

ORIGINAL ARTICLE

Antimicrobial Stewardship (AMS) Program in Private Hospitals in the Philippines: Its Acceptability, Barriers, and Enablers

ABSTRACT

Background: Antimicrobials are drugs that are often misused and inappropriate antimicrobial prescribing often results in poor clinical outcome and drug resistance. Monitoring and regulation of antimicrobial use is currently being done by the Department of Health through the Antimicrobial Stewardship (AMS) Program. There is a need to determine the factors that affect successful implementation of an AMS program in private hospitals in the Philippines. This study was conducted to identify the enablers and potential barriers in implementing an AMS program in nine (9) private hospitals.

Methodology: A concurrent mixed methods design was used to assess various stakeholders' (physicians, administrators, other AMS members) perceptions of existing or proposed AMS programs, and to identify barriers and enablers in their implementation. Quantitative data were collected using self-administered survey questionnaire to assess clinician's acceptance of AMS programs. Qualitative data were collected through semi-structured one-on-one interviews of clinicians and other AMS personnel and focus group discussions (FGD) of selected clinician groups. Data were gathered from October 2018 to October 2019.

Results: 409 clinicians were surveyed, 52 were interviewed and 46 sat for 13 sessions of FGDs. Overall, the survey established that physicians were well aware of antimicrobial resistance problem. Majority of the clinicians indicated general agreement with the currently practiced antimicrobial protocols in their hospitals and with the AMS program. However, there were disagreements in perceptions with how antimicrobial restrictions impair prescribing practices and overuse of the same. These responses were strong points of discussion during the Key Informant Interviews (KII) and FGDs. All respondents were amenable with the institutionalization of an AMS program in their hospitals. The hospital leadership's commitment was determined to be the key enabler of a successful AMS program's implementation. Barriers identified for hospitals with existing AMS programs were: lack of dedicated staff, resistance and/or non-cooperation of physicians, lack of support from non-medical departments, and inadequate cooperation between hospital

Marimel R. Pagcatipunan, M.D.^{1,14}

Servando Halili Jr., P.H.D.²

Rosemarie S. Arciaga, M.D.^{3,14}

Sarah R. Makalinaw, M.D.^{4,14}

Ma. Liza M. Gonzales, M.D.^{5,14}

Robert Dennis Garcia, M.D.^{6,14}

Cynthia Aguirre, M.D.^{7,14}

Anna Lisa Ong-Lim, M.D.^{8,14}

Imelda Luna, M.D.^{9,14}

Elizabeth Gallardo, M.D.^{10,14}

Jonathan Lim, M.D.^{11,14}

Delta Aguilar, M.D.^{12,14}

Nicole Pererras, M.D.^{13,14}

¹ Associate Professor 3, Division of Infectious and Tropical Disease, Department of Pediatrics, Philippine General Hospital, University of the Philippines, Manila, Philippines.

² Fellow, Fulbright-CHED-MAEP and FAIMER Institute; Associate Professor 5, Zamboanga State College of Marine Sciences and Technology; Faculty (PT), School of Medicine, Ateneo de Zamboanga University, Zamboanga City, Philippines.

³ Faculty, Ateneo de Zamboanga University-School of Medicine, Zamboanga City, Philippines.

⁴ Active Consultant, The Medical City Ortigas and Victor R. Potenciano Medical Center, Medical Specialist II, Rizal Medical Center, Manila Philippines.

⁵ PROFESSOR 3, Department of Pediatrics, Philippine General Hospital-College of Medicine, University of the Philippines, Manila, Philippines

⁶ Section Chief, Pediatric Infectious Disease Makati Medical Center, Makati City

⁷ Consultant, Pediatric Infectious Disease, The Medical City Hospital

⁸ Assistant Professor, UP PGH, Consultant Pediatric Infectious Disease, Manila Medical Center and Metropolitan Medical Center, Manila

⁹ Assistant Professor and Head, Section of Pediatric Infectious Diseases, St Luke's Medical Center Quezon City

¹⁰ Professor, Past Chair, Department of Pediatrics Saint Louis University Hospital of the Sacred Heart, Baguio City.

¹¹ Consultant, Department of Pediatrics, Chong Hua Medical Center, Cebu City

¹² Consultant, Department of Pediatrics, Davao Doctors Medical Center, Davao City

¹³ Consultant, Department of Pediatrics, University of Perpetual Help DALTA, Las Pinas City, Metro Manila

¹⁴ Fellow, Pediatric Infectious Disease Society of the Philippines and Philippine Pediatric Society.

Correspondence:

Dr. Marimel R. Pagcatipunan

E-mail: mrpagcatipunan@yahoo.com

The authors declare that the data presented are original material and has not been previously published, accepted or considered for publication elsewhere; that the manuscript has been approved by all authors, and all authors have met the requirements for authorship.



personnel. Barriers identified, regardless of the status of the AMS programs were: deficiency in knowledge with developing and implementing an AMS program, inadequate information dissemination, unavailability of an IT-based monitoring for antibiotic use, and the influence of pharmaceutical companies on stakeholders with regards to antimicrobial use.

Conclusions: Similar enablers and barriers to a successful implementation of an AMS program were seen in the different hospitals. A hospital leadership's commitment was determined to be the key enabler. The success or failure of any AMS program appears to depend on physician understanding, commitment and support for such a program. By involving the main players in an AMS program- the hospital administrators, clinicians and other key members, perceived barriers will be better identified and overcome, and enablers will help allow a successful implementation of an AMS program.

This multi-center study was funded by Philippine Council on Health Research and Development (PCHRD) and Pediatric Infectious Disease Society of the Philippines (PIDSP) and was conducted by the PIDSP Research Committee.

BACKGROUND

Antimicrobials are commonly prescribed drugs in all age groups, in many situations they are either misused or overused. This inappropriate prescribing habit contributes to increased cost of medical care, prolonged course of an illness, and increased rates of antibiotic resistance.

Antimicrobial resistance is recognized as one of the greatest threats to human health worldwide. One of the manageable causes of antimicrobial resistance is the overuse and misuse of antimicrobial agents in humans, animals, agriculture, and consumer products.¹ Antimicrobial resistance is expected to develop over time, as a consequence of any antimicrobial use, whether appropriate or not, as microorganisms mutate and acquire resistance to a drug when exposed to it. To counteract this process, antimicrobials should be used responsibly and appropriately, in order to preserve their usefulness, recognizing that the use of these drugs is accompanied by a myriad of individual and societal effects.

In the Philippines, data from the Antimicrobial Resistance Surveillance Program (ARSP) of the Department of Health (DOH) has shown an alarmingly high resistance of various pathogens to first-line antimicrobials. Multi-drug resistance (MDR) among bacterial organisms-*Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Acinetobacter baumannii*, is a public health concern because of the limited treatment options, high cost of care, and infection control challenges. MDR and extensive drug resistance (XDR) rates are increasing.² These disturbing data reinforce the importance of promoting the rational use of antibiotics. This concern is the main goal of creating a program that institutes antimicrobial stewardship (AMS).

The ARSP data is a wake-up call to both government and private sectors to prioritize the implementation of an AMS program in the clinical setting. The DOH, for its part, has started to roll-out and implement the AMS program in all government and private hospitals. In a controlled clinical environment, such as a tertiary government hospital, the implementation of an AMS program may be relatively straightforward. This may not be the case in most private hospitals and small government hospitals.

While it is equally important to implement an AMS program in private hospitals, doing so can be challenging, given the marked variations in the prescribing habits of private clinicians. The current DOH AMS Manual highlights the need for the support and cooperation of hospital administrators, for the program to become successful.

As a society whose members are stewards of rational antimicrobial use, the Pediatric Infectious Disease Society of the Philippines (PIDSP) looked into the challenges of implementing an AMS program in private hospitals. More importantly, physician perceptions regarding restricted antimicrobial prescribing and an institutionalized AMS program, in general, were sought. In so doing, enablers and potential barriers to the implementation of an AMS program would be identified.

METHODS

Data were gathered to assess clinicians' perceptions and to identify barriers and enablers in the implementation of a hospital-based AMS program, using qualitative and quantitative methods. Convenience sampling was employed. Medical directors, pediatricians, internists, medical technologists, pharmacists and infection control nurses from nine privately-owned hospitals, from different parts of the country, were asked to participate in this descriptive, cross-sectional study. For ethical reasons, the names of these hospitals are withheld, and the participants anonymized. The protocol was reviewed and approved by the Institutional Review Board (IRB) and ethics committee of each hospital.

The hospitals were stratified as follows: three NCR Hospitals with an existing AMS program; three NCR hospitals with no, or had just started an AMS program; and one hospital each, from Luzon, Visayas and Mindanao with no AMS program. Data were gathered from October 1, 2018 to October 31, of 2019.

Quantitative data was collected using a 26-item opinion survey administered to determine the clinicians' acceptability of an AMS program. The instrument was adapted from a validated tool from the Greater New York Hospital Association (GNYHA), with minor revisions made. The survey questionnaire was revised using Cronbach's alpha, which showed a reliability of 0.762, thus validating the revisions' entry into the final version

of the questionnaire. Likert scale and frequency distribution and measures of central tendency (mean, mode and range) were determined.

Qualitative data were generated from interviews and FGDs to ascertain the participants' positions regarding an AMS program, including the struggles and setbacks they faced, their strategies, successes and suggestions, in the implementation of the said program. A set of guide questions were used. The responses were recorded and transcribed, but were not read back to the participants. A Qualitative Descriptive Study (QDS), an approach commonly used in health research, and loosely grounded on more conventional qualitative approaches was used to process the data (Kim, 2017). Themes were determined through axial coding.

Two research assistants distributed and retrieved the 26-item survey questionnaire from selected clinicians in the target hospitals. The questionnaire has 4 sub-parts: a. Antimicrobial Resistance: Scope of The Problem and Key Contributors; b. Antibiotic Prescribing Practices; c. Antimicrobial Stewardship Programs; and d. Acceptability of an Antimicrobial Stewardship Program. Collected data were processed manually and rechecked before they were statistically processed in Microsoft Excel. Results were reviewed for consistency and accuracy and frequencies, means and modes were determined.

RESULTS AND ANALYSIS

The demographic data and type of participation of study participants from the 9 hospitals were as follows: 409 clinicians (Pediatricians, n= 282, Internists, n= 127) were surveyed, 52 were interviewed individually as Key Informant Interviewee (KII) with 13 Focus Group Discussion (FGD) sessions and an average of 2-6 respondents per session (a total of 46 participants) were conducted. Summary in Tables 1 and 2.

Table 1. AMS Survey Respondents (N=409)

HOSPITAL	PEDIA	IM	TOTAL
I A	29	13	42
II A	55	2	57
III A	51	11	62
IV B	19	0	19
V B	23	0	23
VI B	20	1	21

NCR Sub Total	197	27	224
VII B	35	41	76
VIII B	35	41	76
IX B	15	18	33
Provincial Sub Total	85	100	185
TOTAL	282	127	409

Legend: A- Hospital with AMS program B- with no or which had just started an AMS program

Table 2.1. Participants of Key Informant Interviews. (n=52)

POSITION	Number of Respondents
Medical Director	7
Department Head (Internal Medicine)	4
Department Head (Pediatrics)	8
Infection Control Head / Pharmacist Head	7
AMS Physician	6
AMS / ICC Nurse	7
Clinical Pharmacist	9
Microbiology Head	2
ICS Department Manager	2
TOTAL (n)	52

Table 2.2. Participants in Focused Group Discussions, 13 sessions. (n=46)

Department	Number of Respondents
Adult Department (Metro Manila)	2
Adult Department (Provincial)	10
Pediatrics Department (Metro Manila)	15
Pediatrics Department (Provincial)	19
TOTAL (n)	46

**A. AMS: Acceptability –
 Antimicrobial Resistance: Scope of The Problem and Key Contributors**

The first part of the questionnaire was on Antimicrobial Resistance: Scope of The Problem and Key

Contributors. The respondents were asked to respond to 6 items about antibiotic resistance, surveillance and related protocols. Table 3 consolidates the responses from the different hospitals.

Table 3. Antimicrobial Resistance: Scope of The Problem and Key Contributors

Questionnaire Items	Hospitals										Mode	RANGE
	I	II	III	IV	V	VI	VII	VIII	IX			
1. Antibiotic resistance is a significant problem in this institution	3	4	4	4	4	2	4	4	4	4	4	(2, 4)
2. A MDRO patient’s room is cleaned according to hospital cleaning protocol after discharge	4	4	5	5	4	4	4	4	4	4	4	(4,5)
3. Adherence to hand-hygiene protocols is efficient in this institution.	4	4	5	5	4	4	4	4	4	4	4	(4,5)
4. The institution does enough to control the development of resistant organisms through surveillance.	4	4	5	5	4	5	4	4	4	4	4	(4,5)
5. This institution provides an adequate MDRO education program for its staff.	4	4	4	4	4	4	4	4	4	4	4	4
6. A patient is likely to develop an MDRO infection during their stay (while admitted) in this institution.	2	2	3	3	2	3	3	2	4	2	2	(2, 4)

Legend: 1 - Strongly Disagree, 2 - Disagree, 3 - Neither, 4-Agree, and 5 - Strongly Agree

Table 3 shows that the participants generally agreed that antibiotic resistance is a significant problem in their institutions, with a mode of 4. The responses were not unanimous, however, with a range of 2 to 4. A case in point is hospital VI, wherein the collective response to this item no.1 was 2, indicating that antibiotic resistance is not a significant problem in that hospital. Hospital I registered a 3, suggesting that doctors in said hospital are evenly divided on the matter. When mean scores (data not shown) for Hospital VI were obtained, compared to mode, the result was closer to a 3, suggesting a considerable diversity of opinion within the hospital.

For items nos. 2 to 5, all the respondents agreed that their institutions ensure that hygienic protocols are in place to mitigate the development of drug resistance, such as the cleaning of an MDRO-patient’s room, according to hospital cleaning protocol after discharge; there is adherence to hand-hygiene protocols; enough

efforts are being done to control the development of resistant organisms through surveillance; and adequate MDRO education for its staff is being provided.

For item no. 6, there was a wide variation of responses, with a mode of 2, but a mean of 2.8. This implies a significant variation in perception with regards to acquiring an MDRO infection during a hospital stay. The 6 questions established that hospitals were very much aware of the antimicrobial resistance problem, that they agreed that necessary protocols were being followed, but there was uncertainty whether such protocols were effective enough.

Antibiotic Prescribing Practices

The respondents were asked about their antibiotic prescribing practices.

Table 4. Antibiotic Prescribing Practices

Questionnaire Items	Hospitals										
	I	II	III	IV	V	VI	VII	VIII	IX	MODE	RANGE
7. Microbiology lab results are efficiently communicated to the attending physician.	5	4	5	5	4	4	4	4	4	4	(4,5)
8. I regularly consider the antibiotic susceptibility patterns at this institution (e.g. the institutional antibiogram) when empirically prescribing antibiotics.	4	4	5	5	4	4	4	4	4	4	(4, 5)
9. If medically appropriate, intravenous antibiotics should be stepped down to an oral alternative after three days.	4	4	4	4	4	4	4	4	4	4	4
10. Restrictions on antibiotics impair my ability to provide good patient care.	2	2	3	3	4	4	3*	2	2	2	(2, 4)
11. Antibiotics are overused in this institution.	4	2	2	2	2	2	4	3	4	2	(2, 4)
12. More judicious use of antibiotics would decrease antimicrobial resistance.	5	5	5	5	5	5	5	5	5	5	5
13. Antimicrobial stewardship programs improve patient care.	5	5	5	5	5	4	5	5	5	5	5

Legend: 1 - Strongly Disagree, 2 - Disagree, 3 - Neither, 4-Agree, and 5 - Strongly Agree

* with opposite responses from two departments. The responses were 2 and 4.

The questions in part 2 of the questionnaire (Table 4) center on protocols for antibiotic dispensation. The respondents opined that microbiology results were efficiently communicated to them, with responses of 4 and 5. The respondents also similarly agreed with the item no. 8, on considering the hospital antibiogram when writing antibiotic orders, and item no. 9, stepping down from intravenous to oral antimicrobials in three days, when appropriate. Despite the agreement on the need for antibiotic restrictions, responses to item no.10 showed some variability in responses on whether such restrictions affect patient care, with 2 (22%) hospitals (V and VI, NCR-no AMS) responding that such policies impair the ability to give good care, and a plurality of 6 (66%) disagreeing that it does so. These polarized opinions were expressed even in the same hospital (VII, Provincial), wherein one department answered 2 (agree), and the other 4 (disagree). When mean (2.77) was compared to mode (2), the former points to the general sentiment being closer to “neither,” rather than to “disagree,” which is the mode response. This indicates

that between hospitals, and between departments within a hospital, opinions varied.

Item no. 11, on whether or not antibiotics are overused in the institution had similar variability of answers for item no. 10; median answer was 2, but mean was 2.7 (which is closer to a “neither” answer). But hospitals I, VII, IX, all big hospitals with 2 provincial hospitals but no AMS yet, agreed mean (4) that antibiotics are already overused in their institution.

Items 12 (judicious use of antimicrobials would decrease resistance) and 13 (AMS improves patient care) showed a uniform and almost unanimous “strongly agree” response in all hospitals, except for one “agree” for item no. 13.

Antimicrobial Stewardship Program

Part 3 (Table 5) are questions on opinions on the antimicrobial stewardship program.

Table 5. Antimicrobial Stewardship Program

Questionnaire Items	Hospitals										
	I	II	III	IV	V	VI	VII	VIII	IX	Mode	RANGE
14. Antimicrobial stewardship programs reduce the problem of antimicrobial resistance.	5	5	5	5	5	5	5	5	5	5	5
15. Antimicrobial stewardship programs decrease this institution's infection rates.	4	5	5	5	5	4	5	5	5	5	(4,5)
16. This institution has a functional antimicrobial stewardship program.	4	4	5	5	4	4	5	4	4	4	(4,5)
17. Personal and individual efforts regarding antimicrobial stewardship improves this institution's resistance problem.	4	4	5	5	4	4	5	4	4	4	(4,5)
18. This institution provides adequate training on antimicrobial prescribing and use.	4	4	5	5	4	3	4	4	4	4	(3, 5)
19. Additional staff education is needed on antimicrobial prescribing and use.	4	4	4	4	4	4	4	4	4	4	4
20. Prescribing physicians are the only disciplines who need to understand antimicrobial stewardship.	4	2	1	1	2	2	2	2	2	2	(1, 4)

Legend: 1 - Strongly Disagree, 2 - Disagree, 3 - Neither, 4-Agree, and 5 - Strongly Agree

Strong undisputed agreements strongly agree were expressed concerning the effectiveness of antimicrobial stewardship programs in reducing the problem of antimicrobial resistance (item no. 14) and decreasing infection rates (item no.15). All agreed that their institutions have functioning AMS programs (item no. 16) and that individual contributions towards the same help their institution in improving antimicrobial resistance (item no. 17).

The respondents agreed that their hospital provides adequate training for antimicrobial dispensation, except for hospital VI which replied "neither" (item no. 18), and all agreed on the need for

additional staff education (item no.19). These responses were strong points of conversations during the Key Informant Interviews (KII) and FGDs.

All disagreed that only physicians are the only ones who need to understand antimicrobial stewardship, except for Hospital I, that answered, "Agree."

Acceptability of Antimicrobial Stewardship Program

The final segment of the questionnaire is on the acceptability of the AMS in private hospitals (Table 6).

Table 6. Acceptability of Antimicrobial Stewardship Program

Questionnaire Items	Hospitals										
	I	II	III	IV	V	VI	VII	VIII	IX	Mode	Range
21.I am amenable to having an AMS program in our institution	5	5	5	4	5	4	5	4	5	5	(4, 5)
22.I support the programs of the AMS committee in our institution	4	4	5	5	4	4	5	5	5	5	(4, 5)
23.I am willing to attend the educational sessions conducted by the AMS committee	4	4	5	5	4	4	5	4	5	4	(4, 5)
24.I am willing to be subjected to antibiotic audit when you prescribe restricted antibiotics	4	4	5	5	4	3	4	4	5	4	(3, 5)
25.I agree with the 7th day automatic stop order policy of the AMS committee	4	4	4	4	4	4	4	4	5	4	(4, 5)
26.I agree with the antibiotic restriction policies of the AMS program in our institution	4	4	5	5	4	4	4	4	5	4	(4, 5)

Legend: 1 - Strongly Disagree, 2 - Disagree, 3 - Neither, 4-Agree, and 5 - Strongly Agree

All of the respondents are amenable with the institutionalization of an AMS program (item no. 21); hospitals I, II and III already have an existing AMS program prior to the survey. All expressed support for an AMS in their hospitals (item no. 22) and expressed

willingness to be subjected to antibiotic audit), except hospital VI, which had a neutral stand on this last item (item no. 24). The respondents agreed with a 7-day automatic stop order, and with the antibiotic restriction policies of the AMS program in their institutions.

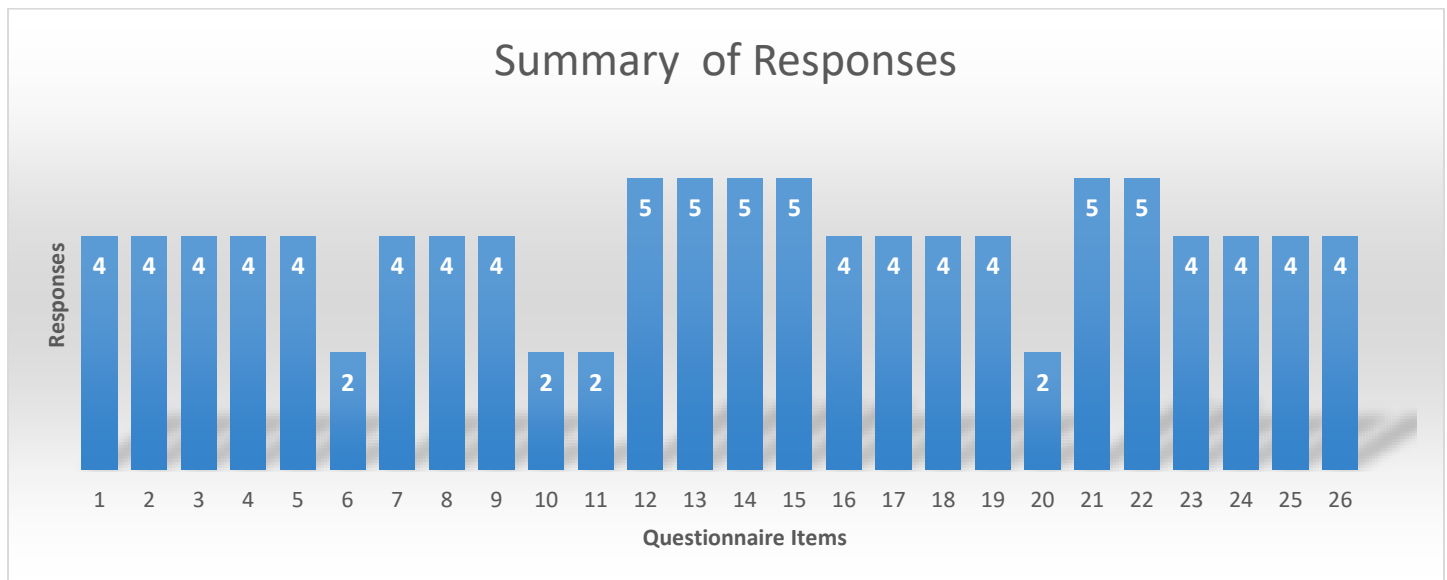


Figure 1. Summary of Responses to the 26-Item Opinion Survey

Figure 1 summarizes the responses to the survey using mode to highlight the prominent/dominant responses.

The statements questionnaire solicited opinions of agreement, disagreement and neutrality. Items # 6, 10, 11, and 20 were controversial statements framed as such to provoke disagreements or neutral responses. The rest of the items are positive statements constructed to elicit agreements or neutral responses. The opinion survey managed to gather diverse opinions in many of items especially for items # 6, 10, 11, and 20 which responses ranging from 1-5. Collectively, however, as shown in Figure 1, the trend of responses is within the framework of the questionnaire and is geared towards the acceptability of an AMS program as a viable means to curtail the emergence and progression of problems with antimicrobial resistance.

B. AMS: Enablers and Barriers

The following section centers on the enablers and barriers of implementing an AMS program. It looks into the experiences of physicians, administrators, microbiology heads and infection control nurses in hospitals with and without AMS programs, through FGDs and KIIs.

Enablers to AMS Implementation

Hospitals I, II, and III have organized and functioning AMS programs. The participants from these hospitals said that an AMS program is already an integral part of their operating procedures and they attributed the successful implementation to a few conditions. The respondents shared that the full commitment of the hospital's leadership is the key enabler for success. The leadership's commitment to comply with DOH and international accreditation (such as JCI) standards regarding AMS, fully enabled these hospitals to establish an AMS protocol. The respondents acknowledged the problem of MDROs and they have realized that a good AMS program is necessary to combat it. Such impressions were gauged from the FGDs and KIIs, during which the functions, policies and workings of the hospitals' AMS program were discussed. Prior to the formal implementation of their AMS programs, the three hospitals already had an existing program as part of the

infection control committee. Such programs monitored their own infection control indicators and it became incumbent upon the infectious disease group to raise alarms" (KII 5). For hospitals without an AMS, the Infection Control Committee (ICC) is the *de facto* antimicrobial steward.

The discussions brought out the perception that it is the hospital administrator who decides on the guidelines, policies and educational programs of the AMS program (KII 1), thus, enhancing his or her role as a key enabler in the implementation of a successful program. Policies strengthen the program (KII 1), while education-for both consultants and patients can change perceptions and influence appropriate changes in antibiotic use (KII 1). An AMS program is not solely a government program, it is also necessary for international accreditation (KII 1; KII 6). Thus, this lead to the hospital management taking the lead in the formation of an AMS program. When a strong political will from within the hospital allowed the creation, establishment and functioning of a program, the workings of the AMS program became a routine process. Regular orientation and collaboration with stakeholders within the hospitals were also underscored as enablers for the AMS program's implementation.

Some suggestions provided for a successful AMS program were: creating a professionalized approach to medical treatment, providing and disseminating periodic infection rate updates to stakeholders, and conducting regular audits of antibiotic usage among clinicians.

Hospitals that are still in the process of establishing their AMS program were asked how an AMS program can be successfully established in their hospitals. The following responses were obtained from the FGDs and KIIs:

1. Leadership Commitment
2. Adherence to DOH AMS Guidelines
3. Educational Awareness Program: regular orientation and Information dissemination (posters and infographics)
4. Cooperation and collaboration among clinicians
5. Regular antibiogram review
6. Additional staff for the AMS team (e.g. clinical pharmacist)
7. Mutual respect among health professionals
8. Better communication on case referrals
9. Pilot AMS with initial evaluation

Box 1. Suggested Enablers for a successful AMS program

Some of the enablers, already mentioned earlier, like leadership commitment and adherence to DOH AMS Guidelines; regular orientation, as well as cooperation and collaboration also emerged as themes for the hospitals without AMS.

Of these themes-additional staff, educational programs and piloting the AMS warrant short elaboration. Many respondents mentioned the need for additional staff, especially clinical pharmacists, to routinely monitor antibiotic use. It was suggested that, to enable a functional AMS, more clinical pharmacists should be hired and be assigned to specific areas or floors in the hospitals, to allow better monitoring of antimicrobial use.

Educational program was also identified as an important enabler. The educational program may come in many forms, ranging from promoting information dissemination, carrying out awareness campaigns, encouraging open and regular communication with stakeholders (KII 1, IX), providing technical know-how on AMS (KII 2, V), and more importantly, conducting periodic updates on AMS outcomes to show that the program works (KII 5, I).

The respondents also suggested to pilot test the AMS program prior to its implementation. In hospital XI, a six-month pilot period was conducted to discover missing links, which were addressed accordingly (KII 4, XI). The result of the pilot testing can be used to recalibrate the prospective AMS program before its formal start of operation (hospital XI has recently launched its AMS program successfully).

1. Staff-related concerns
2. Need for additional manpower (like clinical pharmacists and microbiologists)
3. More workload for nurses
4. Resistance/ Non-cooperation from other doctors
5. Resistance/Lack of acceptance from some clinicians, some consultants, mostly from senior consultant
6. Lack of support from other departments/ lack of cooperation between hospital personnel
7. IT Resources
8. Unavailability of IT-based monitoring scheme for antibiotic use
9. Funding
10. Additional cost to patients (on additional AMS protocol for antibiotic use)
11. Lack of knowledge in developing and implementing the AMS program
12. Influence of pharmaceutical companies

Box 2. Barriers to AMS implementation (Hospitals with an AMS program)

Below were the barriers echoed by the participants from hospitals with no AMS or those hospitals on the process of putting up their respective AMS programs. Although these barriers are only perceived or anticipated they are similar to the actual barriers in Box 2.

1. Lack of manpower: Clinical pharmacists, Microbiologists, Nurses, Infectious Disease physicians
2. Lack of acceptance of AMS by clinicians
3. Additional expenses
4. Additional financial cost on the patients in relation to doing specimen culture and professional fee
5. Unavailability of medicines in the hospital's pharmacy
6. Drug sponsorships /Conflicts of interest
7. Unstable IT system
8. Lack of information dissemination

Box 2. Barriers to Implementation (Hospitals without an AMS)

DISCUSSION

This descriptive, cross-sectional study of perceptions and observations on antimicrobial stewardship in nine private hospitals acquired important data that may be useful in crafting AMS programs in the future, to aid hospitals that do not have existing AMS programs. There was unanimous agreement among clinicians, in as far as their individual hospitals were concerned, that: rooms from which patients had MDROs should be cleaned well upon a patient's discharge; hand hygiene protocols are being done efficiently; enough organism resistance surveillance is being done; adequate MDRO education is being provided; microbiology results are efficiently transmitted to the doctor; antibiotic susceptibility patterns are regularly considered when prescribing antibiotics; step-down from intravenous to oral antibiotic should be considered after three days, if appropriate; judicious antibiotic use decrease organism resistance rates; AMS programs improve patient care, reduce antimicrobial resistance, and decreases infection rates; their hospital has a functional AMS program, but additional staff education is needed on proper antimicrobial use; individual physician efforts to aid the AMS program help reduce antibiotic resistance; doctors support an AMS program, and are willing to attend educational sessions provided by such; doctors agree to a 7-day antibiotic automatic-stop order, and with antibiotic restriction policies of the AMS program. On the other hand, there was non-unanimity on the following items: antibiotic resistance is not a significant problem in 78%; 44% reported that a patient is unlikely to develop an MDRO infection during the hospital stay, with 44% being neutral; 44% disagreed that antibiotic restriction impairs a doctor's ability to give good patient care, but 33% were neutral. Fifty-five percent disagreed that antibiotics are overused in their hospital, but 33% agreed of their overuse. Eighty-nine percent agreed that their hospital provides adequate training on antibiotic use, but 11% (hospital VI) disagreed. Eighty-nine percent disagreed that only doctors should be educated on AMS programs, but 11% (Hospital I) agreed. Eighty-nine percent are willing to be subjected to antibiotic audit when using such, but 11% disagreed (Hospital VI). From FGDs and KIIs, enablers and barriers to a good AMS program were identified.

In this study, the three hospitals with an existing AMS program and another three hospitals without an AMS program in the provinces, are big private hospitals with teaching programs. The other three hospitals without an AMS program in NCR are also big private, but non-teaching hospitals. The institution of hospital based AMS programs are an offshoot of the DOH's creation of the National Antibiotic Guidelines in 2017, which was aimed at "optimizing antimicrobial use and helping to improve the quality of patient care and patient safety." Although the program is already in place in government hospitals, quite a few private hospitals already have an institutionalized AMS program. Many private hospitals are still in the process of complying with the DOH guidelines. An AMS program essentially promotes good antimicrobial stewardship, which is one of two major principles which impact on the problem of antimicrobial resistance. Several terms are used to refer to antimicrobial stewardship programs: antibiotic policies, antibiotic management programs, and antibiotic control programs, are some of these, which may be used interchangeably. The terms refer to programs intended to change antimicrobial use in health care institutions. This may employ any of the following individual strategies: 1) education through the creation of guidelines for antimicrobial use, 2) restriction in dispensing targeted antimicrobials only for their approved indications, 3) review and feedback of targeted antimicrobials for appropriateness, 4) computer assistance and use of information technology to implement strategies and use of expert systems to provide patient-specific recommendations at the point of care, and 5) antimicrobial cycling through scheduled rotation of antimicrobials used in hospitals or units within a hospital like the intensive care unit.^{3,4} AMS programs elsewhere have become more common; a survey of 502 physician members of the Infectious Diseases Society of America's Emerging Infections Network, reported that 50% of the respondents indicated that their hospital had an antimicrobial restriction program in place. Teaching hospitals were significantly more likely to have such a program than non-teaching hospitals, 60% versus 17%^{4,7}.

Of the 26 items in this study's questionnaire, there was unanimous agreement among the respondent hospitals in 19 items, all of which sought reinforcement

on desired attitudes of physicians towards: identifying the problem of antimicrobial resistance and the factors that contribute to this, appropriate antimicrobial usage practices, the value of an AMS program, and the acceptability of an AMS program. Clinicians agreed on practices like adherence to hand hygiene protocols, educational programs, and considering their institutional antibiogram when empirically prescribing antibiotics. They showed strong agreements on the principle that more judicious use of antibiotics would decrease antimicrobial resistance and improves patient care. These results are similar to previous studies that reflect the view that the most favored interventions are those that provide information and education rather than restrict prescribing behaviour.¹²

Respondents indicated that antibiotic resistance is not a significant problem in 78%. Hospital I had a mean answer of 3 (neither) which may be because they have been implementing their AMS program already and may have seen improvements in their hospital antibiotic resistance while Hospital VI which has not started their AMS program yet, disagreed to the statement. This may reflect that hospitals may see improvements in their antibiotic resistance rates once an AMS program is in place.

Forty-four per cent reported that a patient is unlikely to develop an MDRO infection during the hospital stay, with 44% being neutral but 22% (Hospital VIII and IX) reported that patients are likely to develop an MDRO infection. These 2 provincial hospitals have just started their AMS program. Furthermore, there are more adult internists who answered the questionnaires in these 2 hospitals which may have affected their response. The development of MDRO has many factors to be considered and should be further investigated using individual hospital clinical data, antibiotic usage and different population (pediatric and adult).

This study tried to capture the respondents' opinions regarding the institutionalization of AMS in their hospitals of affiliation. Although there were some differences in opinions, the trend of responses gravitated towards an acknowledgement that MDROs are a major health problem and that antibiotics can be overused, for which reason, an AMS program is necessary. The acceptability of an AMS program, however is just one

facet of a long process. The greater challenge is how to organize and establish it in each unique hospital.

Fifty-five per cent disagreed that antibiotics are overused in their hospital, but 33% agreed at their overuse. Although the term overuse may have been interpreted differently and should have been followed by a scale to further characterize the usage of antibiotics, the diversity of the answers indicates that the perception of clinicians may vary depending on their years of clinical experience and subspecialties.

Eighty-nine per cent agreed that their hospital provides adequate training on antibiotic use, but 11% (hospital VI) disagreed. For example, in the FGDs, respondents said that there is a need to "overhaul" the mindset in terms of antibiotic use by going "back to the literature" regarding a shorter seven-day course as being sufficient for most infections compared to fourteen days. Hospital VI have no AMS program structure yet and may have no activities for AMS program stated. The clinicians' answers may also indicate their satisfaction on the activities being done in their hospitals that support education and training.

Eighty-nine per cent are willing to be subjected to antibiotic audit when using such, but 11% disagreed (Hospital VI). Possible reasons for resistance to antibiotic audit are: a clinician may feel that he or she is competent to decide which antimicrobial is appropriate, and an external audit is unnecessary; another reason may be the additional cost to the patient, should there be one, by an audit. In some institutions, the AMS program can incur additional costs to patients when the restricted antibiotics ordered may need approval by the infectious disease specialists. In a study by MacDougall et al, 28% of participating institutions required prior approval by an infectious diseases clinician, before certain antimicrobials are dispensed, while 21% required approval by a clinical pharmacist.⁴ Of note was that larger hospitals were more likely to have antimicrobial restriction programs compared to smaller ones.⁵ In the Philippines, it can be argued that the AMS is still in its infancy, especially in privately-owned hospitals. All the participating large hospitals in this study have infectious disease clinicians who give approval for the certain prescribed restricted antimicrobials. However, to date, there are few private hospitals with in-house AMS programs and infectious disease specialists. Locally,

clinical pharmacists are not allowed to approve the use of restricted drugs. In most of these hospitals, the challenges and impact of ongoing AMS activities have yet to be clearly defined and evaluated.

This study found that the top enabler for an AMS program is a committed hospital leadership. Best practices shared by the hospitals with working AMS program identified hospital leadership's commitment and adherence to DOH AMS Guidelines as the main drivers for starting its implementation. This was followed by: regular educational awareness programs, such as providing regular orientations for all the staff, information dissemination (posters and infographics) and providing and disseminating a hospital antibiogram review. Other identified enablers are additional staff especially, clinical pharmacists, promoting mutual respect among health professionals, and better communication when a case is referred to multiple services. The findings in this study suggest that hospitals undergo similar experiences as AMS programs are implemented.

Barriers identified for hospitals with, and without, AMS programs, were: a deficiency in knowledge with developing and implementing the AMS program, inadequate information dissemination, unavailability of an IT-based monitoring scheme for antibiotic use, and the Influence of pharmaceutical companies upon stakeholders with regards to antimicrobial use. The low level of experience with AMS suggests a degree of unfamiliarity with data and interventions. These barriers, however, as one respondent said, are temporal: *"I don't think there's going to be permanent barriers. I mean it's always the independence of the doctors that's going to be a big problem"* (KII4 VIIB). During the FGDs and KIIs, a recurring theme was that, the success or failure of any AMS program largely hinges on physician, the major player in the AMS program. The role of the physician in the AMS program can not be underestimated. In the hierarchy of health care delivery, the physician is at the pinnacle, and his/her decisions dictate the course of medical therapy. The importance of physician understanding and acceptance of the AMS program emerged as an important enabler for a successful program implementation. One of the common items that came out was the apparent superiority complex and the *"ako ang doctor"* (I am the doctor) mentality. For the

respondents (who were mainly doctors), this mentality can be counter-productive to an AMS program, especially when antibiotic prescriptions are concerned. This problem can be exacerbated when different antibiotic treatment modalities are considered or offered, according to various specialists involved in a single case. This brought about calls from some respondents to suggest for the DOH to dialogue with specialty societies.

The AMS programs of hospitals I, II and III were not created overnight. The successful implementation of their AMS programs did not come without barriers. Prior to their fruition, the programs hurdled several obstacles, such as staff-related concerns (hiring additional clinical pharmacists and microbiologists; adding workload to nurses), and overcoming resistance from non-cooperating, mostly senior physicians. Several infrastructures were made operational, like information technology (I.T.) resources for medical records and improved monitoring systems. Compared with hospitals from countries like Singapore, local hospitals still need to develop a more sophisticated I.T.-based antibiotic monitoring scheme.

Lastly, it was identified that the influence of pharmaceutical companies over private hospitals and clinicians on drug use may affect antibiotic prescribing practices. It is common knowledge that drug companies can influence physicians who *"tend to prescribe more of the medicines that are being promoted by those companies that support them"*. The prescription of broad spectrum antibiotics for illnesses that call for "basic" antibacterial and with a strong lobby from drug companies, is a reality and adds to antibiotic misuse. Drug companies and their transactions with physicians are "real barriers". For the AMS program to work, physicians will have to be educated and convinced about the ill-effects of inappropriate antibiotic use and not be swayed by pharmaceutical companies promotions.

LIMITATIONS

Limitations to this study were due to the convenience sampling selection bias which may affect the results particularly among the adult clinicians where the response rate on the questionnaires in the NCR was low and the hospitals selected were all large hospitals with an infectious disease specialist . No demographic

information was collected to test for bias between responders and non-responders, thus the investigators can only speculate on whether there were any important differences between these groups.

CONCLUSION

In this study, the identified enablers and barriers to a successful implementation of an AMS program, and an assessment of the perceptions of clinicians and hospital administrators, showed that in hospitals with an existing AMS program-the relevant themes and issues to program implementation, are similar as for hospitals without an AMS program. The common challenge was in finding qualified personnel willing and able to direct such programs and manage the team at each institution. The team members should also be fairly compensated for the additional time and effort thus funding is needed to implement the program.

The findings gathered from this research may be used to draft guidelines for the institutionalization of an effective and feasible AMS program for private hospitals, as mandated by the Department of Health. Hospitals administrators recognize that they need help from outside sources, including the DOH, to develop and implement an AMS program. A well-designed AMS program will be more acceptable and easier to roll-out for hospitals which have yet to start an AMS program and will enhance ongoing programs in hospitals with existing AMS-related activities.

This study found that physicians and hospital administrators agree that antimicrobial protocols need to be in place. Stakeholders need to continuously be educated on the complexity of the multifaceted problem of antimicrobial resistance, to appreciate the need for an AMS program. The success or failure of any AMS program appears to depend on the firm resolve and commitment of the hospital's leadership and physician understanding, commitment and support. By involving these main players in the AMS program and with a knowledge of other enablers and barriers, a successful development and implementation of an AMS program can be achieved.

ACKNOWLEDGEMENTS

The authors would like to recognize the support given by the research assistants:

Ms. Jonalyn Nuqui and Ms. Amparo Labez. Interviewers. Ms. Ma. Teresita N. Reyes, RN and Ms. Ann Pauline R. Dela Cruz. PIDSP Secretariat: Ms. Jhenny Manalo and Ms. Mary Manese.

REFERENCES

1. Promoting Antimicrobial Stewardship in Human Medicine. Retrieved from https://www.idsociety.org/Stewardship_Policy
2. Antimicrobial Resistance Surveillance Program , 2018 Annual Report. Department of Health , Research Institute for Tropical Medicine.
3. Principles and Strategies Intended to Limit the Impact of Antimicrobial Resistance. (2006, April 24). Retrieved from <http://www.idsociety.org/.../IDSA/.../Antimicrobials>
4. Mac Dougall, C., Polk, R. 2005. Antimicrobial Stewardship Programs in Health Care Systems. *ClinMicrobiol Rev.* 18(4): 638–656.
5. Rifenburg, R. P., J. A. Paladino, S. C. Hanson, J. A. Tuttle, and J. J. Schentag. 1996. Benchmark analysis of strategies hospitals use to control antimicrobial expenditures. *Am. J. Health Syst. Pharm.* 53:2054–2062.
6. Lawton, R. M., S. K. Fridkin, R. P. Gaynes, and J. E. McGowan, Jr. 2000. Practices to improve antimicrobial use at 47 US hospitals: the status of the 1997 SHEA/IDSA position paper recommendations. *Society for Healthcare Epidemiology of America/Infectious Diseases Society of America. Infect. Control Hosp. Epidemiol.* 21:256–259.
7. Sunenshine, R. H., L. A. Liedtke, D. B. Jernigan, and L. J. Strausbaugh. 2004. Role of infectious diseases consultants in management of antimicrobial use in hospitals. *Clin. Infect. Dis.* 38:934–938.
8. New Antibiotic Stewardship Guidelines Focus on Practical Advice for Implementation (14 April 2016). Retrieved from https://www.idsociety.org/New_Antimicrobial_Stewardship_Guideline_2016/
9. James R, Luu S, Avent M, et al. 2015. A mixed method study of the barriers and enablers in implementing antimicrobial stewardship programs in Australian regional and rural hospitals. *J Antimicrob Chemother.* 70(9):2665-2670
10. Chavez N.J., Cheng A.C., Runnegar N., et al. 2014. Analysis of knowledge and attitude surveys to identify barriers and enablers of appropriate antimicrobial prescribing in three Australian tertiary hospitals. *Internal Medicine Journal. Royal Australasian College of Physicians.* Doi:10.1111/imj.12373
11. Salsgiver E, Bernstein D, Simon M, et al. Knowledge, attitudes and practices regarding antimicrobial stewardship among antimicrobial prescribers at five acute care hospitals. 204 Poster Abstract Session. *Antimicrobial Stewardship: Current state and future opportunities.* October 8, 2015 .
12. Cotta M.O, Robertson.M.S, Tracey, Mark, et. Al. 2014. Attitudes towards antimicrobial stewardship: results from a large private hospital in Australia. *Healthcare Infection,* 2014,19,89-94. <http://dx.doi.org/10.1071/HI14008>.