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Forum: GC1- General Question and Program Support

Issue: The issue of over-prescription of antibiotics

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Introduction

Antibiotics are a type of medicine which are used to treat illnesses rooted from bacterial infections and hold a great importance for the health services. These medicines are effective by preventing the reproduction of the bacteria or completely killing the bacteria in the medium. Antibiotics are strong medicines which even can reduce the beneficial bacteria located in the intestines of humans and needed for an effective process of digestion or result in the exhaustion of the liver if they are used excessively or unnecessarily.

Bearing in mind the possible outcomes, the unnecessary usage of antibiotics can pose serious threats to the health of individuals. According to a research conducted by the Center for Disease Control and Prevention of the US government, at least 30% of the prescriptions of antibiotics are not necessary which indicates that antibiotics are prescribed for diseases which may be rooted from a virus, can be tackled without an antibiotic or can be cured with the other types of antibiotics than the prescribed type since there are two types of antibiotics which are detailed in the Definition of Key Terms section.

Apart from the health concerns raised by the excessive usage and over-prescription of antibiotics, this issue also results in a vital and dangerous situation called antibiotic resistance. By over-prescribing antibiotics, the spread and effectiveness of antibiotic resistance also increase which reduces the effectiveness of the antibiotics used to cure illnesses. Hence, to both promote the public health and to prevent the spread of antibiotic resistance, the over-prescription of antibiotics by doctors in clinics or hospitals needs to be reduced.

Definition of Key Terms

Bacteria: It is the plural form of bacterium. Bacterium is a member of a large group of unicellular microorganisms which consist of both harmful ones that can cause illnesses and diseases and harmless ones from which individuals can benefit (e.g. The bacteria located in the humans' intestines)

Virus: Virus is an infective agent that generally includes a nucleic acid molecule in a protein coat which is only capable of reproduction if located in a living cell. Thus, it can reproduce in the human cells and impose infections and diseases.

Prescription: An instruction written by a doctor which authorizes the patient to be able to obtain and use a specific medicine and/or be issued with a specific treatment.

Antibiotics: A medicine specifically developed and used for the treatment of bacteria-rooted diseases which aims to kill the bacteria causing that disease or reduce the reproduction of the bacteria.



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Broad spectrum antibiotics: A group/type of antibiotics which is effective against a wide range of bacteria which vary in types and effects. Thus, this type of antibiotics is prescribed if the bacteria causing the disease could not be identified or two or three different types of bacteria are present in the body and cause the disease at hand. The risk of the usage of this type of antibiotics is that they tend to kill both beneficial bacteria and harmful bacteria.

Narrow spectrum antibiotics: A group/type of antibiotics which is effective to and can combat against limited types of bacteria. This type of antibiotics is prescribed provided the bacteria causing the disease is identified. Since the narrow spectrum antibiotics do not attack the beneficial bacteria located in the body, they are the ideal ones to be used in the treatment of bacteria-rooted diseases.

Antibiotic resistance: Bacteria are organisms capable of adapting the changes in the surrounding environment. Thus, they can become resistant to a type of antibiotic which means the antibiotic will not be effective in combating the resistant type of bacteria. This condition is named as antibiotic resistance and can lead to the diseases rooting from the antibiotic resistant bacteria not to be treated with antibiotics which may lead to unfavorable conditions in the public health and increase in the number of deaths due to bacterial infections.

Background Information

Discovery of Antibiotics



receiving a Nobel Prize
due to his discovery in
1945.

Antibiotics were firstly developed in the first quarter of the 20th century. Paul Ehrlich, a German physician, discovered the first modern antibiotic by realizing that a substance named arsphenamine could treat syphilis. Following this discovery in 1909, Alexander Fleming accidentally discovered penicillin in 1928 which led to the mass production of the antibiotics in the second quarter of the 20th century.

The First Realization of the Antibiotic Resistance

The danger of antibiotic resistance has been realized following the wide usage of antibiotics especially in the World War II for the treatment of the infectious wounds the soldiers had. After the war ended, the discoverer of penicillin, Alexander Fleming, warned the public about the possible effect of excessive usage of antibiotics of resistance in bacteria by stating “There is the danger that the ignorant men may easily underdose himself, and by exposing his microbes to non-lethal quantities of the drug make them resistant.”

Following the statements of Fleming and the encounter with the antibiotic resistant bacteria, some of the doctors also agreed with Fleming and tried to warn both the public and their colleagues regarding the dangers posed by the excessive usage of antibiotics. However, the warnings were ignored by most of the scientists back then since they believed that they would be able to tackle the antibiotic resistance by developing more antibiotics as they started to develop different antibiotics than penicillin and it was possible to use the other type of antibiotic if the bacteria became resistant to penicillin. The pharmaceutical companies even used this in their advertisements when they developed a new antibiotic.



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For the subsequent few years, these plans of the pharmaceutical industry seemed to be working. They have come up with different types of antibiotics, sometimes completely new products and sometimes products resulting from the merge of two or more antibiotics developed earlier. However, in order to enhance the conditions and the outcomes of the industry, the companies also encouraged the doctors to prescribe more antibiotics to promote the usage of these newly produced drugs by the people. They adopted a policy named as “shot-first-ask-questions-later” in which they made the patients take the antibiotic even before the test results arrived or they promoted the prescription of the antibiotics for the patients suffering from cold which results from viral infections, not bacterial ones.

These unfavorable conditions and over-prescription of antibiotics triggered a reform campaign for the undesirable and poor qualities of the new drugs in the market. The representatives of this campaign especially urged the Food and Drug Administration (FDA) to put effective and strict regulations in effect to control and regulate the antibiotic market which then consisted of some drugs that had some fatal side effects on the patients. The campaign succeeded with dangerous antibiotics pulled off from the market and stricter regulations applied to the newly produced ones.

Meanwhile, the threat of antibiotic resistance got bigger with the discovery of the ability of a bacterium to transport the resistance gene to another bacterium in the early 1960s which might have led to the accelerated spread of the antibiotic resistance among the bacteria. Following this discovery, experts on the issue sought for ways to combat with the over-prescription of the antibiotics and the spread of antibiotic resistance. The World Health Organization (WHO) had already organized conferences and events as early as in the 1950s on antibiotic resistance but there was no outcome. In that sense, the experts had two targets to combat antibiotic resistance: the FDA and the doctors. They needed the FDA to come up with stricter regulations on the market of antibiotics to get the dangerous and harmful drugs out of the market and the doctors to reduce the prescriptions of the antibiotics to the patients unless it was obviously needed.

Following these actions, there has been an objection from the doctors considering the beneficial outcomes of the usage of antibiotics but eventually, the awareness of the public and pharmaceutical companies has been raised, more efforts have been put on this issue and more sources have been spared to tackle with the spread and increase of the antibiotic resistance and over-prescription of antibiotics.

Timeline of Major Events

Date of Event	Description of the Event
1909	The discovery of the antibiotic effects of a substance named as arsphenamine by Paul Ehrlich
1928	The discovery of penicillin by Alexander Fleming



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1945	Alexander Fleming pointing out the possible consequence of antibiotic usage which is the resistance of the bacteria against the antibiotics/Alexander Fleming receiving a Nobel Prize for his discovery
1955	The discovery of the bacteria resistant to penicillin followed by several countries applying measures to limit the usage of penicillin with allowing it to be used by only prescriptions
1960	The development of methicillin, against the resistance of the bacteria against penicillin to which the bacteria also developed resistance through the end of the year
1990	Methicillin-resistant Staphylococcus Aureu (MRSA) beginning to sicken healthy people followed by a raised awareness of the public on the issue of antibiotic resistance
2002	Up to 60% of the <i>S. aureus</i> cases happening in the hospitals were rooting from MRSA
2005	Over 100000 Americans sickened by MRSA
2013	FDA establishing action plans to end the usage of certain antibiotics in animals
2014	The WHO releasing the statement of “This serious threat is no longer a prediction for the future, it is happening right now in every region of the world and has the potential to affect anyone, of any age, in any country.”

Major Countries and Organizations Involved

World Health Organization (WHO)



The World Health Organization (WHO) has been the utmost organization tackling with the health problems across the globe. Founded in 1948, WHO has been working on to reduce the health issues around the world, solve the problems rising from health issues and create the optimal conditions for the individuals.

For that purpose, the resistance of bacteria against the antibiotics along with the over-prescription of the antibiotics by doctors have been on the agenda of WHO since 1950s following the first conferences organized in the pursuit of finding solutions for antibiotic resistance and reducing the prescription of antibiotics by doctors unless it was obviously necessary. Following these actions, WHO has been working on to raise the awareness of the public and the doctors on the issue of antibiotic resistance and the possible health-related consequences of the over-prescription of antibiotics on the individuals by establishing global action plans and funding initiatives for this very purpose which are detailed in the Previous Attempts to Solve the Issue section.

Center for Disease Control and Prevention (CDC)



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The Official Logo of CDC

Founded in 1946, the Center for Disease Control and Prevention of the US Government has been working on to reduce the diseases and prevent the spread of diseases across the US in a national base. For that purpose, the diseases rotted from antibiotic resistant bacteria have been one of the important points in the agenda of CDC. Following the National Action Plan for Combating Antibiotic Resistant Bacteria (CARB) released by the White House in 2015, the CDC aims to reduce the antibiotic prescriptions in the country by 15% by 2020. For that purpose, it has been working on increasing the public awareness on the unnecessary and over-prescription of antibiotics and its possible harms by forming press releases and by supporting both local and national activities aiming to increase public awareness.

Alliance for the Prudent Use of Antibiotics (APUA)



The Official Logo of APUA

Founded in 1981, the Alliance for the Prudent Use of Antibiotics (APUA) has the primary aim of promoting the healthy, effective and beneficial usage of antibiotics by benefitting from the ability of them to kill bacteria causing infections and diseases. For that purpose, the spread of antibiotic resistance and the over-prescription of antibiotics which is against the fundamental purpose of antibiotics considering the possible outcomes, have been one of the most vital issues to tackle and combat with according to APUA. APUA has been cooperating with many nations and international organizations in order to track down the spread of resistant bacteria against antibiotics, observe the conditions and the recent developments in the prescription of antibiotics in these nations through which they come up with chapter networks. By doing so, it ensures that the necessary actions are taken, and the over-prescription of antibiotics is prevented in these countries.

Previous Attempts to Solve the Issue

WHO's Global Action Plan

WHO has been giving the utmost importance to the issue of antibiotic resistance and measures which can be taken in order to prevent the increase of antibiotic resistance including the prevention of the over-prescription of antibiotics. Thus, in 2015, with the urge to act against the spread of antibiotic resistance globally and effectively along with its unfavorable consequences, WHO adopted a global action plan which outlines the following five objectives directly stated by WHO:

1. To improve awareness and understanding of antimicrobial resistance through effective communication, education and training,
2. To strengthen the knowledge and evidence base through surveillance and research,



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3. To reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures,
4. To optimize the use of antimicrobial medicines in human and animal health,
5. To develop the economic case for sustainable investment that takes account of the needs of all countries and to increase investment in new medicines, diagnostic tools, vaccines and other interventions.¹

With the aforementioned objectives, the Global Action Plan on Antimicrobial Resistance aims to engage with the society in order to promote the public health and increase the awareness of the public upon the issue, prevent the infections from arising by implementing measures to keep public places clean, and regulate the prescription of the antibiotics to infected people as a part of the objective 4.

United Nations high-level meeting on antimicrobial resistance

On 21st September 2016, in the New York UN Headquarters, the General Assembly conducted a meeting on the spread of antibiotic resistance and the threats posed to the public health. The representatives discussed possible actions which could be taken along with the Global Action Plan on Antimicrobial Resistance, possible outcomes of the rapid spread of the antibiotic resistance and the steps that could be taken in order to reduce the number of unnecessary prescriptions of antibiotics. Thus, this meeting has been the lead of the governments to collaborate and cooperate on this issue.

Possible Solutions

In order to solve this issue, two aspects need to be addressed: the increase of the awareness of the public on the seriousness of the issue and to properly adopt effective legislations in order to fully monitor and regulate the prescription of antibiotics. In that sense, the ways to raise the public awareness need to be considered: In what ways and on what aspects do we need to warn the public? How can we inform them and how can they make sure that the prescriptions for antibiotics written for them are necessary? Apart from these points, the question of implementing the global action plan individually in each country: Will there be differences in the application procedure or will the countries follow the same pathway? How will the prescriptions be regulated and by which aspect? Furthermore, the monitoring process of the recent conditions of antibiotic resistance and over-prescription of antibiotics needs to be worked upon as well.

Useful Links for Further Research

- <https://www.nytimes.com/2016/03/27/opinion/sunday/how-to-stop-overprescribing-antibiotics.html>
- <https://blogs.wsj.com/experts/2017/06/30/how-to-keep-doctors-from-overprescribing-antibiotics/>
- http://www.wpro.who.int/entity/drug_resistance/resources/global_action_plan_eng.pdf
- <http://www.who.int/antimicrobial-resistance/policy-package-july2016.pdf?ua=1>
- <http://www.who.int/antimicrobial-resistance/amr-aidememoire-may2016.pdf?ua=1>
- <https://antibiotic.ecdc.europa.eu/en/get-informed/factsheets/factsheet-general-public>

¹ http://www.wpro.who.int/entity/drug_resistance/resources/global_action_plan_eng.pdf



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- <https://antibiotic.ecdc.europa.eu/sites/eaad/files/media/en/eaad/Documents/antibiotics-factsheet-primary-care-prescribers.pdf>

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- “United Nations High-Level meeting on antimicrobial resistance.” World Health Organization, www.who.int/antimicrobial-resistance/events/UNGA-meeting-amr-sept2016/en/.