

National Antimicrobial Stewardship Program in Saudi Arabia; Initiative and the Future



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Abstract

General Administration of Pharmaceutical care start the implementation of pharmacy strategic plan in 2012. More than thirty national program of pharmacy practice started during the period 2012-2015. National Antimicrobial stewardship program among them. The program highly demand at our county because of poor perception of antibiotics and misuse of antibiotics, and poor adherence of antibiotics guidelines. The program consisted of several committee at MOH level, regional, peripheral hospital and primary care centers. Antimicrobial stewardship guidelines, policy and procedures, and antimicrobial stewardship key performance indicators to follow up the program. The program started at MOH hospitals; expand to cover primate care centers and private's institutions. National Antimicrobial Stewardship program is crucial practice at health care organizations to prevent antibiotics misadventures, improve clinical outcome of treating infections disease and avoid additional economic burden on health care system in Saudi Arabia

Keywords: Antimicrobial stewardship; Pharmaceutical care; Pharmacy; Ministry of Health; Saudi Arabia

Introduction

In 2013, general administration of pharmaceutical care at Ministry of health in Saudi Arabia started pharmacy strategic plan [1]. The plan contained five strategic goals, with seventeen initiatives and eighty-three projects. Those projects consisted of several pharmacy practices and clinical pharmacy programs [2]. National Antimicrobial stewardship program among them, thus project activated in 2014 at overall hospitals [3]. The Central Committee of Antimicrobial stewardship headed by the author,

it founded to organize the program in 2013. The committee consisted from several memberships including but not limited to medical doctor, are presentative from infection control, are presentative from the laboratory, ID clinical pharmacist from different regions. The committee established strategic of the program for next five years started from local MOH hospitals at Riyadh city then expanded to other areas. Within two to three years privates sectors should be included as explored in Table 1.

Table1: Strategic plan of antimicrobial stewardship program in Saudi Arabia.

Elements of the plan	
2014	2015
<p>Stage 1</p> <ul style="list-style-type: none"> Establish the Central antimicrobial stewardship committee Set the antimicrobial stewardship committee at twenty regions Establish of antimicrobial stewardship committee at ninety MOH Hospitals Publish and distribute the adults antimicrobial stewardship manual booklet and electronic Deliver the antimicrobial stewardship training Courses at MOH Deliver the antimicrobial stewardship training sessions at twenty regions 	<p>Stage 2</p> <ul style="list-style-type: none"> Review the antimicrobial stewardship committee at twenty regions Consider the antimicrobial stewardship committee at ninety MOH Hospitals Establish of antimicrobial stewardship committee at additional ninety MOH Hospitals Review the adults antimicrobial stewardship manual booklet and electronic Publish and distribute the pediatrics antimicrobial stewardship manual booklet and electronic Collect the antibiogram from twenty regions Collect the antibiogram from ninety hospitals Review of antimicrobial utilization Review antimicrobial consumption Delivery of antimicrobial stewardship training Courses at MOH Delivery of antimicrobial stewardship training sessions at

2016		2017	
Stage 3	Review the antimicrobial stewardship committee at ninety MOH Hospitals Establish of antimicrobial stewardship committee at additional ninety MOH Hospitals Review the adults and pediatrics antimicrobial stewardship manual booklet and electronic based on antibiogram Review the antibiogram from twenty regions Review the antibiogram from 180 hospitals Review of adults and pediatrics antimicrobial utilization Review of adults and pediatrics antimicrobial consumption Delivery of adults and pediatrics antimicrobial stewardship training Courses at MOH Delivery of adults and pediatrics antimicrobial stewardship training courses	Stage 4	Set the antimicrobial stewardship committee at ninety private Hospitals Establish of antimicrobial stewardship committee at additional ninety MOH Hospitals Review the adults and pediatrics antimicrobial stewardship manual booklet and electronic based on antibiogram Review the antibiogram from twenty regions Review the antibiogram from 180 hospitals Review of adults and pediatrics antimicrobial utilization Review of adults and pediatrics antimicrobial consumption Delivery of adults and pediatrics antimicrobial stewardship training Courses at MOH and privates sectors Delivery of adults and pediatrics antimicrobial stewardship at MOH moreover, privates sectors training courses
2018			
Stage 5	Review the antimicrobial stewardship committee at ninety private Hospitals Establish of antimicrobial stewardship committee at additional ninety privates Hospitals Review the adults and pediatrics antimicrobial stewardship manual booklet and electronic based on antibiogram Review the antibiogram from twenty regions Review the antibiogram from 270 hospitals Review of adults and pediatrics antimicrobial utilization at MOH and privates institutions Review of adults and pediatrics antimicrobial consumption MOH and privates institutions Delivery of adults and pediatrics antimicrobial stewardship training Courses at MOH and privates sectors Delivery of adults and pediatrics antimicrobial stewardship at MOH and privates sectors training courses		

Antimicrobial Stewardship Program

There are several potential problems found at local country stimulate the high demand of antimicrobial stewardship system. For instant; dispensing antibiotics without a prescription and that found 77.6% of 327 community pharmacies dispensed antibiotic without a prescription and break pharmacy law in Saudi Arabia, and another cross-sectional study showed that is 51% of 285 medication dispensed without prescription [4,5]. Some patients had a poor perception of using antibiotic. In cross section study of a survey distributed to more than 400 patients. The study showed that is more than 50% of the patient not aware of dangerous of antibiotics utilization and more 50% recommended antibiotic to their families, 23% used antibiotic for two days only, and 19.4% admitted to taking antibiotics without prescription to their medical illness [6].

Also increasing of resistance of microorganism with different of isolates, the type of health care service, and regions all over Saudi Arabia and even during mass gathering Hajj period [7-15]. The high resistance increases the economic burden on health care system by 20-60% [16]. From the previous problem, most of the countries in the world start to establish antimicrobial stewardship program [17-19]. There are some hospitals in Gulf countries including Saudi Arabia applied this program and they found are duction of inappropriate prescribing antibiotics, reduction healthcare associated infection and decreased the length of hospitalization period and mortality metric, and reduction of antibiotics cost [20]. In the local studies should reduction of antibiotics, reduction of multidrug resistance microorganism, increase compliance of antibiotics guidelines in adults and pediatrics population [21-24].

Antimicrobial Stewardship Program in Kingdom of Saudi Arabia

In late 2014, a Central Committee at MOH sent a memorandum to start the Antimicrobial stewardship program at very hospitals in Kingdom of Saudi Arabia with formulation antibiotic committee and the antibiotic team as explored in Table 2 and memo activated in early 2015. Others MOH hospitals or primary care centers and privates hospital or community pharmacies will start within 1-2 years according to the strategic plan. The central committee published Antimicrobial stewardship manual

for the program. The program consisted of empirical therapy of common infectious disease in Saudi Arabia, data collection form of some selected antibiotics, sensitivities pattern of common bugs from general microbiological, restricted and controlled antibiotics, policy and procedures of prescribed antibiotic. Maybe the unique advantages of program manual were the conversion of general guidelines to antibiotic physician order. Each disease has a particular form of identified organism, and option listed of first choice antibiotic, second line option, and third line option, the physician has to follow the sequence options.

Table 2: Type of antimicrobial stewardship committees.

	Membership	Functions	Frequently meeting	Reporting
1	Central Antimicrobial Stewardship Committee			
	<ol style="list-style-type: none"> 1. National Antimicrobial stewardship as head of the committee 2. Antimicrobial stewardship clinical pharmacist coordinator 3. Antimicrobial stewardship clinical pharmacist from each twenty regions 	<ol style="list-style-type: none"> 1. Establish of National antimicrobial stewardship program at MOH hospitals 2. Setup strategic planning of National antimicrobial stewardship program at MOH institutions 3. Follow up and update of National antimicrobial stewardship program at MOH hospitals 4. Implement and Follow-up National antimicrobial stewardship Committee at MOH hospitals 5. Setup up policy and procedures of National antimicrobial stewardship the program at MOH institutions 6. Setup up National antimicrobial stewardship program key performance indicators at MOH institutions 7. Review all reports of National antimicrobial stewardship program from all MOH institutions 	Monthly	Every three months
2	Hospital or Primary Care Center (PCC) Antimicrobial Stewardship Committee			
	<ol style="list-style-type: none"> 1. Consultant infectious diseases or Internal medicine or chief of pharmacy ahead of the committee 2. Critical care Physician (Non-PCC) 3. Emergency physician (Non-PCC) 4. Surgeon (Non-PCC) 5. Pediatrician 6. MD of obstetrics and gynecology 7. Nurse 8. Head of clinical pharmacy department 9. Drug Information Center 10. Infection control 11. Microbiology 	<ol style="list-style-type: none"> 1. Supervise the implementation of antimicrobial stewardship program at the hospital or PCC 2. Supervision of program activation, program follow-up, program evaluation, and program development at the hospital or PCC. 3. Approval of the antimicrobial stewardship team members 4. Review and update antimicrobial stewardship protocol at least annually 5. Review the job description, policy, and procedures of antimicrobial stewardship team 6. Supervising of antimicrobial stewardship clinic 7. Examine the antimicrobial stewardship program needs of equipment and medical supplies,...etc 8. Submit reports on the progress of the Commission's work and the team and its effectiveness for patients and health team every three months central pain management committee 	Monthly	Every three months
3	Antimicrobial Stewardship team			

<p>The team consists of</p> <ul style="list-style-type: none"> • Infectious diseases or internal medicine. • Antimicrobial stewardship clinical pharmacist • Antimicrobial stewardship Nurse. <p>The Antimicrobial Stewardship program begins antibiotic surgical prophylaxis, pharmacokinetics of antibiotics, critical care sections, and consultation from any medical and surgical team and expand the services to coverage to all patients.</p>	<ol style="list-style-type: none"> 1. The daily round all patients suffering infectious disease. 2. Operate hospital antimicrobial stewardship clinics. 3. Provide counseling for antimicrobial stewardship. 4. Apply the antimicrobial stewardship protocol at hospital 5. Follow up the antimicrobial stewardship patient and resolve the drug related problem. 6. Measure patient outcomes, quality of life, and cost avoidance of implementation antimicrobial stewardship 7. Receive any antimicrobial stewardship from any treating teams at the hospitals 	Daily	Monthly
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All physician orders will convert as computerized physician order entry (CPOE) in the nearest future. If a medical doctor wishes to prescribe other antibiotics not listed in the form, justification of non-adherence should mention. Also, the program contained two-type key performance indicator. One administration KPI adopted from center disease control the USA. Other clinical KPI adopted from the literature and some application examples as explored in Table 3. [25,26]. Those indicators to follow up the implementation of the program. The

central committee of the program invited all regions to formulate regional Antimicrobial committee with same type members and qualifications of the central committee. All parts formulated them. Then educational awareness workshop had conducted to them. Then all regional committees conducted an educational program for their peripheral hospitals and primary care centers in their regions. The majority of hospitals formulated Antimicrobial hospital committee and stated implement the program. All the program related issues started in January 2015.

Table 3: Antimicrobial stewardship program key performance indicators.

key performance indicators	No	2012	2013	2014	key performance indicators	No	2012	2013	2014
Leadership and Management									
Antibiotics Committee (Central)	1	0	1	1	Antibiotics Committee (PCC)	80-100	0	0	0
Antibiotics Committee (Region)	20	0	0	15	Antibiotics Manual-Booklet	1	0	0	1
Antibiotics Committee (Peripheral)	250	0	0	20	Antibiotics Manual Electronic	1	0	0	1
Optimal Antimicrobial Stewardship Management Use									
Antibiogram (Central)	1	0	0	0	Privilege of Antibiotics Prescribing (Central)	50%	0	0	0
Antibiogram (Region)	20	0	0	0	Privilege of Antibiotics Prescribing (Region)	50%	0	0	0
Antibiogram (Peripheral)	250	0	0	0	Privilege of Antibiotics Prescribing (Peripheral)	50%	0	0	0
Therapeutic Drug Monitoring (Central)	1	0	0	0	Antibiotics Automatic Stop order (Central)	50%	0	0	0
Therapeutic Drug Monitoring (Region)	20	0	0	0	Antibiotics Automatic Stop order (Region)	50%	0	0	0
Therapeutic Drug Monitoring (Peripheral)	250	0	0	0	Antibiotics Automatic Stop order (Peripheral)	50%	0	0	0
Resistance Bugs (Central)	Decrease 20%	NA	NA	NA	Infection Rate (Central)	Will not increase	NA	NA	NA
Resistance Bugs (Region)	Decrease 20%	NA	NA	NA	Infection Rate (Region)	Will not increase	NA	NA	NA
Resistance Bugs (Peripheral)	Decrease 20%	NA	NA	NA	Infection Rate (Peripheral)	Will not increase	NA	NA	NA
Monitoring Antimicrobial stewardship Medications and Use									
Antibiotics Consumption (Central)	1	0	0	0	Antibiotics Utilization Review (Central)	1	0	0	0
Antibiotics Consumption (Region)	20	0	0	0	Antibiotics Utilization Review (Region)	20	0	0	0

Antibiotics Consumption (Peripheral)	250	0	0	0	Antibiotics Utilization Review (Peripheral)	250	0	0	0
Antibiotics Consumption (PCC)	80-100	0	0	0	Post Marketing Surveillance (Central)	NA	NA	NA	NA
Antibiotic Medication Errors (Central)	0	0	0	1	Post Marketing Surveillance (Region)	NA	NA	NA	NA
Antibiotic Medication Errors (Region)	0	0	0	0	Post Marketing Surveillance (Peripheral)	NA	NA	NA	NA
Antibiotic Medication Errors (Peripheral)	0	0	0	0	Post Marketing Surveillance (PCC)	NA	NA	NA	NA
Antibiotic Medication Errors (PCC)	0	0	0	0	Drug Quality Reporting System (Central)	0	0	0	0
Antibiotic Adverse Drug Reaction (Central)	0	0	0	0	Drug Quality Reporting System (Region)	0	0	0	0
Antibiotic Adverse Drug Reaction (Region)	0	0	0	0	Drug Quality Reporting System (Peripheral)	0	0	0	0
Antibiotic Adverse Drug Reaction (Peripheral)	0	0	0	0	Drug Quality Reporting System (PCC)	0	0	0	0
Antibiotic Adverse Drug Reaction (PCC)	0	0	0	0	No of Parenteral Antibiotic (Central)	0	NA	NA	NA
Antibiotics Policy Adherence (Central)	50%	0	0	1	No of Parenteral Antibiotic (Region)	0	NA	NA	NA
Antibiotics Policy Adherence (Region)	50%	0	0	0	No of Parenteral Antibiotic (Peripheral)	0	NA	NA	NA
Antibiotics Policy Adherence (Peripheral)	50%	0	0	0	No of Parenteral Antibiotic (PCC)	0	NA	NA	NA
Antibiotics Policy Adherence (PCC)	50%	0	0	0	Defined Daily Dose (DDD) (Central)	0	NA	NA	NA
Days of Therapy (DOT) (Central)	0	NA	NA	NA	Defined Daily Dose (DDD) (Region)	0	NA	NA	NA
Days of Therapy (DOT) (Region)	0	NA	NA	NA	Defined Daily Dose (DDD) (Peripheral)	0	NA	NA	NA
Days of Therapy (DOT) (Peripheral)	0	NA	NA	NA	Defined Daily Dose (DDD) (PCC)	0	NA	NA	NA
Days of Therapy (DOT) (PCC)	0	NA	NA	NA					
No of Mortality due to Infections (Central)	0	NA	NA	NA					
No of Mortality due to Infections (Region)	0	NA	NA	NA					
No of Mortality due to Infections (Peripheral)	0	NA	NA	NA					
Education of Antimicrobial stewardship									
Antibiotic Conference	1	0	0	0	Antibiotics Course (Peripheral)	250	0	0	0
Antibiotics Course (Central)	2	0	0	1	Antibiotics Course (PCC)	80-100	0	0	0
Antibiotics Course (Region)	4-2	0	0	0					
Research of Antimicrobial stewardship									
Antibiotics Cost Reduction (Central)	Decrease 20-50%	NA	NA	NA	Antibiotics Cost Reduction (Peripheral)	Decrease 20-50%	NA	NA	NA
Antibiotics Cost Reduction (Region)	Decrease 20-50%	NA	NA	NA	Antibiotics Cost Reduction (PCC)	Decrease 20-50%	NA	NA	NA

At the first step of program implementation, the central committee requested antibiotics consumption and resistance pattern of bugs before and after starting the program. Still the program as an early stage in the process of data collecting. Several challenges faced the program including seldom of Human Resources Infections disease physicians, clinical pharmacist, and microbiologist. We try to replace ID specialist by consultant internal medicine and replace ID clinical pharmacist by trained pharmacist. Other challenges were using of international guidelines for treating infections disease. Unfortunately, we do not have basic of epidemiological data of bug resistance pattern, the central committee decided to apply the international guidelines and work parallel of data collection of drug resistance, then after one year of program implementation the central committee will revise the international guidelines and make local Saudi guidelines.

Conclusion

The antimicrobial stewardship program expand in the coming years to cover all MOH, government institutions, and private sectors with properly gets all the application advantages decrease resistance pattern of the organism, decrease antibiotics usages, and saving of additional cost.

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