

Surveillance of antimicrobial resistance in Lebanese hospitals: retrospective nationwide compiled data



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SUMMARY

Antimicrobial resistance is closely linked to antimicrobial use and is a growing concern worldwide. Antimicrobial resistance increases healthcare costs substantially in many countries, including Lebanon. National data from Lebanon have, in the most part, been limited to a few academic hospitals. The Lebanese Society of Infectious Diseases conducted a retrospective study to better describe the antimicrobial susceptibility patterns of bacterial isolates in Lebanon. Data were based on records retrieved from the bacteriology laboratories of 16 different Lebanese hospitals between January 2011 and December 2013. The susceptibility results of a total 20 684 Gram-positive and 55 594 Gram-negative bacteria were analyzed. The prevalence rate of methicillin-resistant *Staphylococcus aureus* was 27.6% and of vancomycin-resistant *Enterococcus spp* was 1%. *Streptococcus pneumoniae* had susceptibilities of 46% to oxacillin, 63% to erythromycin, and 98% to levofloxacin. *Streptococcus pyogenes* had susceptibilities of 94% to erythromycin and 95% to clindamycin. The mean ampicillin susceptibility of *Haemophilus influenzae*, *Salmonella spp*, and *Shigella spp* isolates was 79%, 81.3%, and 62.2%, respectively. The extended-spectrum beta-lactamase production rate for *Escherichia coli* was 32.3% and for *Klebsiella spp* was 29.2%. *Acinetobacter spp* showed high resistance to most antimicrobials, with low resistance to colistin (17.1%). *Pseudomonas spp* susceptibilities to piperacillin-tazobactam and imipenem were lower than 80% (79.7% and 72.8%, respectively). This study provides population-specific data that are valuable in guiding antimicrobial use in Lebanon and

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neighbouring countries and will help in the establishment of a surveillance system for antimicrobial resistance following the implementation of a nationwide standardization of laboratory methods and data entry.

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1. Introduction

Antimicrobial resistance is a public health concern worldwide, particularly in developing nations, and is associated with many socio-cultural factors. Over the last 70 years, bacteria have become resistant to nearly all clinically relevant antibiotic agents. The United States Centers for Disease Control and Prevention (CDC) estimates that at least two million Americans become infected with antibiotic-resistant bacteria each year, with at least 23 000 people dying yearly as a direct result of these infections.¹ Countries in the Arabian Gulf including Saudi Arabia, the United Arab Emirates, Kuwait, Qatar, Oman, and Bahrain share a high prevalence of infections due to extended-spectrum beta-lactamase (ESBL)- and carbapenemase-producing Gram-negative bacilli.²

The single most important factor leading to antimicrobial resistance globally is the overuse/misuse of antimicrobials.¹ This is mainly due to incorrect diagnosis, the irrational use of antimicrobials, and irregular consumption, the latter due either to an incorrect prescription or to poor compliance. Up to 50% of all antimicrobials prescribed for patients are not needed or are not optimal as prescribed.³ A core action to fight the spread of antimicrobial resistance is their improved use. The lack of implementation of adequate infection control measures has complicated this goal, necessitating urgent intervention.

Infections caused by antibiotic-resistant organisms continue to add considerable and avoidable costs to the already overburdened Lebanese healthcare system. The infections lead to complications that require additional therapeutic interventions, including indwelling catheters, sophisticated life support, intravenous fluid therapy, and prosthetic devices. They can also extend the hospital stay and the use of broad-spectrum antimicrobials appreciably, which in turn can increase the prevalence rate of multidrug-resistant pathogens.

The pattern of antimicrobial resistance changes with time and varies from country to country and also between hospitals within the same country. Therefore, data on the prevailing regional resistance and trends of clinically important bacterial isolates are helpful for physicians making decisions concerning the appropriate empirical treatment of various infections.

In Lebanon, the resistance trends of bacterial isolates have been reported in a few hospitals for several years. However, similar information does not exist at the national level. The Lebanese Society of Infectious Diseases (LSID) study group conducted the present study to better describe the national antimicrobial resistance patterns among clinically relevant pathogens. The LSID also intends to implement a database into which laboratories using standardized techniques can enter their data on a regular basis. This will allow the establishment of a surveillance system in Lebanon, which will help in combating antimicrobial resistance.

2. Methods

This retrospective study was based on the records of antimicrobial susceptibility tests performed on bacterial isolates in the bacteriology laboratories of 16 different tertiary care centres, representing 40.7% of all hospital beds in Lebanon. Hospitals and hospital bed distribution data are presented in Figures 1 and 2,

Geographic distribution of participating hospitals

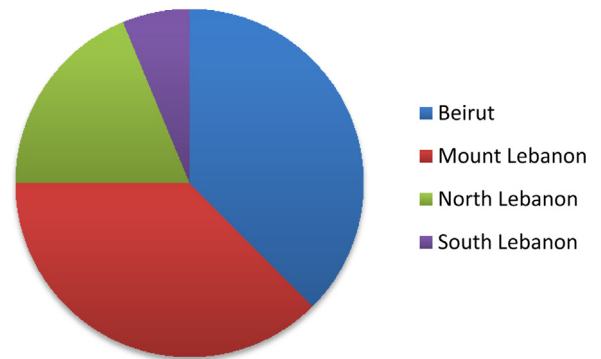


Figure 1. Geographic distribution of participating hospitals.

Distribution of hospital beds

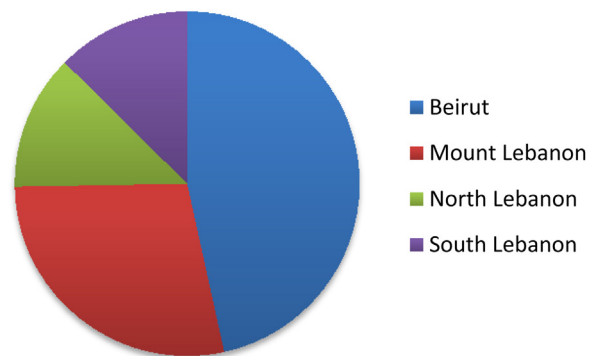


Figure 2. Distribution of hospital beds.

respectively. The only governorate that was not represented in this study was Bekaa.

The study team collected data related to tests performed between January 2011 and December 2013. The data collected were primarily qualitative (resistant, intermediate, or susceptible). Data were then tabulated in Excel spreadsheets. Most of the laboratories generated their data using WHONET software. In an attempt to standardize the selection criteria for bacterial isolates and avoid the duplication of isolates, laboratories not using WHONET software included only the first isolate from each patient with different antibiotic susceptibility profiles (criteria for selection set for WHONET). Six hospitals provided data for the year 2011, 12 provided data for 2012, and 13 provided data for 2013. Clinical specimens included urine, sputum, deep tracheal aspirates, blood, body fluids, central line tips, and others. The characteristics of the participating hospitals, as well as the testing methods and guidelines followed at each institution, are presented in Table 1. Non-automated tests with oxacillin and cefoxitin⁴ and a double-disc synergy test⁵ were used for the detection of methicillin-resistant *Staphylococcus aureus* (MRSA) and ESBL-producing bacteria, respectively.

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