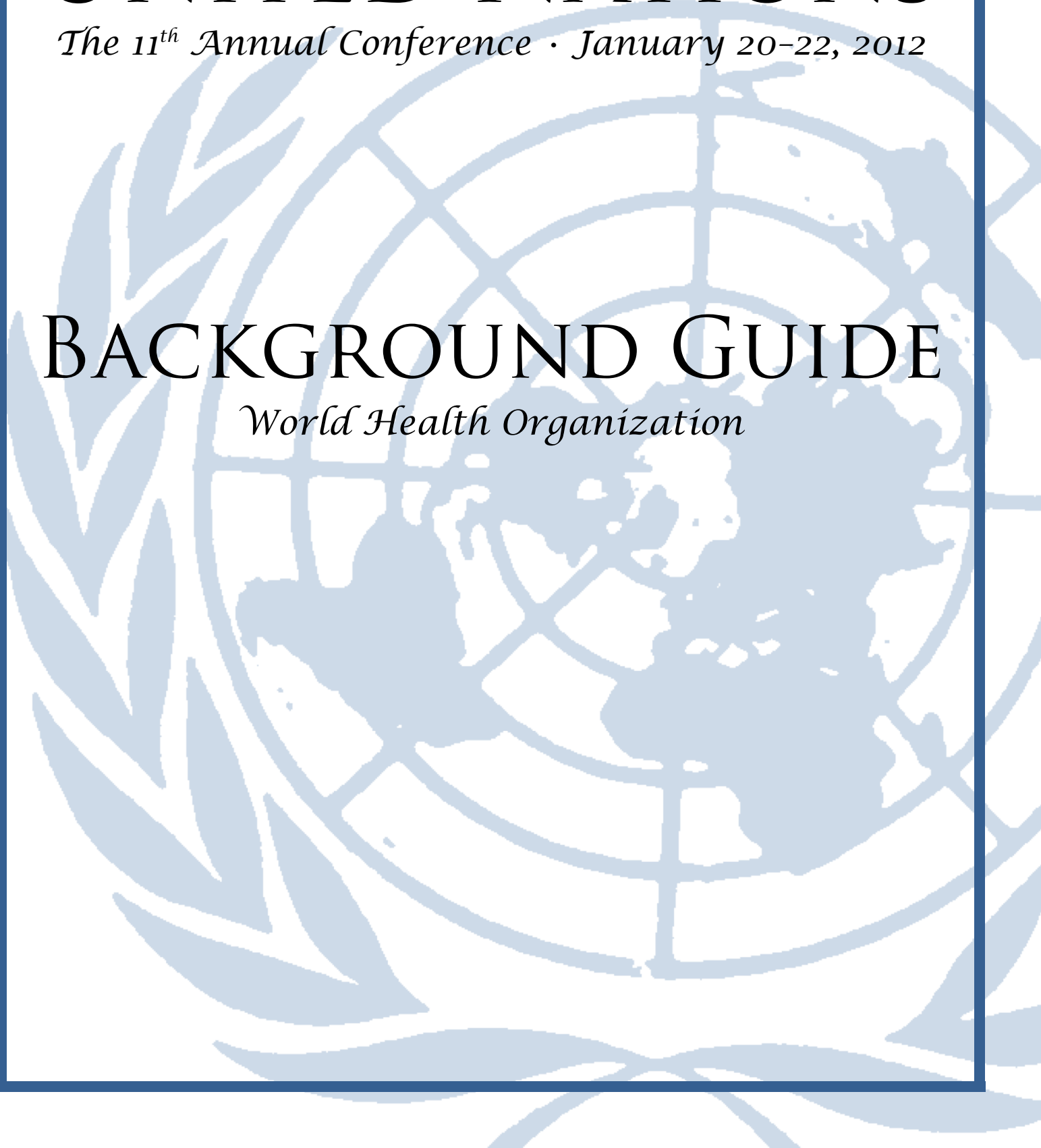


# VANCOUVER MODEL UNITED NATIONS

*The 11<sup>th</sup> Annual Conference · January 20-22, 2012*

## BACKGROUND GUIDE

*World Health Organization*





# VANCOUVER MODEL UNITED NATIONS

*The 11<sup>th</sup> Annual Conference · January 20-22, 2012*

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Dear Delegates,

My name is Max Bedford and I will be your director for the World Health Organization this year at VMUN 2012. Currently, I am in grade 11 at St. George's School and have been involved with MUN since Grade 7, attending multiple conferences throughout the Lower Mainland. At VMUN last year, acted as the Assistant Director of the Security Council and learned a lot of valuable lessons which I hope to bring to the WHO this year in order to make an exciting, memorable committee for everyone involved.

I hope you will enjoy discussing the two topics that my staff and I have selected. I firmly believe that both topics are important issues that require immediate action for the health and safety of our world. Antibiotic resistance is considered "one of the world's most pressing public health issues" and is only getting worse, threatening to tip the world back into the dark ages of the pre-antibiotic era. A comprehensive and lucid solution is key to stabilizing and then eventually eradicating this issue. Also, the HIV/AIDS pandemic has been ongoing for decades. There has been much involvement from a wide variety of organizations including the UN. Yet, there has not been one single solution, which addresses HIV/AIDS from every angle ranging from prevention to education to curing.

I believe that both topics are engaging and will stimulate vigorous and interesting debate. I look forward to meeting you all at the conference and wish you the best of luck in your research and at the conference itself. Please feel free to contact me if you have any questions or concerns.

Sincerely,

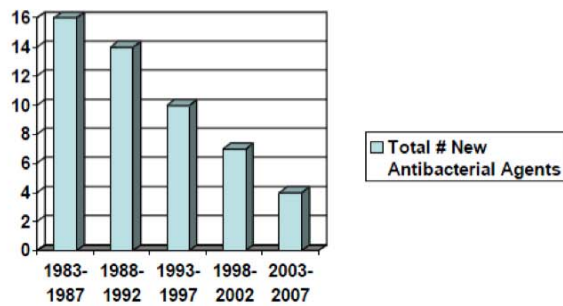
Max Bedford  
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## Topic A: The Rise of Antibiotic-Resistant Bacteria

### Introduction

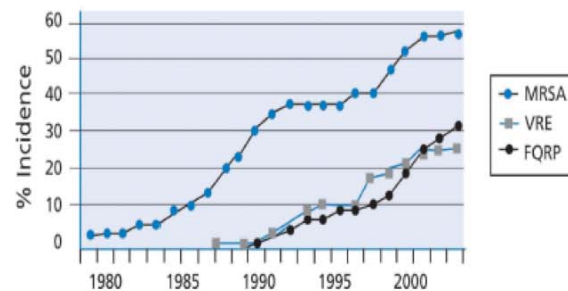
The rise of antibiotic resistance is considered “one of the world’s most pressing public health problems”<sup>1</sup> today. Harmful micro-organisms, such as bacteria, that were previously able to be kept under control by antibiotics have already and are continuing to develop resistance to these medicines at an alarming rate. At the same time as the prevalence of antibiotic-resistant bacteria is increasing, the supply pipeline for new antibiotics is slowly drying up and a tipping point appears to be fast approaching. The negative consequences presented by antibiotic-resistant bacteria are numerous and devastating. Without antibiotics, many of the most vital sectors of healthcare, such as open surgery, chemotherapy, and organ transplants would not be possible. Furthermore, if the continued escalation of the problem is not reversed, much progress made thus far towards achieving the United Nations Millennium Development Goals will be reversed.<sup>2</sup> Antibiotic resistance is not restricted to any one part of the world, but is a global crisis that must be dealt with swiftly and effectively, lest the world fall back into the pre-antibiotic era.

Total Approved Antibacterials: US



Spellberg, et. al., *CID* May 1 2004, Modified

Resistant Bacterial Strains Spread Rapidly



### Timeline

1928 — Alexander Fleming ushers in the antibiotic era with the discovery of penicillin

1936 — The first commercially available antibiotic is sold in the USA

1945 — Alexander Fleming warns of the dangers of antibiotic resistance

1947 — Penicillin resistance is discovered in *Staphylococcus aureus* bacteria

1961 — *Multidrug-resistant Staphylococcus aureus* (MRSA) is found in the UK

<sup>1</sup> “CDC - Get Smart: Antibiotic Resistance Questions and Answers.” *Centers for Disease Control and Prevention*. N.p., n.d. Web. 15 Aug. 2011. <<http://www.cdc.gov/getsmart/antibiotic-use/antibiotic-resistance-faqs.html>>.

<sup>2</sup> Kalunga, Ketra. “Anti-microbial Resistance: A Threat to Treatment of Infectious Diseases.” *Times of Zambia* 8 Aug. 2011: n. pag. *Times of Zambia*. Web. 9 Aug. 2011.

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2010 — The Infectious Diseases Society of America announces its 10 x '20 initiative, calling for 10 new antibiotics to be developed by 2020

April 7, 2011 — WHO announces “antimicrobial resistance and its global spread” as the topic for World Health Day 2011

July 12, 2011 — A strain of gonorrhoea resistant to all available antibiotics is discovered in Japan<sup>3</sup>

August 3, 2011 — An extremely resistant strain of salmonella is discovered in several European countries

## Historical Analysis

In 1928, Alexander Fleming discovered penicillin. This heralded an entirely new age of medicine, the antibiotic era. Antibiotics were praised by some as “miracle drugs,” curing many major diseases such as tuberculosis, which had previously infected and killed millions. During the late 1930s, antibiotics began to become widespread, being sold in pharmacies and used in all sorts of medical centres from hospitals to nursing homes. In 1946, penicillin became “generally available for treatment of bacterial infections”<sup>4</sup> such as strep throat and pneumonia. As expected, when it came into use it was extremely effective, but, in 1947, a strain of *Staphylococcus aureus* that was resistant to penicillin was discovered.<sup>5</sup>

The discovery of penicillin resistance was the beginning of a vicious cycle that continues to this day. As more antibiotic-resistant bacteria are discovered, more antibiotics are introduced, until eventually bacteria become resistant to those new antibiotics as well and the pattern repeats itself. One such example of this occurred in 1959, when methicillin was introduced to combat bacteria, which had become resistant to all other types of existing penicillin. A mere two years later, methicillin-resistant bacteria were discovered in several continents.<sup>6</sup> Through the years, antibiotics have come to be used in the treatment of animals as well. There is no one defining cause for the rise of antibiotic resistance that we can point our fingers to. Since the antibiotic era began, antibiotics have become commonplace, not only in medical care but also in the treatment and feed of livestock. Bacteria are becoming quicker to adapt while the misuse of antibiotics is becoming more and more common, landing the world in its current predicament.

## Current Situation

Today, the perils and dangers predicted by antibiotic resistance are fast becoming a reality. Many factors have combined to create the current issues, and must be looked at comprehensively to truly understand the situation we face. Firstly, the effects and impact that antibiotic resistance is already having on the world must be looked at to understand the scope of the problem, while the misuse of antibiotics in

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<sup>3</sup> Crowe, Kelly. “Resistant gonorrhea strain found in Japan - Health - CBC News.” *CBC.ca - Canadian News Sports Entertainment Kids Docs Radio TV*. N.p., n.d. Web. 15 Aug. 2011.

<<http://www.cbc.ca/news/health/story/2011/07/11/gonorrhea-resistant.html>>.

<sup>4</sup> Todar, Kenneth. “Bacterial Resistance to Antibiotics.” *Online Textbook of Bacteriology*. N.p., n.d. Web. 16 Aug. 2011. <<http://www.textbookofbacteriology.net/resantimicrobial.html>>.

<sup>5</sup> Tacconelli E, De Angelis G, Cataldo MA, Pozzi E, Cauda R (January 2008). “Does antibiotic exposure increase the risk of methicillin-resistant *Staphylococcus aureus* (MRSA) isolation? A systematic review and meta-analysis”. *J. Antimicrob. Chemother.* 61 (1): 26–38.

<sup>6</sup> Enright, M. C., Robinson, D. A., Randle, G., Feil, E. J., Grundmann, H., Spratt, B. G.: The evolutionary history of methicillin-resistant *Staphylococcus aureus* (MRSA). *Proc. Natl. Acad. Sci. USA* 99, 7687–7692 (2002).

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agricultural and medical practices must all also be examined to see how and why bacteria are becoming ever-more resistant. Along with this, the antibiotic pipeline's problems and antibiotic research and development (R&D) or lack thereof is further exacerbating everything.

On April 7, 2011 the WHO declared the topic of World Health Day to be "antimicrobial (antibiotic) resistance and its global spread", bringing antibiotic resistance into the public spotlight. It presents the issue as "not a new problem but one that is becoming more dangerous."<sup>7</sup> By declaring antibiotic resistance as the topic for World Health Day, the WHO acknowledged the severity of the problem and called for "urgent and consolidated efforts needed to avoid regressing to the pre-antibiotic era."<sup>8</sup> Antibiotic-resistant bacteria are taking a severe toll on public health, killing countless people and costing billions of dollars to combat and treat. MRSA (multidrug-resistant *staphylococcus aureus*) bacteria with some of its strains classified as XDR (extremely-drug resistant), is the cause of over 19,000 deaths in America every year.<sup>9</sup> Diseases such as MRSA are most commonly proliferated in medical centres such as hospitals due to high amounts of antibiotics being used and the many open wounds present. It is estimated that in America almost 2 million patients acquire HAIs (hospital-acquired infections) every year, the majority of which stem from antibiotic resistance.<sup>10</sup> However, antibiotic resistance is not a problem confined to the United States or any other region. As evidenced in the rapid global spread of such pandemics as swine flu and avian flu, diseases can reach the furthest corners of the world due to the nature of the globalised society we live in today, although obviously different diseases are more naturally common in different regions due local conditions. In an interview, Dr. Paul Yates discusses how resistant strains of tuberculosis and malaria are more common in the developing world due to the lack of resources to combat it.<sup>11</sup> WHO also estimates that 440,000 new cases of multidrug-resistant tuberculosis (MDR-TB) arise every year and kill at least 150,000 people annually.<sup>12</sup> Antibiotic resistance is leading to the reappearance of many old diseases previously suppressed by antibiotics and is causing health problems globally. Financially, antibiotic resistance is extremely costly. It is costing the US health care system at least \$21 billion a year, and the European Union 1.5 billion Euros each year.<sup>13 14</sup> Antibiotic resistance prolongs illnesses and leads to patients having to spend almost 8 million more total days in hospital per year on average.<sup>15</sup> Also, when the common first-line antibiotics are ineffective against the resistant bacteria, more expensive second and

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<sup>7</sup> "World Health Day 2011." *The World Health Organization*. N.p., n.d. Web. 1 Aug. 2011. <[www.afro.who.int/en/media-centre/events/world-health-day-2011.html](http://www.afro.who.int/en/media-centre/events/world-health-day-2011.html)>.

<sup>8</sup> *Ibid.*

<sup>9</sup> Spellberg, Brad et al. *Combating Antimicrobial Resistance: Policy Recommendations to Save Lives*. Rep. Infectious Diseases Society of America, 15 Feb. 2011. Web. 02 Aug. 2011. <[http://cid.oxfordjournals.org/content/52/suppl\\_5/S397.full.pdf+html](http://cid.oxfordjournals.org/content/52/suppl_5/S397.full.pdf+html)>.

<sup>10</sup> Klevens RM, Edwards JR, Richards CL Jr., et al. Estimating health care-associated infections and deaths in U.S. hospitals, 2002. *Public Health Rep* 2007; 122:160-6.

<sup>11</sup> "Antibiotic Resistance Threatens Return To Pre-Antibiotic Era | Space Coast Medicine and Central Florida Medicine." *Space Coast Medicine and Healthy Living*. N.p., n.d. Web. 2 Aug. 2011. <<http://www.spacecoastmedicine.com/2011/06/antibiotic-resistance-threatens-a-return-to-pre-antibiotic-era.html>>.

<sup>12</sup> "WHO | Antimicrobial Resistance." *The World Health Organization Media Centre*. WHO. Web. 16 Aug. 2011. <<http://www.who.int/mediacentre/factsheets/fs194/en/>>.

<sup>13</sup> World Health Organization. *Race Against Time To Develop New Antibiotics*. Braine, Theresa, 11 Mar. 2011. Web. <<http://www.who.int/bulletin/volumes/89/2/11-030211.pdf>>.

<sup>14</sup> Klevens. Estimating

<sup>15</sup> *Ibid.*

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even third-line antibiotics have to be used. Antibiotic resistance is posing a multifaceted threat to the world in terms of public health and world finances.

The two major causes of antibiotic resistance are the misuse of antibiotics in medicine and the misuse of antibiotics in agriculture. In medicine, a combination of a lack of education and awareness about antibiotics on the part of the patient and errors in doctor's prescriptions add up to optimal conditions for the mutation of antibiotic-resistant bacteria. In many cases, antibiotics are prescribed unnecessarily, mainly due to pressures from patients who insist that doctors give them antibiotics. A lack of knowledge about antibiotics leads many patients to believe that they are cure-alls for any sort of illness that ails them. In fact, antibiotics are only useful in bacterial infections. For such viral infections as the common cold, they are completely useless.<sup>16</sup> However, many patients demand them and doctors who don't have the will to argue with patients will prescribe them carelessly.<sup>17</sup> While patients need to be informed what antibiotics are useful for, doctors must be trained and instructed to only give out antibiotics when absolutely necessary.<sup>18</sup> It has been shown shown withholding antibiotics unless absolutely necessary is effective in terms of reducing the risk of antibiotic resistance and cost-effective as well.<sup>19</sup> Needless use of antibiotics exposes the body to them for a longer time and gives bacteria a larger timeframe to mutate antibiotic-resistant genes. Another factor contributing to antibiotic resistance is when patients do not take their full dose of prescribed antibiotics, or do not finish their prescriptions. Though patients may feel that they are better from their illness, some bacteria may still linger in their body and without any antibiotics combating them they may develop antibiotic resistance *and* stay in the body. Overall, a lack of strict guidelines imposed on doctors leads to unnecessary use of antibiotics, while a lack of knowledge on the part of the patients leads to misuse.

In addition to the misuse of antibiotics in medical practices, the excessive and unneeded use of them in agriculture significantly contributes to antibiotic resistance in animals, which then can pass it along to humans. It is even estimated by some professionals that "transmission from agriculture can have a greater impact on human populations than hospital transmission."<sup>20</sup> Almost 70% of all the antibiotics in the USA are mixed into the feed of livestock, such as cattle and pigs, to enhance production.<sup>21</sup> This misuse of antibiotics leads to a significant increase in antibiotic-resistant bacteria among livestock populations, which are a veritable spawning ground for new strains of antibiotic-resistant bacteria. When antibiotic resistant bacteria develop in farm animals, due to the nature of the cramped, close quarters the animals live in, the bacteria can spread easily and quickly throughout whole animal populations. Furthermore, they can spread to humans through contact with the animals themselves and even consumption of

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<sup>16</sup> "Antibiotics." *E-Medicine Health*. N.p., n.d. Web. 1 Aug. 2011. <[www.emedicinehealth.com/antibiotics/article\\_em.htm](http://www.emedicinehealth.com/antibiotics/article_em.htm)>.

<sup>17</sup> Todar. *Bacterial*.

<sup>18</sup> Arnold SR, Straus SE (2005). "Interventions to improve antibiotic prescribing practices in ambulatory care". *Cochrane Database Syst Rev* (4): CD003539

<sup>19</sup> Hueston, W. J. "Antibiotics: Neither Cost Effective nor 'cough' Effective." *The National Center for Biotechnology*. Web. 01 Aug. 2011. <<http://www.ncbi.nlm.nih.gov/pubmed/9071245>>.

<sup>20</sup> "Agricultural Antibiotic Use Contributes To 'Super-bugs' In Humans." *Science Daily News*. N.p., n.d. Web. 1 Aug. 2011. <<http://www.sciencedaily.com/releases/2005/07/050705010900.htm>>.

<sup>21</sup> Mellon, M et al. (2001) *Hogging It!: Estimates of Antimicrobial Abuse in Livestock*, 1st ed. Cambridge, MA: [Union of Concerned Scientists](#).

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affected animal products such as eggs and meat. In Europe, measures to prevent this have been taken. The European Union banned the use of antibiotics in animal feed in 2006,<sup>22</sup> and after this EU action levels of antibiotic resistant bacteria in animals and humans in the surrounding area were observed to drop.<sup>23</sup> In the USA, two bills had been put forward to ban the use of antibiotics in animal feed for non-medical uses but were not passed and therefore cleared from the books at the end of their congressional sessions.<sup>24</sup>

Antibiotic misuse (a general term describing the unnecessary use and overuse of antibiotics) in medical and agricultural practices is the key cause of antibiotic resistance. Solutions to countering these problems must be sought in order to slow the spread and prevalence of antibiotic resistance.

While misuse of antibiotics is leading to the rise of antibiotic resistance, the antibiotic pipeline is drying up and exacerbating the problem. As bacteria continue to mutate, more and more antibiotics will become obsolete and phased out because they will no longer be effective. Traditionally when this has happened, as in the case of penicillin, there were new antibiotics already developed to take the place of the old ones. Unfortunately now, the antibiotic pipeline is drying up and extremely few new antibiotics are being developed (see graph on page 1). As seen in the graph, only one new antibiotic has been developed since 2008 while in the past at least 2 or 3 were introduced annually. Furthermore, only two new classes of antibiotic classes have been approved in the last 40 years.<sup>25</sup> At present, major pharmaceutical companies and biotechnology companies in general are investing less and less money into developing antibiotics due to the fact they are less profitable than other types of drugs.<sup>26</sup> Currently, in hopes of dealing with this problem, the Infectious Diseases Society of America (IDSA) has introduced the 10 x '20 initiative, calling for governments and companies to invest in creating 10 new antibiotics by 2020.<sup>27</sup> In 2009, the EU called upon its member states to finance and work together to develop new antibiotics and develop an action plan to combat antibiotic resistance.<sup>28</sup> The antibiotic pipeline and research and development efforts are drying up at the worst time possible and immediate action is needed for this wilting industry to be brought back to life for any hope of dealing with antibiotic resistance to be maintained.

Antibiotic resistance is a global problem, harming countries and individuals both financially and medically. Solutions must be sought to deal with the misuse of antibiotics while research and development efforts for new antibiotics must be given a kick-start. Delegates must approach this problem with an open mind and find solutions for several individual problems in order to solve the one giant problem that is antibiotic resistance.

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<sup>22</sup> Castanon J.I. (2007). "History of the use of antibiotic as growth promoters in European poultry feeds". *Poult. Sci.* 86 (11): 2466-71.

<sup>23</sup> *Science Daily News*.

<sup>24</sup> [US House Bill H.R. 962: Preservation of Antibiotics for Medical Treatment Act of 2007](#)

<sup>25</sup> "When Prescription Drugs Don't Work | FoxBusiness.com." *FoxBusiness.com | Business News & Stock Quotes - Saving & Investing*. N.p., n.d. Web. 17 Aug. 2011. <<http://www.foxbusiness.com/personal-finance/2011/03/31/special-report-drugs-dont-work800959/>>.

<sup>26</sup> Spellberg *Combatting*

<sup>27</sup> *Ibid.*

<sup>28</sup> European Union. EMPLOYMENT, SOCIAL POLICY, HEALTH AND CONSUMER AFFAIRS. *Council Conclusions on Innovative Incentives for Effective Antibiotics*. 1 Dec. 2009. Web. 01 Aug. 2011. <[http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/lisa/111608.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/lisa/111608.pdf)>.

## UN Involvement

Though antibiotic resistance has been around since the 1950s, the problem has only just begun to be dealt with in urgency very recently. Being declared as the topic for World Health Day in April of 2011, antibiotic resistance was brought to the public's attention, trying to spur action out of the members of the UN. However, back in 2001, the WHO introduced the "the WHO Global Strategy for Containment of Antimicrobial Resistance". It acknowledged antibiotic resistance as an imminent threat and outlined strategies to contain it by:

- "Reducing the disease burden and the spread of infection,
- Improving access to appropriate antimicrobials,
- Improving use of antimicrobials,
- Strengthening health systems and their surveillance capabilities,
- Enforcing regulations and legislation,
- Encouraging the development of appropriate new drugs and vaccines."<sup>29</sup>

Evidently this strategy was not followed thoroughly or implanted sufficiently as the problem of antibiotic resistances has worsened today. Delegates must consider the need for immediate action to combat this problem and investigate what led to this strategy being, in essence, useless. For a comprehensive list of WHO published documents on antibiotic resistance and a copy of the WHO 2001 strategy, delegates should view the "Additional Resources" section of this guide.

## Possible Solutions & Controversies

There is no one unifying, clear solution to solve the problem of antibiotic resistance. The only hopes for remedying it is through a multipronged approach, tackling the numerous and varying factors which contribute to antibiotic resistance. Below is a partial list of possible solutions to the many aspects of antibiotic.

World Health Day 2011 was a start in establishing antibiotic resistance as an issue needing immediate action, but delegates should further discuss and formulate strategies that will stimulate movement on this issue. It needs to be considered a priority and allocate appropriate funds. Several different strategies that can be implemented to assist in this can be seen in the next few paragraphs.

As previously mentioned, one major reason for the rise of antibiotic resistance is the overuse of antibiotics by general practitioners and particularly, paediatricians. Uninformed patients frequently demand antibiotics to help deal with any illness that befalls them. Education campaigns to inform the general public about a) what antibiotics can and cannot treat and b) the problems, which stem from antibiotic overuse are one particular way to combat this problem. In 2002, a campaign like this was started in France (one of the European nations that consumes the most antibiotics) called "Antibiotics are not automatic"

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<sup>29</sup> WHO Global Strategy for Containment of Antimicrobial Resistance. Rep. Switzerland: World Health Organization, 2001. WHO Document Library. Web. 01 Aug. 2011. <<http://apps.who.int/medicinedocs/index/assoc/s16343e/s16343e.pdf>>.

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and within 5 years, antibiotic consumption went down by over 25%.<sup>30</sup> However today, the campaign is still ongoing but antibiotics are still being given out too frequently. Delegates must look at how these campaigns can reach maximum effectiveness by creating a high level of public awareness in order to phase out needless demands for antibiotics.

In concordance with these campaigns, guidelines must be set for antibiotic distribution by all medical professionals. While patients demand antibiotics because they are uninformed, doctors know when and when not to give out antibiotics but still often give them out even when they are not needed. In countries such as France and the USA where healthcare is run by some doctors as a business, the doctors want to get as many patients in and out as fast as possible so they will prescribe antibiotics for a patient instead of lecturing them about why they are unnecessary, which would waste “valuable time.”<sup>31</sup> In countries where antibiotics are prescribed by professionals, guidelines for when they are to be prescribed must be created and *enforced*. Additionally, medical professionals will need to educate patients on the importance of finishing their prescriptions and the dangers that can stem from failing to do so. The obvious deficiency of this strategy, however, is that it will only work in countries where antibiotics are prescribed. In many countries, especially in the developing world, antibiotics are sold over the counter. Delegates must bring strategies to the table that can reduce the distribution of antibiotics globally.

Outside of medical practice, the unnecessary and abundant use of antibiotics without a medical purpose in agriculture should be another focus point for delegates. As mentioned previously, just less than three quarters of all the antibiotics in the USA are put into animal feed to “promote growth.” While the EU has banned this practice, previous attempts in the USA have failed. All that will probably be needed to create regulations for this practice in many countries is a catalyst, galvanizing the countries to pass legislation.

Lastly, a major priority for delegates to consider is the antibiotic pipeline. Previous attempts to spur action on this has failed, as seen in the WHO’s 2001 strategy. The state of the antibiotic pipeline at present is dangerously precarious and it must be dealt with. The IDSA 10 x '20 campaign needs to be given global attention. Research and development efforts need incentives and financing in order for new antibiotics to be discovered and to find ways to preserve older antibiotics. As well, new antibiotics that are discovered will only be useful if they are not lying idle for years, waiting for approval. However delegates should consider how the state of the economy will factor into obtaining resources and funds needed to finance R&D efforts.

As evidenced above, antibiotic resistance will only be dealt with through several courses of action at once. Guidelines and regulations need to be created, funding needs to be distributed, and awareness needs to be raised. Delegates must think creatively to come up with innovative solutions to these problems while still considering why previous efforts have not been so effective.

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<sup>30</sup> Humphreys, Gary. *Are Antibiotics Still 'Automatic' in France?* Bulletin. *WHO Bulletins*. Web. 01 Aug. 2011. <<http://www.who.int/bulletin/volumes/89/1/11-030111.pdf>>.

<sup>31</sup> *Ibid.*

## Bloc Positions

Antibiotic resistance is a global problem that is not restricted to any one region. What delegates must consider is the state of their country's healthcare system and its limitations. For instance, as previously described, different approaches would be considered by the delegates from countries such as France where healthcare isn't publically funded compared to countries like Canada with universal, publically funded healthcare. As a further example, in some countries such as Mexico, antibiotics are sold over the counter without prescriptions. Delegates should find out whether this is the case for their country. Delegates should read this background guide carefully and consult their country's available public resources to determine how their own government (or, if information is lacking, allied/closely related governments) have dealt and plan to deal with the issues of antibiotic resistance.

## Discussion Questions

1. Despite a comprehensive plan, why did the WHO's 2001 strategy to contain antibiotic resistance fail?
2. If the antibiotic pipeline runs completely dry, what can be done to contain antibiotic resistance without the development of new antibiotics?
3. How can antibiotic resistance be effectively monitored in developing countries with less advanced and developed healthcare systems?
4. Should developed, wealthy nations take on the burden of financing programs combating antibiotic resistance?
5. What can be done in third world nations where residents are too poor to afford antibiotics?
6. What means can be taken to control and contain breakouts of new multi-drug resistant strains of diseases?
7. Will all medical professionals need to be completely re-educated if new antibiotic guidelines are instituted?

## Additional Resources

[http://www.who.int/drugresistance/DC\\_Antimicrobial\\_Resistance/en/index.html](http://www.who.int/drugresistance/DC_Antimicrobial_Resistance/en/index.html)

The WHO document library on antibiotic resistance (includes the 2001 strategy)

<http://www.spacecoastmedicine.com/2011/06/antibiotic-resistance-threatens-a-return-to-pre-antibiotic-era.html>

Informative Q & A relating to many aspects of antibiotic resistance

<http://www.idsociety.org/10x20.htm>

Home site for IDSA 10 x '20 campaign containing many informative documents

[http://www.who.int/bulletin/antimicrobial\\_resistance/en/index.html](http://www.who.int/bulletin/antimicrobial_resistance/en/index.html)

WHO Bulletin Series on Antibiotic Resistance

<http://www.cdc.gov/drugresistance/about.html>

CDC information on antibiotic resistance

## Sources

<http://www.spacecoastmedicine.com/2011/06/antibiotic-resistance-threatens-a-return-to-pre-antibiotic-era.html>

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<http://www.textbookofbacteriology.net/resantimicrobial.html>

<http://www.cdc.gov/drugresistance/about.html>

<http://www.niaid.nih.gov/topics/antimicrobialResistance/Understanding/Pages/causes.aspx>

<http://www.who.int/mediacentre/factsheets/fs194/en/>

[http://www.consilium.europa.eu/uedocs/cms\\_data/docs/pressdata/en/lisa/111608.pdf](http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/lisa/111608.pdf)