2022. Antibiotic Prescribing Behavior Among Surgeon

Anucha Apisarnthanarak, MD[1]; Kittiya Jantarathaneewat, PharmD[1];
Sirithithin Chansirikarnjana, MD[1]; Nattapong Tidwong, PharmD[1];
Linda Mundy, MD, PhD[2]; [1]Thammasat University Hospital, Pathum Thani, Thailand; [2]Bryn Mawr, Pennsylvania, Pennsylvania

Session: 236. Antibiotic Stewardship: Global
Saturday, October 5, 2019: 12:15 PM

Background. A comparative study was conducted to evaluate prescribed antibiotic (AB) use in surgical patients with the Transtheoretical Model of Behavior (TTM) and Theory of Planned Behavior (TPB).

Methods. A survey was conducted at Thammasat University Hospital from January 1 to 31, 2019. We evaluated the appropriateness of AB uses in the surgical department reported per the hospital's Drug Use Evaluation (DUE) form. After review of the DUE, in-depth interviews were conducted to all prescribers to explore antibiotic prescribing behavior based on TTM vs. TPB, using a standardized data collection tool. Data collected included demographics, indications, appropriateness of AB uses, the individual prescriber's behavior based on TTM and TPB. The five TTM stages of change were categorized precontemplation, contemplation, preparation, action, and maintenance. In TPB assessment, we evaluated attitude toward AB uses, subjective norm to AB uses behavior, and perceived behavior control of AB uses behavior.

Results. There were 92 AB uses from 64 prescribers; 70 (70/92; 76%) used antibiotics appropriately. The majority of AB uses (62/92; 67%) were for treatment of infections. The most common reasons for inappropriate AB uses included inappropriate AB choices for treatment and prophylaxis of SSIs (n = 11, 50%) and inappropriate duration (n = 8, 36%). Physicians categorized in higher stages of TTM (action and maintenance) were strongly correlated with appropriate AB uses, while there was no correlation between the total TPB score and appropriateness of AB uses. By multivariate analysis, the TTM action and maintenance (aOR = 7.95; P = 0.02) and self-reported prescribers who considered patients as first priority (aOR = 4.02; P = 0.04) were associated with appropriate AB uses, while neurosurgical procedures (aOR = 0.13; P = 0.003) and antibiotic prescriptions for surgical prophylaxis (aOR = 0.15; P = 0.04) were associated with inappropriate AB uses.

Conclusion. Antibiotic prescribers categorized by TTM stages strongly correlated with appropriate AB uses. Additional studies to assess appropriate AB prescribing behavior, based on TTM stages of change, offer an opportunity to optimize surgical care.

Disclosures. **All authors:** No reported disclosures.

2023. Antimicrobial Resistance and Stewardship Knowledge and Perception among Medical and Pharmacy Students in Nigeria

Chukwuemeka Michael Ubaka, PhD[1]; Natalie Schellack, PhD[2];
Benedict Nwomeh, MD, MPH[3]; Debra A. Goff, PharmD[4]; [1]University of Nigeria, Nsukka, Enugu, Nigeria; [2]Sefako Makgatho Health Sciences University, Medunsa, Gauteng, South Africa; [3]National Children's Hospital, Columbus, Ohio; [4]The Ohio State University Wexner Medicine Center, Columbus, Ohio

Session: 236. Antibiotic Stewardship: Global
Saturday, October 5, 2019: 12:15 PM

Background. Nigeria is the most populous country in Africa and has high rates of antimicrobial resistance (AMR). The practice of antimicrobial stewardship in Nigerian hospitals is very limited and the subject is rarely included in undergraduate medical and pharmacy curriculums. To further acceptance and implementation of antimicrobial stewardship programs (ASP) in Nigeria health system, baseline measurements of the knowledge and perceptions held by graduating medical and pharmacy students was deemed essential. This study evaluated the knowledge and perceptions of a cohort of Nigerian medical and pharmacy students in concepts of AMR and ASP.

Methods. This was a cross-sectional questionnaire-based study of final year medical and pharmacy students from the two largest schools in the southeastern region of Nigeria. A previously published 20-items questionnaire measuring knowledge and perceptions toward AMR and ASP was adopted for the study. Results were expressed as frequencies and percentages.

Results. Completed questionnaires were received from 79.3% (361 of 455 students), over half (60%) were male, and mostly between 22 and 25 years old (68.7%). More pharmacy students had formal training on ASP compared with medical students (41.3% vs. 27.5%, P < 0.05). Pharmacy students (n = 84.3% and 90.5%) were significantly more knowledgeable of factors that promote the spread of AMR and interventions to combat resistance than medical students (n = 73.9% and 82.3%), P < 0.05, respectively. Interestingly, 23.3% of medical students thought pharmacists should lead ASP teams, while 5.8% of pharmacy students thought doctors should lead ASP. However, both held poor perceptions of each other's roles in the ASP team.

Conclusion. Knowledge of AMR and ASP among medical and pharmacy students in Nigeria is lacking. Inter-professional collaboration to change perceptions and drive ASP in urgently needed.

Disclosures. **All authors:** No reported disclosures.

2024. A Multifaceted Intervention to Improve Oral Antimicrobial Prescription at the Emergency Department at a Japanese Tertiary Care Center

Yasuaki Tagashira, MD; Hitoshi Honda, MD, PhD; Tokyo Metropolitan Tama General Medical Center, Fuchu-City, Tokyo, Japan

Session: 236. Antibiotic Stewardship: Global
Saturday, October 5, 2019: 12:15 PM

Background. The emergency department (ED) is one of the most important settings where antimicrobials are frequently prescribed in developed countries, and at least 30% of antimicrobials prescribed at the ED are inappropriate. Some studies revealed that various factors, especially the physician-related factors were associated with inappropriate antimicrobial use. Implementing effective strategies to modify prescribing practice is needed to optimize antimicrobial therapy at the ED.

Methods. We implemented a multifaceted intervention to patients discharged with oral antimicrobial agents in the ED at a Japanese tertiary care center from October 2018 to March 2019. The intervention included (1) an educational didactic session to physicians, (2) an evidence-based tool book regarding antimicrobial use for common diagnoses, (3) antimicrobial order sets for common diagnoses, (4) monthly reports of the appropriateness of antimicrobial use, and (5) post-prescription review and feedback by an infectious diseases physician. The proportion of appropriate discharge antimicrobial prescription at ED, and changes in the prescription density, measured as the number of prescription per 1,000 patient visits between pre- and post-intervention were evaluated.

Results. The total number of patient visits at the ED during the study period was 52,274. With the intervention, the mean monthly discharge antimicrobial prescription decreased from 42.7 to 34.2 per 1,000 visits (proportional reduction 0.20; P < 0.01). Overall, appropriate prescription rate significantly increased from 47.7% (742/1,555) to 77.4% (421/544) (P < 0.01). The rate of unnecessary and inappropriate discharge antimicrobial prescription accounted from 27.5% (428/1,555) and 21.7% (337/1,555) to 8.5% (46/544) and 10.7% (58/544), respectively. A substantial improvement in discharge antimicrobial prescription against intra-abdominal infections and odontogenic infections during the intervention period was observed (changes in the proportion of appropriate prescription was 0.37 [P < 0.01] and 0.51 [P < 0.01], respectively.

Conclusion. An evidence-based, multifaceted intervention led to decreasing unnecessary prescription and optimizing physicians' antimicrobial prescriptions at the ED.

Disclosures. **All authors:** No reported disclosures.

2025. Evaluation of the Impact of an Antimicrobial Stewardship Program in a Tertiary Hospital in Northern Italy: Efficacy of a Persuasive Approach on Antibiotics Consumption and Rate of *Clostridium difficile* Infection

Erika Chiari, MD[1]; Davide Mangioni, MD, [1,2,3];
Ester Pollastri, MD[1]; Liana Signorini, MD[1];
Giovanni Moioli, MD[1]; Giuseppe Paraninfo, MD[1];
Evelyn Van Hauwermeiren, MD[1]; Barbara Saccani, MD[1]; Davide Bertelli, MD[1];
Elena Festa, Pharmacist[1]; Arnaldo Caruso, MD[4];
Roberto Stellini, MD[1]; Francesco Castelli, MD[1]; [1]Department of Infectious and Tropical Diseases, Spedali Civili, Brescia, Italy; [2]Infectious Diseases Unit, Departement of Internal Medicine, Fondazione IRCCS Cà Granda Ospedale Maggiore Policlinico, Milan, Italy; [3]Infectious Diseases Unit, Departement of Internal Medicine, Fondazione IRCCS Cà Granda Ospedale Maggiore Policlinico, Brescia, Lombardia, Italy; [4]Department of Microbiology and Virology, Spedali Civili, Brescia, Lombardia, Italy

Session: 236. Antibiotic Stewardship: Global
Saturday, October 5, 2019: 12:15 PM

Background. Antimicrobial resistance (AMR) situation in Italian hospitals and regions represents a major public health threat [ECDC, 2017]. Antimicrobial stewardship programs (ASPs), particularly when based on local epidemiology, have been beneficial in optimizing antibiotic therapy as well as reducing hospital rates of *Clostridium difficile* infection (CDI) and AMR [Akpan MR, *Antibiotics* 2016]..

Methods. Our ASP program has been conducted at *Spedali Civili* General Hospital of Brescia, Northern Italy (1300-bed tertiary hospital), between the beginning of 2016 and the end of 2017. A preliminary analysis of local epidemiological data was performed (Table 1). Seven groups ("districts") were identified according to microbiological and clinical similarities. This was a persuasive-based ASP. First, we trained physicians on general principles of AS, then guidelines for the management of "difficult-to-handle" infections were drafted based on international guidelines and local microbiological data (Table 2)..

Results. Here we show the results of pre-ASP (2015) vs. post-ASP (2018) analysis on antibiotic consumption (AC) and CDI rates. AC is expressed in DDD/100 bed-days. The overall hospital AC decreased from 84.31 to 76.84 (–9%), consistently with national recommendations [Italian National Plan against AMR, 2017]. In accordance with the local guidelines developed within our ASP, carbapenem consumption decreased from 5.77 to 4.87 (–16%) and fluoroquinolones (FLQ) from 14.45 to 9.94 (–31%). At the same time piperacillin/tazobactam use increased from 5.53 to 8.46 (53%). 3°–4°G cephalosporins and glycopeptides consumption slightly reduced from 11.78 to 11.42 (–3%) and from 4.07 to 3.83 (–6%), respectively. AC of the different districts involved is reported in Table 3. CDI rates decreased from 0.0434/100 bed-days in 2015 to 0.0315/100 bed-days in 2018 (–27%) (Figure 1).

Conclusion. Our ASP was a persuasive-based program in a setting of high AMR rates. In the short term, it has shown a positive impact in improving AC (in particular of broad-spectrum antibiotics with a high risk of resistance selection and CDI) and CDI rates. Audits for local guidelines adherence and the evaluation of AC, AMR and CDI rates are ongoing as long-term quality measures for assessing the impact of our ASP.

Table 1. Antimicrobial resistance (non-susceptibility) rates of selected pathogens, invasive isolated (2016). Local hospital data (blood cultures) are compared to Italian, European and US data (blood and CSF cultures).

	Spedali Civili General Hospital	Italy *	Europe *	United States †
% methicillin resistant *Staphylococcus aureus*	33,1	33,6	17,7	45
% 3G cephalosporin resistant *Escherichia coli*	25,5	29,8	14,9	15
% 3G cephalosporin resistant *Klebsiella pneumoniae*	39,2	55,8	25,7	12
% carbapenem resistant *Klebsiella pneumoniae*	19,5	33,9	6,1	3
% piperacillin/tazobactam resistant *Pseudomonas aeruginosa*	14,8	30,7	18,8	7
% ceftazidime resistant *Pseudomonas aeruginosa*	12,5	23	14,4	19
% carbapenem resistant *Pseudomonas aeruginosa*	15,9	23,5	18,2	10

* ^ Surveillance of antimicrobial resistance in Europe 2017. Annual Report of the European Antimicrobial Resistance Surveillance Network (EARS-Net). Stockholm: ECDC; 2018
† The Center for Disease Dynamics Economics & Policy. ResistanceMap: Antibiotic resistance. 2018. https://resistancemap.cddep.org/AntibioticResistance.php. Date accessed: April 30, 2019.
All the prevalence data refer to 2016 except for % ceftazidime resistant *Pseudomonas aeruginosa* (2014)

Table 1.

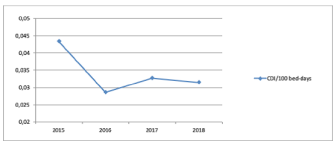
Variables	Non-Transplant (N=379)	Transplant (N=93)	P value*
Demographics			
Age in Years (Mean, SD)	54, 14	54, 14	0.1002
Male (%)	185, 49.3%	51, 54.8%	0.3418
Race:			
White	210, 56%	70, 75.3%	0.0068
Black	121, 32.3%	19, 20.4%	
Asian	8, 2.13%	1, 1.1%	
Other	36, 9.6%	3, 3.2%	
Candida Score (Mean, SD)	1.14, 1.05	0.98, 0.99	0.1736
Candidemia Risk High	38, 10%	4, 4.3%	0.0623
ICU	331, 88%	47, 52.2%	< 0001
Clinical characteristics			
Co-morbidities:			
Renal Failure	214, 56.5%	63, 67.7%	0.0478
HIV	8, 2.13%	3, 3.23%	0.2894
Malignancy on chemotherapy	42, 11.2%	26, 28%	< 0001
Antibiotics ≥48hrs preceding test	367, 97.87%	90, 96.77%	0.4632
Fever/Hypothermia (Tmax >38 or <36 °C)	157, 41.87%	33, 35.48%	0.2619
Neutropenia (ANC < 1000 cells/cc)	22, 5.9%	15, 16.1%	0.001
Severe Sepsis†	85, 22.7%	19, 20.4%	0.6424
Vasopressor Required	103, 27.5%	15, 16.1%	0.0242
Ventilator Required	264, 69.7%	28, 30.1%	< 0001
Presence of CVC	185, 49.6%	33, 35%	0.0146
Presence of prosthesis or ICD	22, 5.8%	7, 7.5%	0.5354
TPN	90, 24%	18, 19.8%	0.3921
Tube Feeding	193, 51.5%	28, 30.8%	0.0004
Surgery	173, 46.1%	36, 38.5%	0.1868
Abdominal Infection	30, 8%	0, 0%	0.0053
GI perforation	32, 8.5%	3, 3.3%	0.0891
Abscess	17 4.55%	1 1.08%	0.1429
ID consult	258, 67.55%	71, 76.34%	0.0904
Outcomes			
Antifungal started	202, 53.3%	62, 66.67%	0.0200
Antifungal discontinuation after negative T2	199, 62.51%	60, 64.52%	0.0370
In-patient Mortality	128, 34%	13, 14%	0.0002
30-Day Mortality	28, 7.5%	7, 7.5%	0.979

*p<0.05 significant
†Severe sepsis: at least 2/4 SIRS criteria with multi-organ dysfunction or vasopressor support

Table 3. Antibiotic consumption per year (from 2015 to 2018) measured in DDD/100 bed-days in the districts involved in the ASP and difference (expressed in %, Δ %) between pre-ASP and post-ASP.

	2015	2016	2017	2018	Δ % 2015-2018		2015	2016	2017	2018	Δ % 2015-2018
Spedali Civili General Hospital (units involved in the ASP)						Osteoarticular					
piperacillin/tazobactam	5.55	7.04	7.90	8.46	53%	piperacillin/tazobactam	1.15	1.06	1.93	2.25	96%
3-4 G cephalosporins	11.70	12.66	10.90	11.42	-3%	3-4 G cephalosporins	7.50	7.20	3.03	4.12	-46%
carbapenemes	5.77	6.24	5.51	4.87	-16%	carbapenemes	0.50	1.28	1.54	3.82	218%
fluoroquinolones	14.45	13.57	11.01	9.84	-32%	fluoroquinolones	13.15	13.62	10.27	9.62	-27%
glycopeptides	6.07	3.95	3.71	3.83	-6%	glycopeptides	5.52	9.92	10.16	7.72	40%
Cardiothoracic						Onchematological					
piperacillin/tazobactam	4.20	4.92	4.90	6.50	55%	piperacillin/tazobactam	3.31	3.95	3.94	6.99	111%
3-4 G cephalosporins	5.75	6.72	6.62	7.31	27%	3-4 G cephalosporins	21.16	30.16	15.77	17.56	-17%
carbapenemes	2.40	2.42	2.23	2.17	-10%	carbapenemes	10.02	12.10	8.19	9.51	-5%
fluoroquinolones	10.18	8.60	8.01	7.60	-25%	fluoroquinolones	24.98	23.69	21.52	25.53	-7%
glycopeptides	3.56	2.69	3.02	2.75	-10%	glycopeptides	8.37	8.59	7.48	11.65	39%
Cervicospinal						Internal Medicine					
piperacillin/tazobactam	1.69	1.57	1.77	2.53	50%	piperacillin/tazobactam	8.07	10.60	11.37	13.31	65%
3-4 G cephalosporins	6.20	7.51	7.02	6.91	11%	3-4 G cephalosporins	15.47	16.56	15.59	17.01	10%
carbapenemes	3.12	3.69	2.56	2.29	-27%	carbapenemes	7.60	7.86	7.16	6.71	-12
fluoroquinolones	10.30	11.55	10.51	9.06	-4%	fluoroquinolones	16.98	16.22	14.20	14.98	-12%
glycopeptides	2.02	2.60	1.76	2.41	-15%	glycopeptides	3.53	3.10	3.20	3.44	-3%
Abdominopelvic						Intensive Care					
piperacillin/tazobactam	4.51	6.32	8.30	7.42	64%	piperacillin/tazobactam	16.72	16.25	16.87	21.53	68%
3-4 G cephalosporins	9.52	8.56	7.00	6.20	-35%	3-4 G cephalosporins	21.45	27.29	24.54	15.94	-26%
carbapenemes	2.08	2.76	2.62	2.13	-26%	carbapenemes	14.69	26.01	24.63	17.56	20%
fluoroquinolones	11.83	9.60	7.06	7.77	-34%	fluoroquinolones	16.07	13.11	13.72	16.90	5%
glycopeptides	2.02	1.72	1.40	1.47	-27%	glycopeptides	13.91	12.36	9.51	12.23	-10%

Figure 1. *Clostridium difficile* infection rates per year (from 2015 to 2018) measured in cases/100 bed-days.



Disclosures. **All authors:** No reported disclosures.

2026. A Current Status of Antimicrobial Stewardship Programs in Korean Large Hospitals: A Nationwide Survey in 2018

Bongyoung Kim, MD, PhD[1]; Myung Jin Lee, MD, MSc[2]; Song Mi Moon, MD, PhD[3]; Se Yoon Park, MD, MSc[4]; Kyoung-Ho Song, MD, PhD[5]; Hyunju Lee, MD, PhD[6]; Jeong Su Park, MD, PhD[7]; Mi Suk Lee, MD[8]; Su-Mi Choi, MD, PhD[9]; Joon-Sup Yeom, MD, PhD[10]; Jin Yong Kim, MD, MPH[11]; Chung-Jong Kim, MD, PhD[12]; Hyun-Ha Chang, MD, PhD[13]; Eu Suk Kim, MD, PhD[3]; Tae Hyong Kim, MD, PhD[4]; Hong Bin Kim, MD, PhD[14]; [1]Department of Internal Medicine, Hanyang University College of Medicine, Songpa-gu, Seoul-t'ukpyolsi, Republic of Korea; [2]Division of Infectious Diseases, Department of Internal Medicine, Inje University Sanggye-Paik Hospital, Seoul, Seoul-t'ukpyolsi, Republic of Korea; [3]Department of Internal Medicine, Seoul National University College of Medicine, Seoul, Seoul-t'ukpyolsi, Republic of Korea; [4]Division of Infectious Diseases, Department of Internal Medicine, Soonchunhyang University Seoul Hospital, Soonchunhyang University College of Medicine, Seoul, Seoul-t'ukpyolsi, Republic of Korea; [5]Department of Internal Medicine, Seoul National University College of Medicine, Seoul National University Bundang Hospital, Seoul, Seoul-t'ukpyolsi, Republic of Korea; [6]Department of Pediatrics, Seoul National University Bundang Hospital, Seongnam, Kyonggi-do, Republic of Korea; [7]Department of Laboratory Medicine, Seoul National University Bundang Hospital, Kyonggi-do, Kyonggi-do, Republic of Korea; [8]Division of Infectious Diseases, Department of Internal Medicine, Kyung Hee University School of Medicine, Seoul-t'ukpyolsi, Republic of Korea; [9]Division of Infectious Diseases, Department of Internal Medicine, College of Medicine, The Catholic University of Korea, Seoul, Seoul-t'ukpyolsi, Republic of Korea, [10]Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Seoul-t'ukpyolsi, Republic of Korea, [11]Division of Infectious Diseases, Department of Internal Medicine, Incheon Medical Center, Inch'on-jikhalsi, Republic of Korea, [12]Division of Infectious Diseases, Department of Internal Medicine, Ewha Womans University College of Medicine, Seoul-t'ukpyolsi, Republic of Korea, [13]Division of Infectious Diseases, Department of Internal Medicine, School of Medicine, Kyungpook National University, Daegu, Taegu-jikhalsi, Republic of Korea, [14]Division of Infectious Diseases, Department of Internal Medicine, Seoul National University Bundang Hospital, Kyonggi-do, Kyonggi-do, Republic of Korea

Session: 236. Antibiotic Stewardship: Global
Saturday, October 5, 2019: 12:15 PM

Background. The aim of this study was to examine the current status of antimicrobial stewardship program (ASP) in large hospitals in South Korea, identifying problems and hurdles for implementation of proper ASP, and providing a reference for the proposal of ASP policies.

Methods. The questionnaire was designed based on the "Seven Core Elements of Hospital Antibiotic Stewardship Programs" from Centers for Diseases Control and Prevention of the U.S. and modified from the questionnaire of the previous survey on ASP in Korea, 2015. The survey targeted all the hospitals with 500 beds or more in South Korea in 2018. The online-based survey using SurveyMonkey® platform was conducted for 3 weeks from June to July 2018. Only one ASP-associated physician per hospital participated in the survey.

Results. The response rate to the survey was 88.4% (84/95). The median number of medical personnel participating in ASP was 4 [interquartile range (IQR) 2.25–5], most of which were infectious diseases specialists (median 2, IQR 1–2). Besides, some pediatric infectious diseases specialists, pharmacists, etc. were participating in the ASPs. Only 6.0% (5/84) of hospitals had full-time workers for ASP. Restrictive measures for designated antibiotics was a widely accepted ASP strategy among Korean hospitals (88.1%, 74/84) and the median number of designated antibiotic classes was 16 (IQR 11–19). An 11.9% (10/84) of hospitals introduced monitoring and intervention program against inappropriate antibiotic combination therapy. The proportion of hospitals which had interventions for inappropriate long-term antibiotic use and parenteral to oral conversion strategy were 9.5% (8/84) and 1.2% (1/84), respectively. Lack of time, personnel, and appropriate reward were perceived as the major barriers to establishing ASP in Korean hospitals.

Conclusion. ASP in Korean hospitals were mainly carried out by 1–2 infectious diseases specialists and it heavily depended on restrictive measures for designated antibiotics. Supporting manpower and establishment of the appropriate reward system is necessary for improvement of ASP in Korean hospitals.

Table 1. Characteristics and resources of study hospitals

	Total (n=84)
Hospital information	
No. of inpatient beds (%)	
500 – 999	68 (81.0)
≥ 1,000	16 (19.0)
Hospital types (%)	
University-affiliated hospital	63 (75.0)
Other teaching hospital	16 (19.0)
Non-teaching hospital	5(6.0)
No. of ICU* beds (%)	
<20	7 (8.3)
20-29	18 (21.4)
≥30	59 (70.2)
Human resources	
No. of infectious diseases specialists (%)	
0	10 (11.9)
1	21 (25.0)
2	31 (36.9)
3	13 (15.5)
≥4	9 (10.7)
No. of medical personnel participating in ASP, median (IQR)	
Infectious disease specialists	2 (1-2)
Pediatric infectious disease specialists	0 (0-0)
Pharmacists	0 (0-0)
Laboratory microbiology specialists	0 (0-0)
Other specialists	0 (0-0)
Clinical fellows	0 (0-1)
Residents	0 (0-0)
Nurses	0 (0-0)
Presence of full-time worker for ASP (%)	5 (6.0)
The leader of ASP (%)	
Infectious disease specialists	69 (82.)
Pediatric infectious disease specialists	2 (2.4)
Other specialists	13 (15.5)
Presence of antimicrobial management committee (%)	63 (75.0)
Reward for operating ASP from the administration (%)	18 (21.4)

Abbreviations: ASP, antimicrobial stewardship programs; ICU, intensive care units; IQR, interquartile range

* It includes medical ICU, surgical ICU, medical-surgical ICU, and neurosurgery ICU

Table 2. Strategies of antimicrobial stewardship programs

A. Tracking and reporting

	Total (n=84)	Hospital with IDS (n=74)	Hospital without IDS (n=10)	*P*[a]
Monitoring for antibiotic consumption, quantitative evaluation (%)				
Regular monitoring	42 (50.0)	40 (54.1)	2 (20.0)	0.088
Irregular monitoring	11 (13.1)	9 (12.2)	2 (20.0)	0.613
Monitoring level for antibiotic consumption (%)				
Antibiotic ingredient name	40 (47.6)	36 (48.6)	4 (40.0)	0.741
Antibiotic brand name	17 (20.2)	16 (21.6)	1 (10.0)	0.679
Data collection for antibiotic consumption (%)				
With computerized program	23 (27.4)	22 (29.7)	1 (10.0)	0.272
Request to hospital data processing department	25 (29.8)	23 (31.1)	2 (20.0)	0.716
Regular report of antibiotic consumption (%)	35 (41.7)	**35 (47.3)**	**0 (0)**	**0.004**
Target audience of regular report of antibiotic consumption (%)				
Hospital administration	17 (20.2)	17 (23.0)	0 (0)	0.201
High prescribers of antibiotics	13 (15.5)	13 (17.6)	0 (0)	0.349
Whole hospital staffs	6 (7.1)	6 (8.1)	0 (0)	1.000
No existence of regular report	49 (58.3)	**39 (52.7)**	**10 (100)**	**0.004**
Monitoring for compliance with guideline of antibiotic use (%)	15 (17.9)	14 (18.9)	1 (10.0)	0.682
Monitoring for compliance with use of antibiotic recommended by IDS (%)	21 (25.0)	21 (28.4)	0 (0)	0.060
Monitoring for *C. difficile* infection rate (%)	57 (67.9)	52 (70.3)	5 (50.0)	0.279
Monitoring for adverse event by antibiotic use (%)	57 (67.9)	**68 (91.9)**	**5 (50.0)**	**0.003**

Abbreviations: IDS, infectious diseases specialist

[a] comparison between hospital with IDS and hospital without IDS

B. Action

	Total (n=84)	Hospital with IDS (n=74)	Hospital without IDS (n=10)	*P*[b]
Restrictive measures for designated antibiotics (%)	74 (88.1)	**68 (91.9)**	**6 (60.0)**	**0.016**
Prospective audit and feedback (%)				
For patients using specific antibiotics	41 (48.8)	39 (52.7)	2 (20.0)	0.089
For patients having specific diseases	4 (4.8)	4 (5.4)	0 (0.0)	1.000
For patients in specific departments or wards	10 (11.9)	10 (13.5)	0 (0.0)	0.600
Frequency of prospective audit and feedback (%)				
Everyday	16 (19.0)	15 (20.3)	1 (10.0)	0.679
Every 2-21 days	10 (11.9)	10 (13.5)	0 (0)	0.600
Irregular	18 (21.4)	17 (23.0)	1 (10.0)	0.682
Monitoring and intervention on antibiotic use (%)				
Inappropriate antibiotic combination therapy	10 (11.9)	9 (12.2)	1 (10.0)	1.000
Inappropriate long-term antibiotic use	8 (9.5)	7 (9.5)	1 (10.0)	1.000
Inappropriate perioperative antibiotic use	36 (42.9)	34 (45.9)	2 (20.0)	0.177
Inappropriate antibiotic administration	8 (9.5)	8 (10.8)	0 (0)	0.587
Inappropriate antibiotic dosage	17 (20.2)	17 (23.0)	0 (0)	0.201
High-risk antibiotics for *C. difficile* infection[a]	5 (4.8)	0 (0)	4 (5.4)	1.000
Automatic stop order (%)	13 (15.5)	12 (16.2)	1 (10.0)	1.000
Formulary restriction (%)	13 (15.5)	12 (16.2)	1 (10.0)	1.000
Automated intervention system linked with antimicrobial susceptibility results (%)	10 (11.9)	9 (12.2)	1 (10.0)	1.000
Computerized clinical decision support program (%)	35 (41.7)	**34 (45.9)**	**1 (10.0)**	**0.040**
Intravenous to oral conversion strategy (%)	1 (1.2)	1 (1.4)	0 (0)	1.000
Antibiotic rotation/cycling (%)	0 (0)	0 (0)	0 (0)	-

Abbreviations: IDS, infectious diseases specialist

[a] it depends on policies of each hospital

[b] comparison between hospital with IDS and hospital without IDS