

Antibiotic Resistance—A World Health Problem We Cannot Ignore

PHYSICIANS are well aware of the problem of antimicrobial resistance. The combined order for a "culture and sensitivity" test implies a reasonable expectation that an organism may often be resistant to commonly used antimicrobial agents. The code words "cover" and "empiric" are used to anticipate the variety of organisms that may be responsible for an infection, as well as resistant strains among them. Each time an antimicrobial agent is used, however, there is a small but added effect on the ecology of the microbial world.

The collective decisions of thousands of physicians and farmers and millions of consumers involving over-the-counter antibiotic drugs in the underdeveloped nations of the world have exerted a profound effect on the pool of resistant bacteria. The underdeveloped nations of the world have become an important market for the sale of obsolete antibiotic combinations (1) as well as the newest agents not yet licensed in this country. Travel is so extensive today that physicians may need to treat a patient infected by a gonococcus resistant to penicillin originating from Manila, a *Salmonella typhi* resistant to chloramphenicol and trimethoprim from Mexico, or a *Klebsiella* resistant to aminoglycosides from the hospital across town. The efficacy of commonly used antibiotic agents to prevent "traveler's diarrhea" is limited in areas where resistance-bearing plasmids are abundant (2). For example, prophylactic use of trimethoprim-sulfamethoxazole is limited in Mexico because of fecal colonization with trimethoprim-resistant strains of *Escherichia coli* (3).

The frequency of antibiotic resistance of microorganisms is clearly related to two major forces: the remarkable genetic diversity and ability to transfer resistance among bacteria; and the selective pressures of antimicrobial use. Strategies to limit emergence of resistant populations fall into the following general categories: limitation of antimicrobial use to specific indications, using no more drug than is necessary for the desired effect; prevention of the spread of resistant strains in the environment; development of an alternative method of prevention or cure, such as by immunization; and development of new agents that overcome, at least temporarily, the resistance mechanism.

Two very different approaches to deal with the problem of antibiotic resistance were presented at recent meetings. A Scientific Working Group on Antimicrobial Resistance was called together by the World Health Organization (WHO) in 1981 (4) to examine the issues and make recommendations. This past summer, the Thirteenth International Congress of Chemotherapy was held in Vienna, Austria. The contrast between the two meet-

ings was striking. The WHO group prepared a report that favored more extensive worldwide surveillance of resistance and methods to reduce use of antibiotic agents for therapy and in the food supply. The attendees at the chemotherapy meeting received pounds of abstracts and learned of the development of a remarkable array of new chemotherapeutic agents. Clearly, the medical world is placing its bet heavily on the development of new drugs to counter the problem of resistance.

Are we destined, then, to a perpetual cycle of programmed obsolescence and escalating costs as each new drug is introduced and resistance inevitably emerges? The answer appears to be yes, at least for the next few years. Because no one is smart enough to place a limit on technological development, we have no alternative but to watch the selective pressures of the market "shake out" the new drugs. Physicians must be involved in this selective process and maintain objectivity despite highly sophisticated marketing (5).

Concern about rising health-care costs and the Tax Equity and Fiscal Relief Act, recently passed by Congress, may have a greater impact on the use of antibiotic agents and payment for the costs of sensitivity testing than do the warnings from experts. A new international organization, the Alliance for the Prudent Use of Antibiotics, was recently formed to address the worldwide problem of antibiotic resistance (6). The real action in this country, however, is at the level of the individual physician and local hospital. As might be expected with such an important issue, abundant views and advice are available (7-10).

Physicians wish to maintain their independent right to prescribe drugs and bitterly resent attempts by others, no matter how expert, to control drugs that might be useful for their patients. The patient also has the right to expect that he or she will not be exposed unnecessarily to a population of antibiotic-resistant bacteria. Hospital staffs must address the issue of antibiotic resistance and develop measures for surveillance and prevention, not because it is required by the Joint Commission on Accreditation of Hospitals or because of the economic implications of overuse, but because it is good medical practice. The WHO report is recommended as a useful guideline for this effort. (CALVIN M. KUNIN, M.D.; *Ohio State University School of Medicine; Columbus, Ohio*)

REFERENCES

1. GUSTAFSSON LL, WIDE K. Marketing of obsolete antibiotics in Central America. *Lancet*. 1981;1:31-3.
2. Traveller's diarrhoea [Editorial]. *Lancet*. 1982;1:777-8.
3. MURRAY BE, RENSIMER ER, DUPONT HL. Emergence of high-level trimethoprim resistance in fecal *Escherichia coli* during oral administration of trimethoprim or trimethoprim-sulfamethoxazole. *N Engl J Med*. 1982;306:130-5.
4. WORLD HEALTH ORGANIZATION SCIENTIFIC WORKING GROUP ON ANTIBACTERIAL RESISTANCE. Control of antibiotic-resistant bacteria: memorandum from a WHO meeting. *Bull WHO*. 1983;61:423-33.
5. MUSER DM. Antibiotics: the medium is the message. *Rev Infect Dis*. 1983;5:809-12.
6. LEVY SB. Antibiotic resistance. *Infect Control*. 1983;4:195-7.
7. COUNTS GW. Review and control of antimicrobial usage in hospitalized patients: a recommended collaborative approach. *JAMA*. 1977;238:2170-2.
8. BUCKWOLD FJ, RONALD AR. Antimicrobial misuse—effects and suggestions for control. *J Antimicrob Chemother*. 1979;5:129-36.
9. JACKSON GG. Antibiotic policies, practices and pressures. *J Antimicrob Chemother*. 1979;5:1-4.
10. KUNIN CM. *Practical Aspects Of Antibiotic Review*. Atlanta: American Health Consultants; 1979:11.

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