after wound closure will not increase efficacy, but actually increase toxicity and costs.[10] Results from other studies reported incidence SSI were more influenced by inaccurate in time administration than inaccuracies in antibiotics choices.[21]

Results of this study indicated the level of compliance to SAP guidelines was 0.5%. This result was comparable to those carried out in Iran in 6 hospitals whereas the proportion was 0.3%.[17] Lack of awareness of the SAP guidelines, cultural factors, educational background, personal preferences, training, influence from colleague, the supply of medicines were several factors that affects the compliance of health professionals with recommended guidelines.[18]

In conclusion, compliance SAP in a district hospital in Jakarta with evidence based guidelines remained low. In this study, noncompliance was most commonly due to inappropriate choice of drug and inappropriate timing of administration than recommended. However, even SAP were emphasized as complement of asepsis principles and good surgical techniques, it should be considered as one important component of an effective policy in controlling infection, especially related to SSI.

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