1 Significance of Internet Resources on Antimicrobial Resistance

We recently put together a list of a number of World Wide Web (WWW) addresses of sites or pages of major international networks that present data regarding resistance to commonly used antimicrobial therapeutic agents. The relevant article was published and is an open access educational resource available at: http://www.journals.uchicago.edu/CID/journal/issues/v43n5/40114/40114.html (1). This chapter is mainly based on the published article (1); however, here we supplemented our compilation of the relevant WWW resources with a collection of internet links of representative major national networks/organizations including data on antimicrobial resistance.

Our lists of WWW resources of data from surveillance studies on antimicrobial resistance may be useful to practitioners, especially infectious disease specialists, as well as to scientists with a research interest in the field of antimicrobial resistance. Such educational and informative WWW resources are potentially helpful because of the growing problem of antimicrobial resistance that has become a significant public health concern worldwide (2). This refers practically to all types of pathogens, including viruses, bacteria, mycobacteria, fungi, and parasites. Previous studies have shown the impact of antimicrobial resistance on various outcomes including mortality, morbidity, and cost and length of hospitalization (3–5).

The Infectious Diseases Society of America (IDSA) and the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) have recently published their concerns regarding the considerable proportion of clinical isolates that are resistant to various antimicrobial agents (6, 7). Among the various clinically important bacteria, Staphylococcus aureus, Streptococcus pneumoniae, Enterococcus spp., Acinetobacter spp., Pseudomonas spp., and Klebsiella spp. represent major pathogens that cause high incidence of infections and are resistant to treatment with antibiotics of many antimicrobial classes (8–12). Of particular concern recently is the increasing incidence of community-acquired methicillin resistant Staphylococcus aureus (MRSA) in most countries (13) as well as the epidemic of multidrug-resistant (MDR) Acinetobacter baumannii infections in several countries, especially in patients in the intensive care unit (ICU) setting (14).

When practicing medicine during this era of easy international travel, and because transfer of patients between hospitals in different countries is not rare, the clinician and, especially, the infectious disease specialist should have easily available epidemiological data regarding antimicrobial resistance. In addition, investigators studying various aspects of the problem of antimicrobial resistance also benefit enormously from the availability of such data. Thus, both clinicians and investigators benefit by knowing the proportion of clinical isolates that are resistant to various antimicrobial agents in their community, hospital, area, country, continent, as well as around the globe, because the cross-continental travel of both humans and goods causes the spread of antibiotic-resistant bacteria from one country to another.

Advances of modern technology, including the development of the Internet and the WWW, have given the opportunity to clinicians and researchers to have immediate access to continuously updated information in various scientific fields. Thus, the collection and update of ongoing surveillance antimicrobial resistance data from various sources has been made possible (15). As a useful guidance tool to practitioners and researchers, we sought to compile a list of major networks’ Web pages/sites that provide valuable WWW links that offer additional information relevant to the problem of antimicrobial resistance.
2 Methodology of WWW Resource Selection

We gathered information regarding the relevant WWW resources by making use of internet search engines (Google, AltaVista, and Yahoo). We used as key words the abbreviated names of major antimicrobial surveillance systems/projects that were known to us (i.e., MYSTIC, GSMART, SENTRY, PROTEKT, NNIS, VICNISS, INSPEAR, ANSORM, STRAMA, DANMAP, etc.). Also, we performed searches of the PubMed database, Current Contents, and the WWW for information regarding additional relevant sources by using the following key words: resistance, antimicrobial resistance, surveillance, network, program, and project. In addition, we reviewed the information provided in the initially identified sources to find additional WWW links that contained data relevant to antimicrobial resistance.

We chose to include in our lists dependable English-language Web pages, which we categorized into three groups: those that presented antimicrobial resistance data from major international networks; those that presented antimicrobial resistance data from major national networks; and those that provided links to other international surveillance organizations/associations that study antimicrobial resistance. Regarding the first group of Web pages, those that were finally presented in our assessment were selected from a very extensive catalog, by the criterion of providing international surveillance data (more than two countries involved). In the second group we included representative major national network Web sites. For both groups, strong selection criteria were comprehensive and evidence-based information, as well as ease of access to that information. In the third group we included link-providing Web pages from the most commonly visited Web sites by infection experts.

Although we managed, through our gathering strategy, to review most of the major international and national networks’ Web sites/pages, it is inevitable that some were overlooked, while for some others we decided that they did not fulfill the criteria to be enlisted.

3 Internet Resources on Antimicrobial Resistance from Major International Networks

In Table 1, we list 24 Web pages/sites of 19 major international networks that present data of antimicrobial resistance, either as interactive database or as reports of international antimicrobial resistance surveillance systems. We accessed each of the Web addresses and verified that they contain data from surveillance studies on antimicrobial resistance.

4 Internet Resources on Antimicrobial Resistance from Major National Networks

In Table 2, a catalog of 11 representative major national network Web pages, which present data of drug-resistant microorganisms either in the form of interactive databases or as annual surveillance reports, is shown. We could verify that the Web addresses presented in the table are easily accessible and contain comprehensive and valuable antimicrobial resistance information.

5 Internet Links on Antimicrobial Resistance from Major Networks

In Table 3, we present 11 major networks’ Web pages/sites providing numerous of valuable Web links to international organisms/associations that conduct research on antimicrobial resistance and/or suggest guidelines for infection control as well as for prudent use of antibiotics. We accessed each of the links included in this table and verified that they contain information relevant to the field of antimicrobial resistance.

6 Limitations in the Selection of Relevant Internet Resources

The goal of our effort was to provide to clinicians and investigators immediate access to a collection of WWW resources that include updated information regarding the antimicrobial resistance patterns of clinical isolates from patients of various parts of the world. We acknowledge that the lists we present are far from exhaustive. Rather, they should be regarded as a subset of relevant WWW resources that include readily available information on antimicrobial resistance.

We need to highlight the significance of the numerous national antimicrobial resistance surveillance projects that are monitoring the resistance pattern of clinical isolates from patients within the borders of each country. The investigators related to some of these projects report their national-level data in scientific publications. In addition, a small amount of data related to these efforts is included in regional Web sites. Although the presentation of each and every one of the various Web sites of the national antimicrobial surveillance networks of each country would be valuable, it was considered beyond the scope of this chapter.

We believe that efforts for the continuous update of information of databases reporting the findings of surveillance