Infection Control in Healthcare Facilities

Barry Farr, Department of Internal Medicine, University of Virginia, Charlottesville, VA 22908 USA

Natural selection accounts for most of the increase in antibiotic resistance in healthcare facilities during the past half century. In 1859, Darwin wrote that nature selects the strain or species most suited to survive within a particular environment. In an environment such as a modern US hospital, where almost half of all patients are on antimicrobial agents, a microbe with a mutation for resistance enjoys a selective advantage to survive, proliferate, and spread. Spread of antibiotic-resistant pathogens within healthcare facilities is an important source of antibiotic-resistant nosocomial infections.

The infection control movement was formed more than three decades ago to control antibiotic resistance because of the thought that, if antibiotics no longer worked, we might not always be able to cure infections. The idea was to find a way of preventing infections from happening in the first place. Some people look upon infection control as a dismal failure because antibiotic resistant nosocomial infection rates continue rising. This has happened despite having infection control guidelines for preventing spread for decades. Why haven’t these guidelines worked?

Study after study has shown that large proportions of the population regularly fail to comply with all kinds of public health guidelines. A number of articles also show that clinicians do not comply with treatment guidelines any better than they do with infection control guidelines. Their failure to adhere to infection control guidelines is thus certainly not unique.

One simple infection-control guideline is hand cleansing. In a hand hygiene study in my hospital, it was observed that some of the subjects would always cleanse their hands. On the other hand, seven healthcare workers were observed who never washed their hands during a total of 24 hand-washing opportunities. Some of these workers were watched going from room to room to room. Simple forgetting accounts for some of this noncompliance; the fact that microbes are invisible makes it easier to forget them. Another reason for noncompliance is the failure to recognize that infection control could actually be part of the solution to this problem.

MRSA, active surveillance cultures and contact isolation

In addition to encouraging handwashing, what can we do about controlling the spread of infection in healthcare facilities? Some healthcare workers have given up hope because infections get to a hospital, start spreading, and then usually become endemic. This was the pattern when methicillin-resistant Staphylococcus aureus (MRSA) arrived at the University of Virginia in 1978. By 1980, half of all S. aureus surgical site infections and 40% guideline for antibiotic use from the American College of Physicians

Vincenza Snow, ACP-ASIM, 190 N Independence Mall West, Philadelphia, PA

In 1999, the American College of Physicians-American Society of Internal Medicine (ACP-ASIM) designated antibiotic resistance as the “clinical theme” for the years 2000-2001. Clinical themes are areas of internal medicine that the College has decided to highlight for their overarching importance to clinical practice and in which it will concentrate efforts on producing related educational products. As a part of this effort, the ACP-ASIM released four guidelines on the appropriate use of antibiotics in acute upper respiratory infections in adults in the March 20, 2001 issue of Annals of Internal Medicine. The guidelines are based on five “principles” papers produced by a CDC-sponsored multidisciplinary panel of experts from internal medicine, family practice, emergency medicine, and infectious disease. The goal for the guidelines and accompanying papers is to provide clinicians with practical strategies for limiting antibiotic use to those patients most likely to benefit from treatment. The guidelines cover acute nonspecific upper respiratory infection, acute sinusitis, acute pharyngitis, and acute bronchitis.

The majority of antibiotics prescribed to adults in ambulatory practice in the United States are for acute respiratory
INFECTION CONTROL continued from page 1 of all _S. aureus_ bacteremias were due to the outbreak strain of MRSA. Putting patients with MRSA infection into contact precautions seemed to have little effect for almost three years.

At the end of 1980 Thompson and colleagues started doing active surveillance cultures. This involved swabbing patients and doing cultures to see if they were in fact carrying MRSA. These active surveillance cultures showed that many more patients had MRSA than had been suspected. According to the CDC guidelines, contact precautions are recommended for patients known or suspected to be colonized or infected with pathogens such as MRSA. When the additional patients, who were colonized but not exhibiting clinical symptoms, were put into contact isolation, the spread of infection decreased significantly. These measures ended up eradicating the MRSA strain from the hospital (after it had appeared uncontrollable for almost three years).

This outcome suggests that clinically evident infections represent only the tip of the figurative iceberg. By contrast, colonized patients (i.e. asymptomatic carriers of resistant bacteria) represent the majority of the reservoir for spread of infection (Figure 1).

A few years ago, we began to suspect that more VRE and MRSA were coming in, and started culturing patients coming from other healthcare facilities. This was done to prevent spread to other patients. It was also helpful to feed this information back to the other facilities that had not recognized that they had such pathogens spreading in their facilities. This is very important because one hospital cannot conquer antibiotic resistance alone. The surrounding facilities, where it also is spreading, will have to join these efforts or no one will be able to control this spread.

We found that long-term care patients and patients coming from rehabilitation facilities were very high risk for being colonized with MRSA or VRE. It might be best to put such high risk patients into contact isolation while cultures are incubating. This is done routinely in Danish hospitals, which have one of the lowest MRSA infection rates worldwide.

In a MRSA outbreak in a neonatal intensive care unit (NICU), where _S. aureus_ is very easy to spread, active surveillance cultures and contact precautions limited spread to only 3% of the neonates. Only one became bacteremic and none died of MRSA infection. Identifying patients with MRSA and putting them in contact precautions was found to decrease spread to other nearby patients by 16-fold (i.e., as compared with the rate of spread from patients not recognized to have it by cultures). Of note, no infant in the unit had a culture positive for MRSA during the next nine years despite the absence of an antibiotic control program, suggesting that _de novo_ mutation to methicillin resistance occurs rarely among staphylococci. In contrast, in another NICU MRSA outbreak in which these measures were not used for prompt control, the outbreak strain spread to an estimated 40% of all neonates over a 51-month period with 75 developing bacteremia and 14 dying. This suggests that “an ounce of prevention [may be more
cost effective] than a pound of cure,” as the pound of cure doesn’t always work.

**VRE and active surveillance cultures**

The CDC recommended that the infection control community educate healthcare workers as to why VRE was epidemiologically important and needed to be isolated. The CDC recommended active surveillance cultures for "more efficient containment." Since VRE is out of control in most healthcare settings in the US, perhaps all healthcare facilities should be seeking "more efficient containment."

Several publications have shown what happens when active surveillance cultures are not used to address spread of VRE throughout a hospital.6,7 These reports have shown a high incidence of colonization and correspondingly high rates of clinical infections. One study reported doing some surveillance cultures, but reported that the hospital-wide VRE infection rate just kept increasing, leading them to conclude that the CDC guidelines do not work. They were only doing cultures on patients in 35 (4.6%) of the 757 beds in the facility, however. This was another example of focusing preventive efforts only on the tip of a figurative iceberg. Effective control obviously requires detection of colonization and prevention of spread throughout the facility.

Some have found a polyclonal pattern among VRE culture isolates and concluded that this means that the cultured VRE were unrelated to each other and therefore that VRE wasn’t spreading in their hospital.6 However, such studies have usually been limited by inadequate sample size, failure to identify all VRE strains in all patients, and failure to look for transposons, which can give a polyclonal pattern despite patient-to-patient spread.

Early in a clonal VRE outbreak at our hospital, one ICU reached a 100% prevalence of VRE. Using active surveillance cultures and contact precautions as recommended by the CDC controlled an eight-ward outbreak of VRE at my hospital8 and then kept the hospital-wide prevalence of colonization below 0.5% over a three year period. After three years and 4 months, an antibiotic control program was started in May 1998 to save money and to decrease the selective pressure for potentiating antibiotic resistance. It should be noted, however, that there are no examples of an antibiotic control program showing such a sustained effect (i.e., controlling VRE over such a long period) nor to this degree. That preventing spread of infection works has been reported in 14 different studies by different investigators in different settings suggests a causal association; one of these studies involved an entire health district in Iowa, in which all 28 nursing homes and all four hospitals used active surveillance cultures to identify colonized patients and contact precautions to prevent spread.9

**Infection control is cost-effective**

MRSA and VRE cause more than their share of antibiotic-resistant infections in hospitals throughout the US and cost significantly more to treat than infections due to antibiotic susceptible-strains of the same species.10,11 According to a study from Duke University, the median attributable excess cost of an MRSA bacteremia was $27,083, as compared with MSSA bacteremia, which had a median attributable excess cost of $9,661.10 The majority of mortality studies show significantly higher mortality for resistant strains.10,12

In one such study by Jernigan in neutropenic bone marrow transplant patients, attributable mortality was 46% with VRE bacteremia and 0% with vancomycin-susceptible enterococci (VSE) bacteremia.

Several studies have evaluated the cost effectiveness of using active surveillance cultures and barrier precautions to prevent infections and concluded that this is more cost effective than letting these microbes spread freely.13-17

Several years ago, Wenzel published an article in which he contended that having an infection-control program is more cost-effective in terms of quality-adjusted life-years saved than a number of other, very well-accepted therapeutic and prophylactic interventions such as Pap smears, liver transplants, mammograms, peritoneal dialysis, or therapy for severe hypertension.18 This implies that we could double or triple what we are spending on infection control in our hospitals to meet the most important infection control challenge we have ever encountered and still be more cost effective than most of those other interventions.

John Kennedy said that, “some see things as they are and ask, ‘why?’” Many investigators’ interest in antibiotic resistance stops there. Others sympathize with Kennedy, who said that he “dream[ed] things that never were [i.e., as they should be] and ask[ed], ‘why not?’

This article was adapted from a talk given by Dr. Farr at the APUA sponsored conference “Antibiotic Resistant Infections: A Global Problem with Local Solutions” on May 2, 2000.
GUIDELINES continued from page 1

TRACT infections, in particular acute sinusitis, acute pharyngitis, acute bronchitis, and nonspecific upper respiratory tract infections, including the common cold. Physicians have reported that unrealistic patient expectations, patient pressure to prescribe antibiotics, and insufficient time to educate patients about the inefficacy of antibiotics are some of the reasons why antibiotics are prescribed for upper respiratory tract infections (URI). However, how patients present also appears to affect the decision to prescribe antibiotics. Patients who present with a predominant clinical feature, such as acute cough, are taken to have acute bronchitis, nasal and sinus symptoms are diagnosed as sinusitis, and acute sore throat is considered pharyngitis. Acute respiratory complaints in the absence of a predominant symptom is typically diagnosed as “URI.”

The ACP-ASIM guidelines … dispel the common misperception that purulent secretions indicate bacterial infection …

A study that utilized a standardized symptom and physical examination recording form concluded that clinicians identify and treat with antibiotics a subset of upper respiratory tract infections primarily characterized by the presence of purulent manifestations.

The ACP-ASIM guidelines provide practical recommendations for clinicians on how to differentiate viral from bacterial infections, and they dispel the common misperception that purulent secretions indicate bacterial infection. They describe under what circumstances patients would benefit from antibiotic treatment or when symptomatic treatment only is indicated. They guide clinicians in their choice of antibiotics, favoring the narrow-spectrum agents. Finally, we hope that they raise consciousness among clinicians as to the importance of restricting the use of antibiotics, particularly broad-spectrum antibiotics, in upper respiratory infections.

Summary of Guidelines for the Appropriate Use of Antibiotics

**URI**

- URI is a nonspecific upper respiratory infection in which sinus, pharyngeal and lower airway symptoms are frequently present but are not prominent.
- These infections are predominantly viral in origin and complications are rare.
- Antibiotics should not be used for nonspecific URI in previously healthy adults.
- It is appropriate to offer symptomatic treatments such as decongestants, analgesics, and antipyretics.

**Acute Sinusitis**

- Sinus radiography is not recommended for the diagnosis of uncomplicated sinusitis.
- Mild or moderate acute bacterial sinusitis does not require antibiotic treatment; appropriate doses of analgesics, decongestants, and so on should be offered.
- Severe or persistent moderate symptoms and specific findings of bacterial sinusitis (such as unilateral facial pain, unilateral maxillary pain, and facial swelling lasting longer than 7 days) can be treated with antibiotics, in addition to appropriate symptomatic treatment.
- Narrow-spectrum antibiotics are reasonable first-line agents (amoxicillin, trimethoprim-sulfa, and doxycycline).

**Acute Pharyngitis**

- All patients with pharyngitis should be offered appropriate doses of analgesics, antipyretics and other supportive care.
- Only about 10% of pharyngitis in adults is due to having Group A beta-hemolytic streptococcus (GABHS).
- Antibiotics should be limited to those with the highest probability of GABHS.
- The preferred antimicrobial treatment of GABHS pharyngitis is penicillin or erythromycin in penicillin-allergic patients.

**Acute Bronchitis**

- Antibiotics are not recommended for the treatment of uncomplicated acute bronchitis in previously healthy adults, regardless of the duration of cough.
- Production of yellow or green phlegm is not an indication of bacterial infection.
- Almost all acute bronchitis is caused by viruses.
- Appropriate doses of analgesics, cough suppressants, and other symptomatic relief should be offered.

Bibliography
Chile Enforces Regulations on the Sale and Dispensing of Antibiotics

Luis Baustrelllo, APUA-Chile chapter, and Q.F. Angela Cabello, Gustavo Fricke Hospital, Viña del Mar, Chile

After more than a decade of increasing antibiotic consumption in Chile, physicians became alarmed by the associated economic costs as well as rising antibiotic resistance due to indiscriminate use of these drugs.1 A study compared antibiotic consumption in Chile over a ten-year period from 1988 to 1998. Antibiotic consumption was measured as Defined Daily Doses (DDD)/1,000 inhabitants/day.2 The results showed a marked increase in consumption for most antibiotics studied (Table 1).3

The analysis of ten years of antibiotic consumption showed that while many antibiotics were being sold, the most dramatic increases were seen in the sales of amoxicillin (498%), amoxicillin-clavulanic acid (16,460%), cephalexin (309%) and fluoroquinolones (473%). The cost to the Chilean population for these drugs totaled US $45.8 million in 1997 (Table 2).

These data were submitted to the Ministry of Health in Chile in December of 1998. With support from the Chilean Infectious Disease Society, Chilean Microbiology Society, Chilean Society of Pharmacology, the Medical and Pharmaceutical Associations, Health Commission of the Chilean Congress, Public Health Institute, and National Consumer Association, the Ministry of Health decided to act by enacting an existing regulation (Res. Ex. 1333 del I.S.P.) starting in September of 1999. The existing law required a prescription in order to dispense antibiotics to consumers. The Ministry of Health also released a document (4C/5051) outlining an action plan for the rational use of antimicrobial agents, including a mass media campaign to reach the public. Pharmacies across the nation were informed about the measure through bulletins and posters visibly displayed at each drugstore.

Three months later, a second antibiotic consumption study evaluated the impact of the enforced measure. A three-month period in 1999 was compared with the same three-month period of 1998 (Table 3). Researchers found that ampicillin consumption dropped by 36% and erythromycin by 30%. Sales of antibiotics dropped by US $6.5 million, with no adverse patient outcomes reported (Table 4).

Table 2. Antibiotic sales in 1988, 1996, and 1997

<table>
<thead>
<tr>
<th>Antibiotic Group</th>
<th>1988*</th>
<th>1996*</th>
<th>1997*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macrolides</td>
<td>1,599,000</td>
<td>10,700,383</td>
<td>14,745,019</td>
</tr>
<tr>
<td>Broad-spectrum penicillin</td>
<td>3,042,000</td>
<td>11,606,151</td>
<td>13,869,812</td>
</tr>
<tr>
<td>Narrow-spectrum penicillin</td>
<td>2,997,000</td>
<td>3,814,038</td>
<td>4,141,114</td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>1,601,000</td>
<td>3,692,174</td>
<td>4,275,996</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>709,000</td>
<td>3,512,470</td>
<td>4,203,548</td>
</tr>
<tr>
<td>TMP-SMX</td>
<td>1,968,000</td>
<td>2,199,671</td>
<td>2,316,532</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>772,000</td>
<td>1,882,546</td>
<td>2,014,394</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>319,000</td>
<td>306,255</td>
<td>308,233</td>
</tr>
<tr>
<td>Total</td>
<td>13,027,000</td>
<td>37,603,688</td>
<td>45,874,648</td>
</tr>
</tbody>
</table>

*DDD/1000 inhabitants/day

Table 3. Recent antibiotic consumption in Chile during a one-year period

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>4th quarter 1998*</th>
<th>4th quarter 1999*</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarithromycin</td>
<td>0.366</td>
<td>0.446</td>
<td>21.8%</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>0.342</td>
<td>0.353</td>
<td>3.2%</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>0.536</td>
<td>0.370</td>
<td>-30.9%</td>
</tr>
<tr>
<td>Amoxicillin</td>
<td>4.599</td>
<td>2.943</td>
<td>-36.5%</td>
</tr>
<tr>
<td>Ampicillin</td>
<td>0.391</td>
<td>0.182</td>
<td>-53.4%</td>
</tr>
<tr>
<td>Amoxicillin–</td>
<td>0.459</td>
<td>0.443</td>
<td>-3.5%</td>
</tr>
<tr>
<td>Clavulanic Acid</td>
<td>0.317</td>
<td>0.386</td>
<td>21.8%</td>
</tr>
<tr>
<td>Cefoxitin</td>
<td>0.424</td>
<td>0.338</td>
<td>-20.3%</td>
</tr>
<tr>
<td>Cefoxitin–</td>
<td>0.184</td>
<td>0.111</td>
<td>-39.7%</td>
</tr>
<tr>
<td>TMP-SMX</td>
<td>0.913</td>
<td>0.633</td>
<td>-30.7%</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>0.199</td>
<td>0.340</td>
<td>-31.8%</td>
</tr>
</tbody>
</table>

*DDD/1000 inhabitants/day

The INFECTION CONTROL continued on page 3

References
**APUA News**

**APUA Highlights the Environmental Impact of Antibiotics**

The objectives of the Ecology Program are: 1) to document the cumulative selective forces of various antibiotic uses in humans and animals, on plants, and on the emergence of antibiotic resistance; 2) to serve as a public information resource; and 3) to document known links between the use of antibiotics in one species or geographical area and the emergence of resistant bacteria in other areas.

APUA's multidisciplinary Ecology team consists of Stephen DeVincent, MA, DVM, Director of the Ecology Program; Martha Richmond, PhD, MPH, Staff Scientist; Karin Travers, DSc, Research Program Manager; and Ellen Wells, BA, Project Assistant.

Within the past year, the Ecology team integrated three APUA projects under the "umbrella" of the Ecology Program; the new "Environmental Impact of Antibiotics" (EIA) project (a national public awareness campaign), the "Facts about Antibiotics in Agriculture and their Impact on Resistance" (FAAIR) project and the "Reservoirs of Antibiotic Resistance" (ROAR) project. More information on EIA, FAAIR, and ROAR is available on the APUA website (www.apua.org).

The new ecology section of the APUA website (www.apua.org, click on "Ecology") disseminates information about the interrelationships and complexities of the environmental impact of antibiotics. To provide varied viewpoints, the website includes links to websites of major stakeholders, including agricultural producers, the pharmaceutical industry, and consumer groups. The uniqueness of APUA's ecology webpages is the inclusion of these various perspectives and the breadth of its focus, which addresses environmental topics including antibiotic residues, and antibiotics in plants, food animals, and aquaculture. In addition, the website include historical archives, ranged by topic, of the ROAR online discussion group. In the near future, the APUA ecology website will house approximately 700 scientific references on the ecology of antibiotic resistance, compiled for the FAAIR project.

One goal of the Ecology Program is to bring the latest scientific evidence to the attention of policy makers who can intervene to improve antibiotic use and contain antibiotic resistance. The information gathered through the EIA project has been conveyed to key policy makers through the following meetings and reports:

- **WHO Global Strategy for Containment of Antimicrobial Resistance:** The World Health Organization (WHO) developed the *Global Strategy for Containment of Antimicrobial Resistance*, incorporating APUA commentary, which was presented to the World Health Assembly in May 2001.


- **National Health Council, July 27, 2000:** Dr. Stuart Levy spoke on antibiotic resistance at this meeting sponsored by the NHC and attended by Congressional staff members and federal agency officials.

- **WHO Forum on Antibiotics in Food Animals, June 2000:** APUA was invited to participate in the international colloquium on the development of "WHO Global Principles for the Containment of Antimicrobial Resistance in Animals Intended for Food."

- **WHO Meeting in Geneva, January 11-12, 2001:** A "Meeting on International Aspects of the Containment of Antimicrobial Resistance," for which goals included encouraging further research and educating international public health organizations. Dr. Levy made a presentation entitled "International and National Teamwork to Contain Antibiotic Resistance."

- **FDA/Center for Veterinary Medicine (CVM) Public Meeting, January 22-24, 2001:** The focus was on the "Use of Antimicrobial Drugs in Food Animals and the Estimate of Regulatory Thresholds on Antimicrobial Resistance." Dr. Levy spoke on approaches to establishing thresholds.

A key component of the educational activities of APUA, with the support of the Cummings Foundation, has been conveying information through the Ecology Program to key policy makers through press communications, articles published in scientific literature, information written for the general public and testimony at key policy meetings. With a highly qualified team in place, extensive information gathered, and collaborations with stakeholders, we expect more opportunities to educate and influence important constituencies about the relationship between the use of antibiotics in humans, animals, agriculture, and aquaculture and its effects on humans, animals and the environment.

**ROAR: Reservoirs of Antibiotic Resistance**

ROAR, the Reservoirs of Antibiotic Resistance project, disseminates information about the contribution of commensal bacteria to the antibiotic resistance problem in pathogenic bacteria. To join ROAR's online discussion group, contact the new moderator, Dr. Karin Travers, APUA Research Manager (karin.travers@tufts.edu). An archive of postings to the ROAR discussion group, categorized by subject and date, has been recently added to the ROAR website (see www.apua.org and click on the "ROAR" link and then the "Discussion Group" link). Many thanks to Dr. James Herrick, James Madison University, for creating the archive!
Guadalajara Declaration to Combat Antimicrobial Resistance in Latin America

Sponsored by: APUA, The Pan American Health Organization, The Pan American Society for Infectious Diseases, The Mexican Association for Infectious Diseases and Clinical Microbiology

The X Pan American (API) Congress on Infectious Diseases in Guadalajara, Mexico from April 30 to May 4, 2001 featured an APUA-sponsored symposium “Improving Knowledge and Practice Regarding Antibiotic Use in the Americas,” which was attended by approximately 80 healthcare professionals. The APUA Symposium produced the “Declaration of Guadalajara for the Containment of Antimicrobial Resistance in Latin America.” The declaration was created by the presenters and the audience of the symposium, assisted by APUA-Latin America Director, Dr. Anibal Sosa. This document is a customized tool for Latin America that can be adapted by policy makers, the media, microbiologists, and universities to guide and advocate for improved antibiotic use. The Declaration is available in English and Spanish at www.apua.org (click on “intl chapters,” then click on “Mexico”).

APUA Chapter News

APUA-Argentina held the First Interdisciplinary Forum for the Prevention and Control of Bacterial Resistance and Prudent Use of Antibiotics to develop a generic national AMR strategy based on WHO’s Global AMR strategy. Dr. Anibal Sosa, APUA-Latin America Director was the keynote speaker. The Forum was held on May 11, 2001 in Buenos Aires, Argentina and was sponsored by APUA-Argentina, the Argentine Society for Infectious Diseases, and the National Ministry of Public Health. Participants invited include: Asociación Argentina de Microbiología, Sociedad Argentina de Pediatría, Sociedades de Médicos de Atención Primaria, ANMAT, Oficina Panamericana de la Salud, Organización Mundial de la Salud, Obras Sociales y Medicina prepagas, Representante del Poder Legislativo, Representante del Poder Judicial, Colegios de Médicos, Colegios de Farmacéuticos, Cátedras de Farmacología, and Cátedras de Enfermedades Infecciosas.

APUA-Ecuador members, Dr. Javier Ochoa and Dr. Juan Arias are organizing the II Ecuadorian-Peruvian Congress on Infectious Diseases to be held in Cuenca, Ecuador in November, 2001.

APUA-Cuba set up a national AMR surveillance system using a computerized system they developed called DYNAMIC. So far, they have set up a clinical, but not an epidemiological, surveillance network.

APUA-Dominican Republic Chapter Coordinator, Dr. Jesus Feris Iglesias, was appointed President of the Council of Health Care Reform Advisor by the President of Dominican Republic, Ing. Hipolito Mejia Dominguez, and the Ministry of Health, Dr. Jose Rodriguez Soldevilla.

APUA-Venezuela Chapter coordinator, Dr. Manuel Guzman Blanco, was appointed as the Ministry of Health’s public health officer to review aspects of antibiotic sale and dispensing in the country and provide recommendations. The Venezuelan government has already approved a “Law for all Drugs” in February, 2001.

Dr. Jose I. Santos, APUA-Mexico chapter coordinator, has been elected President of the Pan American Society of Infectious Diseases. He has recommended that Dr. Jose Donis be the new chapter coordinator for Mexico.

Members of APUA-Chile are working with The Chilean Infectious Disease Society to hold “Training on Antimicrobial Therapy” on June 29-30; and the XVIII Chilean Congress on Infectious Disease to be held on August 23-26 in Pucón, Chile.

APUA-Uruguay Chapter member, Dr. Eduardo Savio, is organizing the “II Regional Seminar of Infectious Disease” to be held on July 5-6, 2001.

Dr. Helio Sader, APUA-Brazil chapter coordinator and organizing committee member, assembled a 4-day symposium on antimicrobial resistance held in Rio de Janeiro, from April 2-5, 2001 and sponsored by the Ministry of Health, FINCRUZ Institute, Pan American Health Organization, APUA-Brazil, Canadian Science Center for Human and Animal Health, Brazilian Society of Microbiology, Infectious Disease Society of Brazil, Rio de Janeiro chapter, Regional Council of Pharmacy of Rio de Janeiro, Regional Council of Veterinary Medicine of Rio de Janeiro. This event ended with a ceremony and the official launching of the APUA-Brazil.

In Guadalajara, APUA-Latin America Initiative Director, Dr. Anibal Sosa organized a working lunch to discuss antibiotic policy and regulation issues. Present were chapter leaders Dr. Maria Hortal of Uruguay, Dr. Maria Eugenia Pinto de Chile, Dr. Eduardo Gotuzzo of Peru, Dr. Rolando Contreras and Lic. Ileana Gonzales of Cuba, Dr. Jesus Feris of Dominican Republic, Dr. Helio Sader of Brazil, and Dr. Manuel Guzman of Venezuela. Guest: Dr. Luis Bavestrello presented insights on success factors for enforcing the Chilean antibiotic prescription law (see page 5).
**Alliance for the Prudent Use of Antibiotics**
75 Kneeland Street
Boston, MA 02111-1901 USA

If you are concerned about the public health threat of antibiotic resistance, become part of the solution. Make a tax-deductible contribution and join our global network of citizens, clinicians, researchers and policy makers.

Name: ________________________________
Address: ________________________________

________________________________________________________________________________

Telephone: ____________________________ Email: ________________________________

<table>
<thead>
<tr>
<th>Membership Level</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Member*</td>
<td>$45</td>
</tr>
<tr>
<td>1-Year Individual ($45)</td>
<td></td>
</tr>
<tr>
<td>2-Year Individual ($70)</td>
<td></td>
</tr>
<tr>
<td>Student ($20)</td>
<td></td>
</tr>
<tr>
<td>Library/Non-Profit ($100)</td>
<td></td>
</tr>
<tr>
<td>Supporting Member*</td>
<td>$55</td>
</tr>
<tr>
<td>1-Year Supporting ($55)</td>
<td></td>
</tr>
<tr>
<td>2-Year Supporting ($95)</td>
<td></td>
</tr>
<tr>
<td>Friend ($250)</td>
<td></td>
</tr>
<tr>
<td>Corporate Member*</td>
<td>$1000</td>
</tr>
<tr>
<td>Affiliate ($1000)</td>
<td></td>
</tr>
<tr>
<td>Associate ($2500)</td>
<td></td>
</tr>
<tr>
<td>Partner ($5000)</td>
<td></td>
</tr>
<tr>
<td>Benefactor ($10,000)</td>
<td></td>
</tr>
</tbody>
</table>

**Payment method in US dollars** (please check one):

- Check drawn on a US affiliate or international money order, payable to APUA.
- Mastercard
- VISA

Card Number: ____________________________
Expiration Date: ________________________
Signature: ______________________________

*Membership is complimentary in the developing world.

APUA is a 501(c)3 non-profit; donations are US tax-deductible. Supporting members help sponsor members in developing countries.

---

**Join APUA's 20th Anniversary Celebration at ICAAC**

APUA has reached the 20-year milestone in our mission to preserve the power of antibiotics. As part of our 20-year celebration, APUA is hosting a special reception at the 2001 ICAAC on Sunday evening, September 23rd. Three past presidents of ASM will share their perspectives on the past and future effectiveness of antibiotic therapy. APUA will present an APUA Leadership Award to an international public health leader who has crystallized solutions and engaged appropriate collaborators to have a major impact. APUA members and friends are invited to join us on September 23rd from 6:30 pm to 8 pm at the Hyatt Regency in Chicago. For information about attending or sponsorship, please contact apua@opal.tufts.edu.