

**CONTROLLING ANTIBIOTIC MISUSE AND OVERUSE:
A REVIEW OF CAMPAIGNS THAT PROMOTE THE
RATIONAL USE OF ANTIBIOTICS
IN THE AMERICAS AND SPAIN**

by

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ABSTRACT

The project's objective was to review what types of community educational interventions have been conducted by health ministries, non-governmental organizations, and research teams to improve antibiotic use in countries with significant Spanish-speaking populations. I conducted a web-based survey to retrieve educational campaign materials promoting the appropriate use of antibiotics in communities in the Americas and Spain. Public health agencies in 10 countries (Bolivia, Chile, Ecuador, Nicaragua, Paraguay, Peru, Spain, Venezuela, Canada, USA) and six non-governmental organizations (PAHO, APUA, USAID, SAIDI, ReAct, AIS) produced materials promoting the rational use of antibiotics (RUA). Key campaign messages focused on: explaining bacteria, viruses, bacterial resistance, and antibiotics; outlining risks associated with self-medication; protecting the existing stock of medications; consulting a health-care professional; and handwashing. Although numerous Spanish-speaking countries promote RUA, more comprehensive, multifaceted efforts are needed to address the regulatory and organizational factors that lead to the development of antibiotic resistance.

Keywords: antibiotics; antibiotic resistance; social marketing; Latin America; Spain; behaviour change

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1: INTRODUCTION

In June of 2008, delegations from 22 countries across Latin America, North America, Europe and Asia met in Cuenca, Ecuador, to analyze the problem of antibiotic resistance, and to develop an international strategy to contain this emerging threat. The product of this assembly was the Cuenca Declaration, a worldwide call to arms to take action against antibacterial resistance. This declaration stated that antibacterial resistance (ABR) is a gravely underestimated threat to public health, caused by the irresponsible usage of an important resource, contradictory to the recommendations of the pioneers who discovered these life-saving medications (ReAct, 2008). The Cuenca Assembly was notable because of the participation of several international delegations, and for the increased attention it created around ABR in Latin America, but it was by no means the first declaration addressing this problem. In fact, Alexander Fleming, upon receiving the Nobel Prize for medicine for the discovery of penicillin, prophetically warned against this drug's misuse:

It is not difficult to make microbes resistant to penicillin in the laboratory by exposing them to concentrations not sufficient to kill them, and the same thing has occasionally happened in the body. The time may come when penicillin can be bought by anyone in the shops. Then there is the danger that the ignorant man may easily underdose himself and by exposing his microbes to nonlethal quantities of the drug make them resistant (Fleming, 1945, p. 93).

Fleming's predictions have come true. Today, antibiotics can be purchased in every country in the world, and their regulation is highly uneven from country to country, and within countries, by province, state and/or region. Many countries lack legislation or enforcement regulating the purchase of antibiotics without a prescription; consumers are able to purchase these essential medicines at competitive prices without having to visit a physician. This level of availability has contributed to the development of antibiotic resistance as well as the emergence of new multi-drug resistant pathogens.

In this report, I explore the threat of antibacterial resistance to global health, and analyze the efforts of governments and health organizations to improve the public's understanding of the proper use of antibiotics through mass media and educational

campaigns. I focus on Spanish-speaking countries for two reasons: first, there is a general lack of awareness of the problem in many parts of Latin America. Second, materials from campaigns in these countries could be used to inform the development of similar campaigns in other Hispanic countries where the unjustified use of antibiotics is rampant. I present materials and key messages from various campaigns in the Americas and Spain that seek to educate the public about the appropriate use of antibiotics. I also review evaluations conducted on the efficacy national campaigns in France and Belgium, and on regional campaigns in Gipuzkoa, Spain, and in the US state of Colorado. Finally, I discuss the implications of these campaigns for countries that have not yet begun to address antibiotic misuse and overuse. The problem of antibiotic resistance threatens to destabilize the health care systems of nation states around the world. It is crucial that all countries educate their citizens to help protect this invaluable medical resource.

2: BACKGROUND

The World Health Organization frames antibiotic resistance as an emerging global threat; one that all countries must address (WHO, 2001). The WHO's response to this new threat was to issue in 2001 its "Global Strategy for Containment of Antibiotic Resistance." This Strategy presented six key points required to respond to the problem, ranging from reducing the disease burden and the spread of infection, to enforcing regulations and legislation, to improving the use of antimicrobials (WHO, 2001). The WHO addressed their Strategy to policy-makers and managers, so that they might urge governments to act swiftly by providing them with expert technical and practical advice.

One reason why the WHO has tailored its strategy to policy-makers might be that the emergence of bacterial infections that are unresponsive to antibiotics is a major threat to the security of all nation-states. These diseases have the potential to cause new epidemics, realign the health care priorities of developed and developing countries, and erase important gains made in the fight against pathogens. What is most concerning is the fact that there is now a very limited number of antibiotics that can effectively be used for treatment against pathogenic bacteria. For each new strain of resistant bacteria that evolves, the precious resource pool of functioning medications decreases. Compounding this problem of declining resources is the fact that very few novel antibiotics have been developed in the past few decades (Coates and Hu, 2007). Thus, the protection of the limited amount of effective antibiotics that remains is a public health priority of global significance.

Along with the WHO, the international public health community has also issued urgent calls for changes in antibiotic use in order to suppress the global epidemic of antibiotic resistance and prolong the effectiveness of these essential medicines. For example, the Pan-American Health Organization has identified the lack of new antibiotics as a major health risk. It states on its website that:

Since the 1980s, the production rate for antibiotics has been surpassed by the speed of the appearance of antimicrobial resistance, which threatens the availability of effective tools to confront emerging and reemerging infectious diseases—some with patterns of multiple resistance, implying a serious global public health risk. (PAHO, 2009)

Other national health authorities echo this warning, and provide solutions to curbing the spread of resistance. Health Canada and the Centers for Disease Control and Prevention in the US both outline the misuse and overuse of antibiotics as one of the primary causes of resistance (Health Canada, 2009; CDC, 2009). They advocate for their use only following a proper diagnosis.

Antibiotics tend to be overused and misused by patients as well as health care providers. Misuse can be seen as using antibiotics to treat viral infections, using an inappropriate antibiotic for an infection, or not completing one's treatment course. In addition to overuse in medical treatment, overuse can also occur in agriculture, when antibiotics are added to the feed of fish or livestock. Both misuse and overuse create problems that impact all members of the population. Overuse in agriculture creates a large reservoir of antibiotic resistance genes that can be transferred to bacteria that infect humans (Witte, 1998). The magnitude of international travel, coupled with the globalization of food production and trade, mean that resistant genes travel great distances very rapidly.

The misuse of antibiotics has important negative effects on the health of communities. Individuals with weakened immune systems are more vulnerable to infections, and are thus more adversely affected when antibiotics become ineffective. Patients in hospitals, or individuals on anti-retroviral medication, for example, lack the defense mechanisms against many pathogens, and have very few options in the event of a serious bacterial infection. Furthermore, it is thought that urban populations that suffer from overcrowding, poor sanitation, environmental degradation and a changing climate have higher incidence rates of resistant infections than those in rural areas (Okeke, Lamikanra, & Edelman, 1999).

The overuse and misuse of antibiotics, coupled with the lack of public and political awareness of the issue, has led legislative decision-makers to seek efficient and cost-effective solutions to this problem. If these solutions are to be executed by the governments of low and middle-income countries, they should ideally be simple and affordable.

Solutions should also be multi-faceted, as research on intervention programs has shown that comprehensive, multidimensional approaches addressing macro, meso, and micro influences increase the likelihood of success (Radyowijati & Haak, 2003; Avorn & Solomon, 2000). At the macro level, influences include regulations on antibiotic

prescriptions and the pharmaceutical industry, levels of enforcement of these regulations, and the mass media environment, including advertising and public health messages. At the meso level, the adoption and implementation of guidelines are a useful strategy to foster appropriate antibiotic prescribing in health care organizations and by professionals such as physicians and pharmacists. In the absence of resources to engage in face-to-face and targeted communication to promote rational antibiotics-related practices by providers, pharmacy staff, patients, and parents of patients, social marketing campaigns directed to the public are a useful approach to address micro-level, knowledge, and attitudinal influences on, for example, the use of antibiotics for common colds and the flu (Weissman & Besser, 2004).

Research has shown that desired changes in consumer purchases of antibiotics can be achieved at the national level through the use of comprehensive public service campaigns. Goossens et al. (2006) evaluated social marketing campaigns in Belgium and France and found that those designed by behavioural science specialists (as well as epidemiologists), and which included messages that addressed the “how” and “why” of behaviour change, were successful in reducing excessive purchasing of antibiotics. For example, the French campaign “Antibiotics aren’t automatic” (Assurance Maladie, Caisse Nationale, 2006) produced brochures, videos and FAQs for parents of young children outlining the many illnesses that do not respond to antibiotics, and how to relieve a child’s cold and flu symptoms. Additional changes in antibiotic consumption in Belgium and France were achieved through the use of campaigns that were broadcast on television and radio, and the authors underlined the importance of television advertising for this type of campaign. Although the findings of this study were restricted to France and Belgium, the authors’ recommendations are applicable to campaigns in other countries. They maintain that when campaign designers create messages that are clear and straightforward, are culturally acceptable, and use a variety of printed, electronic and broadcast media, social marketing campaigns can be targeted towards consumers from diverse socio-economic and educational backgrounds (Goossens et al., 2006).

The WHO recommends several interventions aimed at slowing the spread of antibiotic resistance and protecting the existing stock of effective antimicrobial medications. These interventions include policy and regulatory changes surrounding the use of antibiotics, as well as professional and community educational activities. A

central intervention in the WHO's strategy is the education of patients, the general community, prescribers, and dispensers (e.g. pharmacists) on the appropriate use of antimicrobials. Through community education programs, the aim is to contain the spread of antimicrobial resistance by: 1) discouraging patient self-initiation of treatment and self-medication, 2) educating drug prescribers and dispensers on the importance of limiting antibiotic prescriptions to bacterial diseases, and 3) reducing the overuse and misuse of antimicrobials in agriculture. The WHO thus highlights the need for community-based programs and campaigns to control the spread of antimicrobial resistance through the assistance of stakeholders in pharmacies, hospitals, and the general public.

3: OBJECTIVES OF THE PROJECT

The goal of this project was to assess the breadth of antibiotic-related public education and information in the Americas and Spain by identifying and analyzing interventions promoting the rational use of antibiotics. The specific objective of the project was to determine what types of public educational interventions (in terms of targets, channels, and content) had been conducted by health ministries, non-governmental organizations or other groups to improve antibiotic use in Spanish-speaking populations. The focus was on interventions directed towards the general public, such as public education campaigns directed towards community members, because key components of these programs could be applicable and transferable to other target populations. Whenever possible, this project also sought out and documented the availability, nature, and source of any evaluations of these campaigns. Above all, this pan-American and Spanish assessment was conducted to help inform the design of future campaigns for Hispanic populations in countries where no such information now exists.

4: CRITICAL REVIEW OF THE LITERATURE

In the field of campaigns designed to bring about behaviour change, much has already been written to guide public health practitioners and other campaign designers in producing the most effective interventions possible. Different schools of thought underlie the design of key messages and materials, and an exhaustive review of this field is beyond the scope of this paper. Instead, in the following section I summarize three important themes of effective behavioural change interventions: the key principles behind designing campaigns and marketing health in mass media; the use of social marketing as a tool in the development of campaigns; and empirical evidence that both social marketing and mass media campaigns can lead to specific changes in consumer behaviour, such as reducing the overuse or the excessive prescription of antibiotics.

In order to effect positive changes in knowledge, beliefs, attitudes, or behaviour, several principles of effective campaign design must be followed. Noar (2006) summarizes seven of these and provides examples in the health mass media campaign literature. First, conducting formative research with the target audience assists the planning team in understanding the problem behaviour, their target audience's biases and message preferences, and the communication channels that are most effective in reaching their audience. Formative research is also a useful tool for pre-testing campaign messages and fine-tuning materials to ensure they are appropriate and effective. Second, the use of theory can suggest possible determinants that campaign planners can target, and toward which they can tailor their messages. Examples of commonly used theories for behaviour change include the social cognitive theory (Vaughan & Rogers, 2000; Worden & Flynn, 2002), and the theory of reasoned action (Booth-Butterfield & Reger, 2004; Farrelly et al., 2002). Third, campaign planners should segment their audience into groups according to demographic, socioeconomic, language, or educational characteristics. Fourth, the campaign should be targeted specifically to this audience, and messages should ideally be as creative and unique as possible. Fifth, planners should take advantage of the communication channels with the highest potential to reach the target audience. Sixth, a process evaluation that includes monitoring and collecting data on the execution of campaign activities can ensure that

the campaign's desired outcome is achieved. Finally, an outcome evaluation helps researchers to determine if the campaign met its stated objectives, and whether it influenced the audience's behaviours or attitudes.

When it comes to introducing new public health campaign messages to the general public, the typical media environment is already crowded with other campaigns. Some of these promote ideas that run counter to the public health campaign's goal, or that advocate a different behaviour altogether. Randolph and Viswanath (2004) point to the importance of attempting to understand the information environment prior to initiating a campaign. They assert that not enough campaign planners conduct a proper assessment of their own media environment at the outset. They also highlight the need to influence the environment by redefining the issue for the target audience. These authors argue that the most successful campaigns go beyond health promotion and disease prevention, and instead must control or reshape the public's knowledge and information of the issue.

One of the tools that has worked effectively in planning behavioural change interventions is social marketing. Defined as a program-planning process that applies commercial marketing concepts and techniques to promote voluntary behaviour change (Grier & Bryant, 2005), social marketing is a valuable strategy for public health campaign development. The use of commercial marketing approaches is one of the key aspects that sets social marketing apart from other health planning processes. These approaches include: 1) the notion of exchange, whereby marketers must provide benefits to the consumer in exchange for behavioural change; 2) audience segmentation, which divides the general population into various target groups that are likely to respond to interventions differently; 3) an assessment of other behaviours that compete with the public health recommendation or service; 4) the use of the "marketing mix" of product, price, place, and promotion; 5) extensive consumer research to understand the target audience's needs, aspirations, and values; and 6) the continuous revision and monitoring of the intervention (Grier & Bryant, 2005).

Social marketing has been compared to other behavioural change strategies, such as educational programs or legal measures (Rothschild, 1999). Whereas education invites individuals to freely adopt new behaviours by creating awareness of the benefits of change, and laws use the threat of punishment to coerce individuals to change, social marketing facilitates behavioural change by offering the audience

alternatives that are more attractive or beneficial. Similarly to Randolph and Viswanath (2004), Rothschild (1999) argues that marketing can modify the information environment to make the recommended behaviour more advantageous than the unhealthy one, thereby increasing the odds that the new behaviour will be adopted.

Campaigns that have used social marketing as a conceptual framework, or that have taken advantage of mass media in disseminating their messages, have brought about various forms of behavioural change. An excellent example cited by Grier & Bryant (2005) illustrates how social marketing can reduce the incidence of driving under the influence of alcohol. In rural Wisconsin, the Road Crew project successfully curbed drinking and driving by creating a ride service that carried individuals who had been drinking, or planned to drink, so that they did not drive themselves (Rothschild, Mastin, Karsten, & Miller, 2003). The campaign developers used social marketing to compete with the idea that people who had been drinking could still drive themselves home. Another example shows how mass media can be harnessed to reduce the excessive prescription of antibiotics. In Denver, Colorado, researchers found that a mass media campaign targeting physicians, managed care enrollees, and the general public managed to reduce the overuse of antibiotics in a large metropolitan community (Gonzales, Corbett, Wong, Glazner, Deas, Leeman-Castillo, et al., 2008). The research team purchased advertising on billboards, bus tails, bus stop posters, interior bus signs, and National Public Radio spots. They also developed a public service announcement on a local Spanish network, and earned additional media coverage on television, radio, and in newspapers. Their results showed a significant decrease in the distribution of antibiotics through managed care-associations, and a smaller decrease in the distribution of antibiotics through retail pharmacies. The total savings of reducing the excessive use and prescription of antibiotics in Denver was more than three times greater than the costs of the campaign.

5: METHODS

5.1 Literature Search

Between May and June 2008, and again in June to July 2009, I conducted a two-staged web survey to retrieve educational materials promoting the rational use of antibiotics in community settings. I began by using the Google, Google Scholar, and Google Images search engines to focus on national health ministries, non-governmental organizations, and research teams promoting the rational use of antibiotics in Latin America, Spain, Canada, and the USA. I conducted this survey over two one-month intervals in order to stay up to date with the most recently developed campaigns, and to gather information on those that might disappear due to the ephemeral nature of the internet. In the preliminary 2008 search, I used various combinations of the following Spanish keywords: “ministerio” or “secretaria,” “salud,” “medicamentos,” and the name of the country in question. These search terms were chosen in order to begin by identifying governmental health ministries or secretariats that had created antibiotic-related educational programs. Then, I searched for the terms “medicamentos,” “resistencia,” “nosocomiales,” “antibióticos,” “antimicrobiana,” “programa,” and “campaña” within each Latin American health ministry website. In the 2009 survey, I repeated the same initial search strategy, and conducted a follow-up strategy that searched only the words “campaña,” “iniciativa,” “programa,” “antibióticos,” and the name of each Latin American country, in the same three Google search engines. The purpose of the follow-up search was to pick up documents from non-governmental organizations, or other materials that might not appear in government websites. In each relevant website that came out of the top results of the Google search, I sought programs detailing medications and antibiotics use, and gathered all educational materials, when available.

During the follow up survey, I also extended the search to the Scientific Electronic Library (SciELO), an electronic repository of scientific journals from Argentina, Brazil, Chile, Colombia, Cuba, Spain, Portugal and Venezuela. Much like my use of Google Scholar, I searched SciELO in order to identify additional campaigns I might

have missed, and to locate any campaigns that might have undergone a rigorous evaluation.

One of the limitations of web surveys is that they might overlook materials that have been produced by smaller community groups that are not affiliated with national or international organizations. The details of how materials were used, or how a campaign was run might also elude the search engine. The researcher cannot assume that all antibiotics-related public education projects or campaigns can be found online. One way to circumvent this is to contact experts in other countries, in order to build rapport and collect more information on the existence of campaigns or related antibiotic education materials.

5.2 Direct Communication with Key Informants

In order to ensure that campaign materials that were not online were also collected, I wrote personal emails directly to informants from health ministries, and other non-governmental health organizations. I obtained the email addresses for these key informants from health ministry websites, and from other pan-American health groups, such as the Alliance for the Prudent Use of Antibiotics (APUA). I wrote these requests for materials or campaign evaluation data in Spanish, and sent them to as many informants as possible. Attached to these emails was an introductory letter written and signed by Dr. Veronika Wirtz¹ of the National Public Health Institute (INSP) of Mexico. Informants occasionally put me in contact with other researchers working on campaigns against the misuse of antibiotics, and I followed up my requests with these individuals as well.

¹ Dr. Wirtz was my practicum preceptor at the INSP. The letter explained the purpose of my email and confirmed that I had the support of Dr. Wirtz's team (see Appendix A).

6: FINDINGS

Of the 16 countries where Spanish is the predominant language in North, Central, and South America, I encountered only seven countries that had produced antibiotic-related campaigns directed to the general public or physicians (see Table 1). These seven countries were Bolivia, Chile, Ecuador, Nicaragua, Paraguay, Peru, and Venezuela. Two more countries where Spanish is not the predominant language – the USA and Canada – also produced campaigns in Spanish. It is possible that other countries in Latin America had run antibiotics campaigns recently, but I did not encounter them in my search. A tenth country outside of the Americas – Spain – also produced several public education campaigns. The European Union also promoted the multinational European Antibiotic Awareness Day in Spanish and various other languages on November 18, 2008 and 2009. In addition to these countries, six governmental and non-governmental organizations promoted the appropriate use of antibiotics in Latin America. These organizations were Health Action International (Acción Internacional por la Salud – AIS Nicaragua), the Alliance for the Prudent Use of Antibiotics (APUA), the South American Infectious Disease Initiative (SAIDI), Action on Antibiotic Resistance (ReAct Latin America), the Pan-American Health Organization (PAHO), and the United States Agency for International Development (USAID). The target audience for most of the campaigns was the general public or parents of young children. Some campaigns targeted health care providers, but none was directed towards pharmacists or pharmacy employees. In most cases, and unless it is noted otherwise, I was unable to find evidence of evaluations of these campaigns.

Table 1 Campaigns Promoting the Rational Use of Antibiotics in the Americas and Spain

Country	Campaign details	Date	Campaign funder	Evaluation
Bolivia	Large posters at medical school campuses reminding physicians to wash hands	2007-2008	Ministerio de Salud Bolivia and SAIDI	Not found
Chile	Educational campaign to assist with new legislation requiring prescription for antibiotics purchases	1999	Ministerio de Salud Chile	Not found
Ecuador	“Uso responsable de antibióticos” – Best prescribing practises document mainly for physicians	March 2008	Universidad San Francisco de Quito and Bristol-Myers Squibb	Not found
Nicaragua	Two short public service announcements on radio	Not found	AIS Nicaragua, and Farmaceuticos Mundi	Not found
Paraguay	Campaña de Uso Prudente de antibiótico	October 2007	Ministerio de Salud Paraguay and SAIDI	Not found
Peru	“Los antibióticos son útiles, pero mal usados pueden dejar de curar”	2007	Ministerio de Salud Perú	Not found
Venezuela	“Campaña contra uso inadecuado de antibióticos”	January 2005	Ministerio de Salud y Desarrollo Social Venezuela	Not found
Spain - national	“Uso responsable antibióticos – Usándolos bien hoy, mañana nos protegeran.”	2006	Ministerio de Sanidad y Consumo	Not found
Spain - Gipuzkoa	Programa de Uso Racional de Antibióticos	1999-2004	Colegio Oficial de Farmaceuticos de Gipuzkoa	Gastelurrutia, Larrañaga, & Ortega, 2006
Spain - Valencia	“Uso Responsable de Antibióticos”	April 2008	Hospital Universitario de la Ribera	Not found
USA - national	“Get Smart: Know when antibiotics work”	1995-present	Centers for Disease Control and Prevention	Not found
USA - Colorado	“Get Smart: Use Antibiotics Wisely”	2002-2003	Get Smart Project Team: Ralph Gonzales & Kitty K. Corbett. Funded by the Agency for Healthcare Research and Quality	Gonzales, Corbett, Wong, Glazner, Deas, et al., 2008

Country	Campaign details	Date	Campaign funder	Evaluation
Canada	“Do Bugs Need Drugs?”	1998-present	Capital Health, the Clinical Practice Guidelines program of the Alberta Medical Association, the Alberta Lung Association, the University of Alberta	Blondel-Hill, Fryters, Mitchell, Tomney, Wilson, et al., 2001

6.1 Bolivia

In La Paz, between 2007 and 2008, the Ministry of Health of Bolivia, in association with USAID, SAIDI, APUA, PAHO, and the US Centers for Disease Control and Prevention, conducted several activities around the rational use of antibiotics (de Urioste Blanco, 2008). This partnership helped develop an infection prevention guide for Bolivian medical students, and ran a best practises course for Bolivian physicians on the rational use of medications. The course – based on the WHO’s 1994 “Guide to Good Prescribing” – had previously been developed by Groningen University (the Netherlands) and the WHO.² The theme of the curriculum is for physicians to reduce the unnecessary prescription of medications – including antibiotics – through evidence-based medicine. Building-size posters promoting handwashing to prevent infections were also hung on the walls outside of the faculties of medicine and dentistry at universities in La Paz and Santa Cruz. Outside of campus, banners similar to the handwashing posters were put up in public bathrooms, restaurants, transportation terminals, and health centres. In total, 2000 infection prevention guides were distributed to medical students, and 100 physicians across the country were trained in the rational use of medications course.

6.2 Chile

In September 1999, the Chilean Ministry of Health introduced new regulatory policies to discourage the excess consumption of antibiotics (Bavestrello & Cabello, 2004). The new regulations required that any purchase of antibiotics must be in response to a diagnosis and a medical prescription, the conditions of sale written on any antibiotic had to be followed, and antibiotics could only be sold with a prescription. A study commissioned by the Ministry of Health in 1998 indicated a large increase in consumption and purchases of antibiotics through community pharmacies, between 1988 and 1997. The results of these studies led the Chilean government to implement

² Details on the guide can be found here: <http://apps.who.int/medicinedocs/en/d/Jwhozip23e/> (Accessed November 1, 2009)

new regulations, supported by an educational campaign, posters and pamphlets in pharmacies, and extensive radio, television, and newspaper coverage. A study of the impact of these new regulations showed a 30% decrease in sales of oral antibiotics after one year, and a 43% decrease in sales from pre-1999 levels in 2002 (Bavestrello & Cabello, 2004).

6.3 Ecuador

The search for Ecuador's efforts to curb excessive antibiotics consumption led to a 364-page document detailing best antibiotic-prescribing practises for physicians. This manual was developed by the Universidad San Francisco de Quito, and Bristol-Myers Squibb in March 2008. The document, entitled "Uso Racional de Antibioticos", details the general mechanism of antibiotics, the epidemiology of bacterial resistance, a detailed description of each antibiotic that can be prescribed in Ecuador, as well as the conditions for which these medications are appropriate (Freile & Irigoyen, 2008). Although this document provided a wealth of information for Ecuadorean physicians and health care providers, there appeared to be no campaign or initiative directed towards the general public in Ecuador.

6.4 Nicaragua

Of the nine countries in the Americas that produced education campaigns in Spanish, Nicaragua stands out as the sole nation in Central America that made efforts to curb the excessive use of antibiotics. A radio campaign developed by AIS Nicaragua and Farmaceuticos Mundi produced 2 radio ads alerting the general public of the risks of excessive or irresponsible antibiotics use. The first ad was 2 minutes long. It portrayed a round table discussion between mothers that focused on the appropriate use of antibiotics when their children are ill. The second ad ran for 30 seconds and was developed as a public service announcement for mothers to only use antibiotics under the direction of a physician, and to improve the public's understanding of these medications. AIS Nicaragua also produced a poster promoting the appropriate use of all medications. Although data on the impact of the two radio pieces and the medications poster on the consumption levels of antibiotics was not available, Nicaragua demonstrated that low and middle-income countries could also develop mass media campaigns targeting excessive antibiotic use.

6.5 Paraguay

In association with USAID and the South American Infectious Disease Initiative (SAIDI), Paraguay's Ministry of Public Health (Ministerio de Salud Pública y Bienestar Social) published in 2007 two studies on the factors associated with the prescription, sale, and consumption of antibiotics in the communities of Asunción, Gran Asunción, and Ciudad del Este (Sánchez, Claudio, Kubiak, Sosa, Yrala, & Torrado, 2006a, & 2006b). Through key informant interviews and focus groups, the researchers sought to analyze the knowledge, understanding and practises of prescribers (physicians), pharmacists, and consumers, with regards to the use of antibiotics. Among consumers, their results showed a high level of self-medication and lack of treatment course completion, as well as limited access to physicians and prescriptions. Interviews with physicians and pharmacists uncovered such practises as recommending certain antibiotics prior to examining the patient. Results from these interviews and focus groups led the researchers to recommend developing educational campaigns and interventions for consumers, pharmacists, and physicians to publicize the importance of purchasing antibiotics only with a prescription, completing the treatment course, and using antibiotics only when absolutely necessary (Sánchez, Claudio, Kubiak, Sosa, Yrala, & Torrado, 2006a, & 2006b).

In October 2007, Paraguay's Ministerio de Salud Pública y Bienestar Social launched its campaign to promote more prudent and rational antibiotic prescribing practises among physicians in four separate hospitals ("Mal Uso de Antibióticos", 2007). This initiative was followed by the production and distribution of a 30-second video spot that focused on reducing the overuse of antibiotics in the community, and protecting the existing stock of medications. This video identified the problem of bacterial resistance in terms of the loss of a natural resource that is essential for survival, juxtaposed with powerful images of environmental destruction³.

6.6 Peru

The most comprehensive initiative that I encountered in Latin America was produced by Peru's Ministry of Health in association with SAIDI. Their approach was

³ Although the video is no longer available online, images of campaign materials and the studies on the factors associated with the prescription, sale, and consumption of antibiotics in Asunción, Gran Asunción, and Ciudad del Este can still be retrieved here: <http://www.mspbs.gov.py/programas/index.php?id=40> (Accessed November 1, 2009)

informed by a 2006 study of factors that led to consumers' use of antibiotics in the city of Callao (Sánchez, Claudio, Kubiak, Sosa, Yrala, & Torrado, 2006c). Their campaign's objectives were to: 1) inform and sensitize the general population, and especially mothers of young children, of the appropriate use of and risks associated with antibiotics; 2) promote the appropriate use of antibiotics in mass media; and 3) nurture a stronger sense of social responsibility among pharmacists towards the sale and use of antibiotics (South American Infectious Disease Initiative, 2007). The key messages of the campaign were "Antibiotics are useful, but if misused they can become ineffective", and "Antimicrobials are essential – we must use them responsibly". The campaign was promoted in the press and on the radio, while posters were put up in pharmacies, supermarkets, convenience stores, health centres, and hospitals. The mass media portion of the campaign was supported by events such as public education presentations, health fairs, and a parade (see photos, Appendix B). Even more impressive, organizers recruited two Peruvian cumbia dance celebrities – Deyvis Orozco and Lucy Bacigalupo – to promote the campaign launch and increase its media coverage. Through these types of activities, the campaign designers focused the national media's attention towards their program, and redefined the issue as a problem that affected the health of all communities. As a result, they managed to influence the media environment surrounding antibiotics, which helped to reshape the public's views around the use of these medications. Although data on the impact of this campaign on antibiotics purchases or sales was not available, Peru and SAIDI demonstrated that the promotion of rational antibiotics use could benefit from the involvement of a wide range of community members – from physicians to pharmacists, and from the general public to national celebrities.

6.7 Spain

Spanish campaign materials were the most interesting and innovative of those I found. The Spanish Ministry of Health's campaign – with its key message "the proper use of antibiotics today will protect us tomorrow" – used video and audio pieces, an interactive website, as well as various posters, pamphlets and fact sheets⁴ (Ministerio de Salud y Política Social, 2007). This national campaign was supported by additional local campaigns in provinces such as Gipuzkoa, and Valencia. The main focus of Spain's

⁴ Most of the materials from this campaign can be viewed on the Ministry's website, at: <http://www.msps.es/campannas/campanas07/antibioticos7.htm> (Accessed November 1, 2009)

campaign was to limit the use of antibiotics in the community, and protect the existing stock of medications. Spanish videos were the most memorable components of the campaign. One video featured laypersons in multiple settings providing questionable and humorous medical advice, with the slogan “the misuse of antibiotics and other medications is a health risk – only medical doctors can prescribe their use.” Another video identified the problem of antibiotic resistance in terms of the loss of an essential resource for survival; this video was adapted and slightly modified by the Paraguayan Ministry of Health for their campaign.

The program to promote the rational use of antibiotics in the province of Gipuzkoa ran from 1999 to 2004, and was evaluated in 2006 (Gastelurrutia, Larrañaga, & Ortega, 2006). This campaign was designed to improve knowledge and attitudes associated with the purchase and prescription of antibiotics with the general public and pharmacists. It was run in local pharmacies of Gipuzkoa, of which almost half in the province participated. Results showed a reduction in the demand and dispensing of antibiotics without a prescription, which was consistent with the program’s goals. The authors emphasized the importance of reinforcing their messages tailored to pharmacists and the public, in order to sustain the improvements in antibiotics misuse in the future. Unfortunately, I was unable to determine whether or not this campaign was expanded to the entire country.

6.8 Venezuela

In January 2005, Venezuela’s Ministry of Health and Social Development (MSDS) launched a campaign through the country’s 5000 pharmacies to alert consumers about the risks involved with prolonged antibiotics misuse (“MSDS inicia campaña”, 2005). The campaign was initiated in response to the growing threat of antibacterial resistance on public health in Venezuela. At the time, the director of Medications, Drugs and Cosmetics of the MSDS announced that “the excessive consumption of antibiotics could aggravate, rather than improve, the symptoms of colds and flu, and could occasionally be fatal” (“MSDS inicia campaña”, 2005). The MSDS has produced a frequently asked questions (FAQ) document on their website that informs

the general public about antibiotics, and the causes of bacterial resistance⁵. Additional details of the campaign include the fact that efforts would be concentrated in pharmacies, and directed towards the general public. It is also worth noting that the MSDS has stated in their FAQ that “antibiotic overuse is a national problem that concerns all Venezuelans, and that inaction could lead to massive levels of bacterial resistance and the loss of medicinal resources that are essential for survival” (Ministerio de Salud y Desarrollo Social, 2009).

6.9 The USA

Although the objective of this project was to assess and review existing antibiotics education campaigns in Spanish-speaking populations, this did not limit my research solely to countries where Spanish was the predominant language. Rather, I felt it necessary to examine campaigns in North America as well, because their approaches might also yield valuable information for countries where no such campaigns yet exist. Also, materials from these campaigns were likely to be translated or developed for Spanish-speaking communities, and could be influential in the development of initiatives in other Spanish countries.

It stands to reason that the country with the largest population and economy in the Americas will have the greatest number of educational activities and campaign materials surrounding the appropriate use of antibiotics. There are several states that promote rational antibiotics use at the local and regional level, and the campaigns in Colorado and New Mexico provide key examples (Get Smart Colorado, 2009; New Mexico Department of Health, 2009). Campaigns in both of these states have produced educational print, radio, and video materials that outline the differences between bacterial and viral illnesses, discourage the use of antibiotics for colds and flu, and explain the risks attached with their unnecessary use. All of these materials are available online, in English and Spanish.

On the national level, the Centers for Disease Control and Prevention promote an appropriate antibiotic use campaign directed at hospitals, the general public, and agriculturists. As of September 2003, the CDC has worked in partnership with the Food

⁵ This FAQ can be viewed on the MSDS website, at: http://www.mpps.gob.ve/ms/direcciones_msds/DrogasCosmeticos/informacion_comunidad.html (Accessed November 1, 2009).

and Drug Administration (FDA) to provide a coordinated message on antibiotic use, and create a starting point for efforts across the US. The objectives of their campaign are to promote adherence to appropriate prescribing guidelines among prescribers, decrease demand for antibiotics for viral infections, increase adherence to prescribed antibiotics for upper respiratory infections, and improve the use of antibiotics in agriculture (CDC, 2009).

Despite the purchase of antibiotics being regulated via prescription in the United States, overuse and misuse persist, as consumers can persuade their health providers to overlook prescription guidelines. The CDC's multi-faceted approach aims to fill these gaps in consumer understanding and knowledge of the appropriate use of these medications. Additional educational materials, posters, videos, and audio pieces were made available in Spanish in 2005, and can be viewed on the CDC's website⁶.

6.10 Canada

The Public Health Agency of Canada (PHAC) is responsible for monitoring antibiotic resistance and preventing the spread of outbreaks in this country. PHAC supports the Canadian Integrated Program for Antimicrobial Resistance Surveillance (CIPARS), a national strategy that tracks trends in antimicrobial use and resistance (PHAC, 2009). Similar to the National Antimicrobial Resistance Monitoring System (NARMS) in the US, CIPARS gathers data that helps develop policies to control the use of antibiotics in hospital, agricultural, and community settings, and contain the emergence and spread of bacterial resistance.

In terms of interventions that promote the rational use of antibiotics, federally funded Health Canada (2009) and provincial health ministries provide information online and support campaigns and educational activities directed towards the general public. Materials from these programs are available in English and French, and some are translated in Spanish. In Alberta and British Columbia, for example, the "Do Bugs Need Drugs?" program outlines in plain language how the general public and medical professionals can better use antibiotics and prevent the development of antibiotic resistance (Do Bugs Need Drugs, 2009). An info sheet and an explanatory guide for parents have been translated in Spanish, and these documents are available to the

⁶ These materials can be accessed in Spanish on the "CDC en Español" website at: <http://www.cdc.gov/spanish/especialesCDC/Resfriado> (Accessed November 1, 2009).

general public through the Do Bugs Need Drugs website. The parent guide clarifies the differences between various illnesses that do not require antibiotics (e.g. fever, cold, runny nose, flu, sore throat, etc.) and explains the principles of antibiotic resistance. This program also serves as a clearing house of information and produces separate materials for physicians, pharmacists, occupational health workers, school teachers, daycare centers, assisted living centers, parents and children. The program has recently produced a textbook of guidelines on antibiotic use entitled “Bugs and Drugs: Antimicrobial Reference Book” for community and hospital-based health care practitioners (Blondel-Hill & Fryters, 2006).

The Canadian Committee on Antibiotic Resistance (CCAR) is another source of updated information on bacterial infection prevention and control. It is funded by the Government of Canada, and has been actively supporting Canadian efforts to control the development and spread of antimicrobial resistance (AMR) since 1998. Its mandate is “to coordinate activities and information for health care professionals, patients, the general public, and others who can help stem the rising tide of microbial resistance to antibiotic medicines” (CCAR, 2009a). Following several months of stakeholder consultations across Canada, the CCAR published a series of priority actions that the Public Health Agency of Canada and the Canadian government should take to ensure the long-term success of managing AMR. These actions included: greater leadership and oversight of AMR surveillance activities, the creation of a lead for antimicrobial stewardship, more AMR education and training campaigns – with strong support for the “Do Bugs Need Drugs?” program, and a new governance model for the CCAR that would move AMR-related programs forward at the federal level (CCAR, 2009b). The CCAR concluded the report by expressing its wish that the Public Health Agency of Canada would invest greater resources and talent to address one of the most important public health issues facing Canada and the world.

7: DISCUSSION

Numerous Spanish-speaking and other countries have launched Spanish language campaigns to promote the rational and appropriate use of antibiotics. Some countries have been assisted by the involvement of non-governmental organizations, while others have adapted materials from other national campaigns for their own programs. In Latin America, at least seven countries have designed or promoted educational interventions surrounding the use of antibiotics, which have been directed to the general public or health professionals. These countries were Bolivia, Chile, Ecuador, Nicaragua, Paraguay, Peru, and Venezuela. Two more countries that boast large Spanish-speaking populations – the USA and Canada – also produced interventions and educational materials in Spanish. And in Europe, Spain continues to create several national and provincial interventions that rival those of more populous or wealthier nations. The key messages of most of these interventions focused on: 1) explaining bacteria, viruses, the differences between viral and bacterial infections, bacterial resistance, and antibiotics; 2) outlining the risks associated with self-medication or non-completion of the treatment course; 3) consulting a health professional; 4) protecting the existing stock of medications; and 5) promoting hand-washing. The majority of these campaigns were targeted to the general public, or the parents of young children, while some were directed to health care providers. None of the interventions I encountered were targeted to employees of pharmacies, or other dispensers of antibiotics. This represents an important gap in community education that future programs should address, as dispensers represent a critical link in the patterns of antibiotic misuse and overuse.

Nationwide interventions to improve antibiotic use have led to measurable reductions in the consumption of these medicines, as shown by research in Belgium and France (Goossens et al, 2006). Similarly, regional strategies using mass media have achieved significant reductions in community-level antibiotics overuse in Colorado (Gonzales, Corbett, Wong, Glazner, Deas, Leeman-Castillo, et al., 2008). The evaluation of a provincial intervention to reduce the demand and dispensing of antibiotics without a prescription in Gipuzkoa, Spain, also showed a measurable improvement in the volume

of antibiotics both demanded and dispensed (Gastelurrutia, Larrañaga, & Ortega, 2006). Unfortunately, very little evaluation data from antibiotics interventions in low and middle-income countries was encountered, and it is difficult to predict the results that community or nationwide interventions in these countries can achieve. Furthermore, I was unable to determine the reach of the media coverage on most of these campaigns, and cannot establish what kind of impact, if any, these programs had. Goossens et al. (2006, p. 378) also state that the best method to address antibiotic resistance in developing countries is unclear. That being said, the WHO still recognizes that community-based interventions in all countries are a key component of improving the use of antimicrobials and reducing the threat of antibiotic resistance. The WHO's five recommendations for patients and the general community are to educate patients and community members on 1) the appropriate use of antimicrobials; 2) the importance of infection control measures such as vaccinations and bednets; 3) simple measures to reduce infection in households, such as handwashing; 4) alternatives to antimicrobials for the relief of symptoms; and 5) discourage self-initiation of treatment and encourage informed health-seeking behaviour (WHO, 2001).

Clearly, the education of patients and community members through educational programs should only represent one component of a country's response to antibacterial resistance. Media campaigns constitute only one part of comprehensive initiatives that have been found to be most effective in curbing antibiotics misuse. Interventions that seek to bring about changes in a specific behaviour must address the macro-, meso-, and micro-level factors that influence that behaviour. If they do not focus on these additional factors, their ability to bring and sustain behavioural change will be limited.

Educating the general public addresses the micro-level, knowledge, and opinion-based influences on behaviour, but avoids the meso- or macro-level factors. The WHO (2001) proposes several other strategies that can address these behavioural influences. At the macro level, stricter management and improved guidelines for the use of antibiotics, increased regulation, stronger controls over the use of antimicrobials in food animals and agriculture, and increased surveillance of resistance and antimicrobial usage can have far-reaching impacts on behaviour and the spread of resistance on a national or international scale. At the meso level, improved education for prescribers and dispensers, and greater management of microbials in hospitals can improve the use of antimicrobials on a regional scale. All of this implies that public health policy-makers

around the world must review their existing programs and regulations to contain the spread of antimicrobial resistance, while countries that lack these strategies can look to examples in both developing and more developed nations for guidance in producing their own national strategies. In North and South America, antibiotic education strategies targeted to the general public are representative of those in the rest of the world, in that they have been produced in nation-states with small, moderate, and large economies. Several nations with middle-sized economies still lack programs and policies that cover the use and distribution of antibiotics, and could learn from the examples set by Nicaragua, Bolivia, Peru, and especially Chile. Although there is still much work to be done to reduce the overuse and misuse of antibiotics, there are countries in Latin America that are taking the necessary steps to improve the general public's use of these invaluable medications.

APPENDICES

Appendix A: Introductory Letter from Preceptor Sent to Key Informants Explaining Research Project



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Cuernavaca, Mor., 16 de junio 2008

A quien corresponda:

Por medio de la presente hago de su conocimiento que James Rankin se encuentra realizando una estancia de investigación en el Centro de Investigación en Sistemas de Salud de este Instituto, con el grupo de Investigación en Medicamentos que coordino.

James Rankin es estudiante de Maestría en Salud Pública de la *Simon Fraser University* de Canadá, y actualmente está investigando el desarrollo de campañas informativas sobre uso prudente de antibióticos en Latinoamérica.

Le agradezco mucho el tiempo que pudiera dedicar para contestar las preguntas de James Rankin, ya que su ayuda es central para completar con éxito esta investigación que informará el desarrollo de una campaña informativa en México.

Le agradezco mucho su atención y estoy disponible para cualquier aclaración.

Reciba un cordial saludo.

Atentamente,

Dra. Veronika Wirtz
Coordinadora de la Línea de Investigación
"Medicamentos en Salud Pública: Acceso, Uso y Resistencia Antimicrobiana"

Appendix B: Photos of Local Parade and Health Fair Promoting Rational Use of Antibiotics in Peru

1. Community parade promoting appropriate use of antibiotics campaign



(© Dirección General de Medicamentos, Insumos y Drogas, Ministerio de Salud, Perú, 2007)

2. Health fair educating general public about the appropriate use of antibiotics



(© Dirección General de Medicamentos, Insumos y Drogas, Ministerio de Salud, Perú, 2007)

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