Dynamic Chiropractic

HEALTH & WELLNESS / LIFESTYLE

Antibiotic Resistant Bacteria Become "Medical Catastrophe"

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There is a growing alarm in the medical community related to the great variety of microorganisms that are becoming resistant to antibiotics. Some of these bugs have not only become resistant to the common drug therapies but to all known antibiotics. A recent article published in the Southern Medical Journal goes so far as to call the current situation a "medical catastrophe." The causes are of no surprise to the chiropractic profession and are discussed in many recent medical articles including the March 1996 issue of The DO where six primary causes were listed: "misuse of broad-spectrum antibiotics, increasing use of prosthetics and invasive diagnostic and therapeutic procedures, growing consumer demand for antibiotics, noncompliance with antibiotic therapy, routine use of penicillin in cattle and chicken feed, and lax rules governing the use of antibiotics in other countries." Although six causes are listed, most of the literature suggests that overprescription and misprescription coupled with patient noncompliance are the primary problems.

Before we review some of the current abstracts from the literature that relate to this menacing problem let us take a brief look at how we would search the biomedical literature databases for this information. Medline, Embase and Biosis would be potentially the most productive of sources. A Medline search strategy in the Dialog system should include medical subject headings in a logical argument similar to the following:

bacteria/de and drug resistance, microbial/de.

An alternative method would be to search titles for articles that discuss bacteria and resistance. This could be searched on Medline as follows: Bacterial (w) resistance/TI. The "(w)" tells the search engine the words have to be "with" each other and the "/TI" directs the search to the title field.

When conducting searches of Medline and Biosis through Dialog, here is what we found:

MEDLINE 1985-1996

(BACTERIA? AND RESISTANT?)/TI (820) DRUG RESISTANCE, MICROBIAL/DE AND BACTERIA/DE(2416)

BIOSIS 1969-1996

(BACTERIA? AND RESISTANT?)/TI (2806)
ANTIBIOTIC(W)RESISTANCE/DE AND BACTERIA/DE (203)

The following are a few journal articles relating to antibiotic resistant bacteria that the search located: For additional information or questions about locating the literature, call 1-800-28-FACTS.

1. Berkowitz F. Antibiotic resistance to bacteria. Southern Medical Journal Aug 1995; 88(8): 797-804.

Antibiotic resistance in bacteria has emerged as a medical catastrophe. This results from the speed at which bacteria multiply and are spread, and the ease with which they can change their genetic material or acquire new genes. They exert biochemical resistance by preventing entry of the drug, by rapidly extruding the drug, or by enzymatically inactivating the drug or altering its molecular target. The presence of antibiotics in the internal environments of human beings and animals provides a selective pressure for any resistant organisms to become predominant. Examples of antibiotic resistance in several important human pathogens are Streptococcus pneumoniae, enterococci, staphylococci, enteric bacilli, Haemophilus influenzae, Neisseria gonorrhoeae, Neisseria meningitidis, and Mycobacterium tuberculosis.

2. Tenover F., Hughes, J. The challenges of emerging infectious diseases. Development and spread of multiply-resistant bacterial pathogens. Journal of the American Medical Association Jan 24-31 1996; 275(4): 300-4.

Resistance is an emerging problem in human medicine and the effects of resistance are being noted on an ever-increasing scale. Whether it is treatment of nosocomial bacteremia in New York City or community-acquired dysentery in Central Africa, multiresistant organisms are diminishing our ability to control the spread of infectious diseases. Clearly, the rate at which resistant organisms develop is not solely a function of the use of antimicrobials in humans, but is also highly influenced by the use of these agents in veterinary medicine, animal husbandry, agriculture, and aquaculture, as has been emphasized at recent meetings sponsored by organizations such as Rockefeller University and the America Society for Microbiology, and in the report on bacterial resistance recently issued by the US Office of Technology Assessment. We have entered an era where both physicians and patients must take on the responsibility to use antimicrobials wisely and judiciously. Just as in the days at the turn of the century when the public was an integral part of establishing quarantines for infectious diseases, now again the public's cooperation must be sought for this latest threat to public health. The multiresistant organisms of the 1990s are a grim warning of the possibility of the postantibiotic era.

3. Thornsberry, C. Trends in antimicrobial resistance among today's bacterial pathogens. Pharmacotherapy Jan-Feb 1995; 15(1 Pt 2): 3S-8S.

Resistance of nosocomial and community-acquired pathogens to antimicrobial agents is a serious problem with significant clinical consequences. Microbiologic surveillance data, such as those provided by the National Nosocomial Infections Surveillance System, supply information on current nosocomial pathogens in the United States. Many species show resistance to commonly used antimicrobials and, in many cases, it is emerging resistance. Resistance in many gram-negative bacteria is caused by beta-lactamase production. Escherichia coli, the leading nosocomial pathogen, is capable of hyperproducing TEM-1 beta-lactamase. A novel form of resistance in Kelbesiella pneumoniae and E. coli is caused by extended-spectrum cephalosporinases. Many Enterobacteriaceae can be induced to produce group 1 beta-lactamase by exposure to broad-spectrum cephalosporins and other beta-lactams. Thirty percent of Haemophilus influenzae isolates are resistant to ampicillin because of beta-lactamase production. Issues of concern in gram-positive species include multiple antimicrobial resistance in methicillin-resistant Staphylococcus aureus, enterococci, and coagulase-negative staphylococci, and increasing beta-lactam resistance in Streptococcus pneumoniae. To minimize the development of resistance, antimicrobials must be administered judiciously, and infection-control practices must be instituted and followed.

4. Pechere, J. Bacterial resistance: new threats, new challenges. Support Care Cancer May 1993; 1(3): 124-9.

Bacterial resistance remains a major concern. Recently, genetic transfers from saprophytic, non-

pathogenic, species to pathogenic S. pneumoniae and N. Meningitidis have introduced multiple changes in the penicillin target molecules, leading to rapidly growing penicillin resistance. In enterobacteriaceae, a succession of minute mutations has generated new beta-lactamases with increasingly expanded spectrum, now covering practically all valuable beta-lactam antibiotics. Resistance emerges in the hospital environment but also, and increasingly, in the community bacteria. Widespread resistance is probably associated with antibiotic use, abuse, and misuse but direct causality links are difficult to establish. In some countries as in some hospitals, unusual resistance profiles seem to correspond to unusual antibiotic practices. For meeting the resistance challenge, no simple solutions are available, but combined efforts may help. For improving the situation, the following methods can be proposed. At the world level, a better definition of appropriate antibiotic policies should be sought, together with strong education programmes on the use of antibiotics and the control of cross-infections, plus controls on the strategies used by pharmaceutical companies for promoting antibiotics. At various local levels, accurate guidelines should be adapted to each institution and there should be regularly updated formularies using scientific, and not only economic, criteria; molecular technologies for detecting subtle epidemic variations and emergence of new genes should be developed and regular information on the resistance profiles should be available to all physicians involved in the prevention and therapy of infections.

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