

Antimicrobial Stewardship: Where We Stand



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Introduction

Antimicrobials are among the most widely prescribed drugs to treat infectious disease, yet their strength is being undermined by an alarming increase in antibiotic-resistant bacteria. This phenomenon is identified by the WHO as one of the greatest threats to human health; a threat that is augmented by the lack of research and development of novel antibiotics by pharmaceutical companies.

Although most antibiotic use occurs in the community, the intensity of use in hospitals is much higher. The excessive use and misuse of antimicrobial drugs, particularly broad-spectrum antibiotics within hospitals, have led to strains of bacteria that are resistant to many of the available antibiotic treatments and this resistance is strongly correlated to antibiotics-prescribing patterns.

According to Infectious Diseases Society of America “IDSA”, about 50 % of antimicrobial use in the inpatient setting is either unnecessary or inappropriate [1,2].

Resistant pathogens pose a catastrophic threat to people in every country in the world;

In Lebanon, this was made apparent in the studies performed in an academic tertiary healthcare center to address the patterns of bacterial resistance to antimicrobial agents over a decade. Results showed a serious and worrisome dramatic rise in resistant pathogens over the years [3, 4].

To curb this threat the Infectious Disease Society of America

“IDSA” and the Society of Health and Epidemiology of America “SHEA” developed and issued comprehensive guidelines to enhance antimicrobial stewardship practices “ASP” in hospital settings and recommended that these guidelines do not substitute clinical judgment since clinical judgment is required in the application of these guidelines to individual patients.

Antimicrobial stewardship as defined by the IDSA policy statement refers to coordinated interventions designed to improve and measure the appropriate use of antimicrobial agents by promoting the selection of the optimal antimicrobial drug regimen that encompasses drug indication, the dosing, the duration of therapy, and the route of administration [5,6].

Numerous studies showed that implementation of an antibiotic stewardship program “ASP” not only saves lives, but also reduces antibiotic resistance and consumption as well as cost.

CORE STRATEGIES	SUPPLEMENTAL STRATEGIES
Prospective Audits (includes intervention and feedback to the prescriber) “Known as a back-end approach which is used after an antimicrobial is prescribed”	Education Guidelines and Clinical Pathways Antimicrobial Order Forms Combination therapy Antimicrobial cycling Streamlining or De-escalating Therapy
(A ⁺)-II Antimicrobial Restriction (to ASP or infectious diseases approval only) “Known as a front-end approach, which is implemented before an antimicrobial is prescribed”	Optimizing Antibiotic Dose Converting from Parenteral to Oral Computerized Physician Order Entry “CPOE” and Clinical Decision Support System “CDSS” Microbiology Interventions Others

Concisely stated, starting ASP requires meticulously assessing current antimicrobial prescribing practices or the actual performance against potential performance aiming to identify key stakeholders in antimicrobial management programs, gaps, and needs. These were the topics encompassed in “Assessment of Antimicrobial Practices

in Lebanese Hospitals”.

Materials and Methods:

Study population

The study population consisted of all Lebanese Governmental hospitals (N=30) and Private hospitals (N=128).

Questionnaire

The questionnaire was developed based on review articles that identified the key elements of an ASP.

The visual layout of the questionnaire was simple. The questionnaire was comprised of five parts background on antimicrobial management, ASP structure, process, outcomes, implementation limitations and barriers, in addition to the demographic data and general characteristics All in all data was collected over an interval of two months and a half and analyzed using SPSS version 20 software system.

Results:

Demographic and General Characteristics Findings

The total number of respondents was 58 with a response rate of 37.18 % and encompassed hospitals from all Lebanese provinces. 20% of the respondents were governmental hospitals, 80% were private, 26% of these hospitals were teaching hospitals, 74% were non-teaching ones moreover the size of the hospitals was distributed as follows; 30.2% (≤ 50 beds), 49% (form 51 -150 beds) and 20.8% (≥151 beds) yielding a mean size of 130 beds. (Table 1)

50% of the surveyed hospitals (N: 58) reported that they provide IC services while the other half did not, moreover only 76% of these hospitals with intensive care services had AS practices in place. This is highly worrisome since the longest duration of antimicrobials therapy is in ICU, and the likelihood of colonization with resistant organism increases with the increase in the duration of patient exposure to antimicrobials.

Table 1-Hospitals by Demographic and General Characteristics

Variable	N	%
Province N=55		
Beirut	9	16.4%
Mount Lebanon	19	34.5%
Bekaa	9	16.4%
North	9	16.4%
South	6	10.9%
Nabatiyeh	3	5.5%
Hospital Academic status N=58		
Teaching hospital	15	26%
Non teaching hospital	43	74%

Hospital Ownership N=55		
Governmental	11	20%
Private	44	80%



Hospitals ASP Background

The data descriptive analysis showed that only about 65% (37 hospitals) of the respondent hospitals (57) had an antimicrobial management control program in place but ASP as a terminology was known to only 7.14 % of the respondents. ASP core members were as follows: ID physician 86.5%, clinical pharmacist 83.8%, and IC officer 70.3% (N=37). Analysis demonstrated that other hospitals included additional members in their ASP team like the director of nursing, the quality manager, microbiologist, surgeons, anesthesiologists and hygiene control nurses.

31-33% of the ASP core team collaborates with the pharmacy and therapeutics “P & T” committee and infection control “IC” committees and only 6 % collaborate with other committees. Collaboration and communication among the AS team, P & T committee and IC committee are important to engage all physicians and disseminate any information on antibiotics to all medical staff.

ASP Structure

Data analysis showed that 40.4% of the respondents (n=

57) have a full time ID physician dedicated for ASP while 24.6% have a part time ID physician and 35.1% have no ID physician at all, and in only 22 % (N=37) of the hospitals the ID physician rounds with the pharmacist and review antimicrobials orders on a daily. Only 63% of the respondents (n=55) had antimicrobials educational programs in place; furthermore, 61.8% had written guidelines on antibiotic use, 47.3% had a policy on ordering cultures before starting antibiotics administration, 43.6% had implemented a policy on reviewing antibiotics after 48 hours. Only 5.5 % had computerized physicians order entry and clinical decision support system with some integrated protocols as demonstrated in Table 2.

Variable	N=57	%
Appointment Of Id Dedicated For Asp		
None	20	35.1%
Full Time	23	40.4%
Part Time	14	24.6%
Id /Ph Daily Round And Antibiotic Review	8	22%
Antimicrobials Educational Programs in Place	34	63%
Availability Of Written Guidelines on Antibiotic Use	34	61.8%
Presence Of Policy On Ordering Cultures	26	47.3%
Presence Of Policy On Reviewing Antibiotic After 48 Hours	24	43.6%
Availability Of CPOE And CDSS	3	5.5%

Table 2- Hospitals by Antibiotic Stewardship Program Structure

Antibiotic Stewardship Program Process

Only 4 % of the respondents reported that they receive antibiotic culture results after 24 hours and 49.1% do so after 48 hours while the rest of the hospitals receive results within 72 hours or more. 83.9 % of the respondents developed local antibiogram but only 54.5% communicated the local antibiogram to medical staff.

ASP Control Strategies

73.7% of the respondents (n=57) had antibiotics control strategies in place ,78.6% were implementing Formulary Restrictions and Preauthorization (N = 33) and only 47.6% were implementing Prospective Audit and Feedback to Prescribers (N = 20) while the **Supplemental strategies were distributed as follows:** 59.5% Antibiotic Stop Order (N = 25), 54.8% using Antimicrobial Order Forms (N = 23), 54.8% Intravenous-To-Oral Conversion (N = 23), 52.4% have educational programs in place (N=22), 52.4 % using dose adjustment guidelines, 42.9% have guidelines and

clinical pathways protocols (N=18), 21.4% implementing Streamlining and De-Escalation Therapy (N = 9), and 19% using Antimicrobial Cycling strategy (N = 8).

ASP Auditing Process

75 % of the respondents had an antimicrobials audit team in place and 40.5% of them audit all antibiotic orders not only restricted ones. 33.3% submit reports quarterly (N=30) and 23.3% submit reports on antibiotic use monthly, some do so annually, and the rest either do so without standard frequency or do not report at all (figure 2).

ASP Outcomes Measures

50 % of the respondents (N=56) had an ASP outcomes measures in place although several contradictions were found with some samples' data. 87.5 % were measuring antibiotic consumption reduction & cost savings (n =21), 75% were measuring antibiotics expenditures (n=21), 64.3 % were tracking resistance patterns overtime (n=18), while only 32.1% were tracking defined daily dose (n=9). Others were measuring either compliance with interventions, formulary adherence or decrease in duration of therapy. The percentages of hospitals with high levels of support from hospital administrators and medical staff was 50% (N=54) and 37.7 % (N=53) respectively, (figure 3).

Analytical Analysis

The Bivariate analysis of ASP structure components by hospital ownership, hospital size and hospital academic status did not show any statistically significant results .Furthermore; no significant correlation was found between the availability of ASP in practice and level of the administrators or medical staff support. However; a statistically significant relation was found between the availability of an ID physician dedicated to ASP and the hospital academic status (p value 0.004). A weak correlation was found between hospital ownership and ASP implementation and between the presence of IC services and ASP implementation.

Limitations and Barriers

78.6 % of respondents (N=44) indicated that the barriers to implement ASP were the absence of national guidelines. Others 69.6% (N=39) traced this to the absence of MOPH regulation and support, in addition to other barriers as training and education, ID physicians' shortage, lack of

leadership commitment, lack of financial support and other lacking elements

Discussion

The assessment survey of the antimicrobial practices revealed that the responding hospitals (37.18 %) were from all Lebanese provinces ensuring a wide geographical distribution of respondents and representing antimicrobial practices in the country. Similar studies showed response rates ranged from 7 to 50% [30].

Only about 65% of the respondents (N=57) had an antimicrobial management control program in place, and the study showed that there was no association between the geographic region in which the respondent practiced and the presence of an ASP.

Although nearly most of the hospitals in this study were engaged in antimicrobial management activities, it is likely that each respondent defines this term differently and ASP as a terminology is known to only 7.14 % of the respondents. A lot of efforts are required to define and clarify in details the AS program and guidelines to all medical and administrative staff in the healthcare institutions.

The support of the hospital administrators through

dedicating necessary resources and engaging all medical staff is crucial to the success of ASP [31]. In this study, no significant correlation was found between the availability of ASP in practice and level of the administrators support; however, the presence of ASP is mainly related to the availability of an ID physician and/or enthusiastic pharmacist with an interest in antimicrobials management control. In contrast, the availability of ASP was not only associated with hospitals' size or academic status.

The study demonstrated a shortage in ID physicians as many of the respondents stated that they do not have infectious disease specialists on staff.

Also the analyzed results showed a lack in AS structure components, such as antimicrobials' educational programs that are an important key component of any antimicrobial stewardship activities, evidence-based written and standardized , local or national guidelines and policies on antibiotic use in addition to the absence of computerized physicians order entry and clinical decision support system that are a critical element in ASP as they integrate stewardship protocols into existing workflow and embed relevant information at the point of care . Almost all the respondents reported the lack of software program to facilitate AS activities. The lack of these resources and



incentives reduces the interest of the relevant staff in running such a program.

The survey assessed the utilization of two core stewardship strategies recommended by IDSA] to optimize appropriate use of antibiotics and showed that barely any hospitals were using both and the majority was using one of them in addition to other supplemental strategies whose implementation varied according to each hospital's resources, but no hospital is fully implementing the program as per the published strategies

Only 50 % of the respondents (N=56) had an ASP outcome measures in place, that are crucial for improvement, although several contradictions were found with some samples' data. The majority of the hospitals are measuring antibiotics expenditures and antibiotic consumption reduction & cost savings. Very few hospitals are measuring reduction in days of therapy and very few hospitals are using defined daily doses recommended by WHO as a measure to benchmark the antimicrobial use with similar hospitals.

Although all hospitals have emphasized the importance of ASP in improving patient clinical outcomes and reducing the antimicrobial resistance and cost, they lack the rapid diagnostic tests that will provide fast accurate identification and susceptibility testing, especially in critically ill patients. This lack will delay the appropriate treatment and negatively affect patients' clinical outcomes. A deep study needs to be performed on this point. Moreover, Staffing constraints, ID physicians' shortage and funding issues were, not surprisingly, the most common barriers to the implementation of AS program in addition to the absence of national guidelines, MOPH regulation and legislation, training and education on ASP and lack of automation system to facilitate antimicrobials surveillance, reporting and measures. Besides, insufficient medical staff buy-in due to the lack of collaboration and communication between AS team and pharmacy & therapeutics committee, infection control committee and other committees that are important to engage all physicians and disseminate any information on antibiotics to all medical staff. The study showed that only 31-33% of the ASP core team collaborates with the pharmacy and therapeutics committee and infection control committees and 6 % collaborate with other committees.

Conclusion

As a conclusion, Hospitals, the primary incubators of antimicrobials resistant pathogens, carry the highest responsibility for proper stewardship of antimicrobial

resources. Commitment to the implementation of ASP must come from the highest levels of hospital administration along with a willingness to invest resources in program development. The antimicrobial stewardship is a patient safety issue as well as a public health issue and efforts to limit the emergence and transmission of antimicrobial resistance must be viewed as the fiduciary responsibility of all healthcare institutions and must be taken seriously in all aspects of the continuum of patient care. Resources from internal hospitals as well as national sources need to be allocated to this important public health initiative.

Recommendations

Policy makers are required to develop and implement national action plans

Antimicrobial stewardship programs should be required through regulatory mechanisms and accreditation standards Recommend to the academic universities, school of medicine, encouraging medical students to specialize in infectious disease to cover the shortage in ID physicians' specialty.

Hospitals should establish the best practice procedures for rapid microbiological evaluation and provide rapid diagnostic testing

Prescribers shall be taught to prescribe according to the therapeutic guidelines and evidence based sciences.

Strengthening surveillance and surveillance data should be regularly reported and shared at the national level

Held National annual antibiotics awareness day

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