

Is the COVID19 Pandemic Accelerating the Existing Public Health Problem of Antimicrobial Resistance?

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ABSTRACT

The COVID-19 pandemic has changed the world as we see it. It has caused pain and loss across the globe in terms of human life. Economies have been broken. As a pandemic, it is causing suffering across the borders of the world. This article aims to investigate one other global public health problem that has been with us for decades, the antimicrobial resistance in relation to this pandemic. The COVID-19 pandemic has instigated the use of antibiotics and other antimicrobials both with and without evidence. The abuse of these antimicrobials is due to several factors including medical, cultural, and political and others. There is evidence that antimicrobial resistance was already on the rise but during this pandemic, we might just have accelerated it.

Keywords: COVID-19; Antimicrobial Resistance; SARS-CoV-2

INTRODUCTION

In late December of 2019, a new type of viral disease was first detected in Wuhan, China which was quickly recognized as a novel coronavirus [1]. The similarity of the virus with Severe Acute Respiratory Syndrome-SRAS coronavirus lead it to be named SARS-CoV-2 and the disease was named COVID-19. The WHO declared it a pandemic on March 11th, 2020. According to worldometer's real-time data, to date (October 4th, 2020) the number of infected people with SARS-CoV-2 is more than 352 million and 1.3 million deaths worldwide. (Coronavirus Update (Live)) This pandemic has put forward another long-term public health problem which is Antimicrobial Resistance (AMR), in this case, antibiotic resistance. To illustrate the importance of this problem, even in the middle of a pandemic, the World Health Organization's Director-General addressed the issue of AMR as 'one of the most urgent challenges of our time' which has been further accelerated by the use of a huge amount of antibiotics during this pandemic (WHO news) [2,3].

USE OF ANTIBIOTICS DURING COVID-19

From the beginning of this pandemic, various treatment modalities have been used to treat COVID-19 caused by SARS-CoV-2. Possibly, based on the previous experience of the 2009 influenza pandemic, when bacterial co-infection with the viral disease was always associated with worse prognosis [4], the WHO initially recommended the use of empirical antibiotics in case of COVID-19 [5]. This recommendation has also encouraged early de-escalation

of antibiotic therapy. However, according to Abelenda-Alonso et al., two factors were associated with the failure of this practice [6]. One is the difficulty of processing microbiological samples in overloaded laboratories and another is, at that time there were no successful antiviral drugs that can be used against the disease. Abelenda-Alonso et al. argued that these factors lead to the use of broad-spectrum antibiotics almost routinely, which most of the clinicians would probably avoid in a less-stressful situation. A study conducted in a hospital in Spain showed an interesting biphasic phenomenon in antibiotic use before and during the pandemic. After analyzing the antibiotics usage data, they found out that during the first peak, the empirical antibiotics were used based on hospital guideline containing amoxicillin and clavulanic acid. But, during the second peak, there was a significant increase in the use of broad-spectrum antibiotics [6]. This is just one example of the improper use of antibiotics in a developed country. In the developing world, the use of antibiotics was already out of control and during this pandemic people followed the media, not science to decide which drug they should take, including antibiotics.

Antibiotics were used up to 100 per cent of the patient in intensive care units due to COVID-19 [7]. One of the review studies from Asia by Rawson et al, found out that more than 70 per cent of patients were treated with antimicrobials when only 10% of them had suffered a co-infection [8]. This frequent and unnecessary overuse of broad-spectrum antibiotics making AMR faster and in some cases may be causing permanent damage, which we will see in the future. In an interview with the British Medical Journal, the WHO assistant director-general of AMR told that the early data

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are suggestive of only a minimal number of COVID-19 sufferer had bacterial co-infection [9]. Experts believe that one of the main reasons for this overuse of antibiotics, at least at the beginning of the pandemic, was due to the uncertainty of the disease process and its progression.

Another cause of antibiotics misuse during this pandemic is the media hype surrounding some treatment regimen. For example, the combination use of azithromycin with hydroxychloroquine in the treatment of COVID-19 made popular by media, celebrities and political leaders which caused a shortage of these two drugs in different parts of the world including the USA although they have proven to be ineffective (NIH) [10]. This irresponsible behavior both on the part of important people and media is responsible for a huge amount of antibiotics consumption by apparently healthy people just as a precaution both in the developed and developing world [11].

WHY ANTIBIOTICS ARE USED IN A VIRAL PANDEMIC?

Several reasons might prompt clinicians in using antimicrobials, especially antibiotics. SARS-CoV-2 causes severe infection in the lungs. Some studies suggested that already bacteria colonized lungs like the lungs of a chronic obstructive pulmonary disease is much more vulnerable to this infection [12]. Moreover, most of the patients who are diagnosed with COVID-19, have to spend a minimum of 7 to 14 days in the hospital, making them more vulnerable to hospital-acquired infections [12]. Another point to consider is that recent studies have found out that almost half of the people who have died from COVID-19 in Wuhan, China has had suffered from bacterial co-infection [13]. In severe COVID-19 cases, one of the clinical interventions is mechanical ventilation, which is a well-known cause of hospital-acquired pneumonia [14].

At the beginning of COVID-19, immuno-modulatory drugs also have been used widely to save the patient from a cytokine storm. Although it might have been a necessary choice in early intervention, evidence has suggested that high dose steroid increases the chance of secondary bacterial infection [15].

COVID-19 AND ANTIMICROBIAL RESISTANCE

In Antimicrobial Resistance (AMR) is an old public health problem. Probably one of the most consistent one too. Even before the COVID-19 pandemic, there were approximately three million antimicrobial resistant-pathogen infections annually only in the USA [16]. It is estimated that by the year 2050, there will be as many as ten million deaths per year globally from this problem [17]. If this number does not scare anyone, there are other bad news too. The development of new antibiotics is the most struggling field of drug development. Because antibiotics are not as much profitable as other drugs for chronic diseases, some major companies that tried to bring novel antibiotics in recent years got bankrupted [7].

The global problem of AMR was superimposed by the COVID-19 pandemic. Even in many European countries, including the UK, where the antimicrobial stewardship program is taken seriously, 15-50 per cent of bacteria are resistant to at least one antimicrobial and frequently more than one combinedly, making empirical broad-spectrum antibiotic therapy mostly useless in terms of hospital-acquired infection. A recent study by Rhee et al., suggested that inadequate use of empirical broad-spectrum antibiotics in case of sepsis leads to higher mortality [18]. This is a serious problem in hospitals where COVID-19 patients were treated. Intensive Care

Units are already one of the epicenters of the development of AMR, COVID-19 just made it worse. It is to be seen, in the future how we are going to treat the patient in the ICU's and post-operative care as hospital-acquired infections become more and more prevalent, and bacteria become more resistant to existing antibiotics [19].

As there is no indication of an end to this pandemic to date, we are probably looking into a more complicated AMR situation in the post-COVID-19 world. This situation not only affects the human population but also will be detrimental to animal and wildlife as hospital wastes containing a huge amount of antibiotics get mixed with water and run through the cycle of development of AMR in both human and animal [20].

Although much has changed in terms of COVID-19 treatment guideline as directed by the WHO (Clinical management of COVID-19), the use of unnecessary antibiotics even with the slightest symptoms like fever and runny nose is still in practice in many countries, especially in developing countries where antimicrobial stewardship programme is not being followed and regulation is non-existent in terms of antibiotics use. Antibiotics like azithromycin, vancomycin, carbapenems, ceftriaxone and linezolid, which are 'critically important antimicrobials for human' announced by WHO, used every year to save millions of lives (Critically Important Antimicrobials for Human Medicine 6th Revision 2018). But these life-saving antibiotics were used improperly which will lead to possibly an increased death rate from infection in the coming decades [21].

What we can do

It has become very apparent that this pandemic is not going away very soon. Already there is a second wave of infection in the UK, leading to partial lockdown in several parts of the country. The UK has good monitoring of the ongoing situation which is not the case in the case of developing nations. The AMR was already a huge problem before the pandemic, and during this pandemic, it just has been accelerated [22]. Most of the antibiotics that have been used since the beginning of the pandemic are now found to be ineffective (WHO). The mainline of treatment according to WHO, is now antiviral drugs, oxygen and steroids. During a pandemic, due to overwhelming stress, the clinicians might feel pressured to prescribe empirical antibiotics which do not help in any way. However, now that we have some medications and guidelines based on evidence, our actions must reflect that in practice. Countries across the globe, including developing and developed should formulate a strict plan to avoid unnecessary antibiotics whenever possible. As intensive care units are the epicentre of AMR bacteria, constant monitoring of the resistance pattern arising from those units must be recorded and reported [23]. As we are fighting a pandemic, a global coordinated effort is necessary for surveillance and reporting of AMR to fight the rise of more superbugs [24]. The hospital must follow a strict antimicrobial stewardship programme.

It is unlikely that we will be able to reverse the harm we have already done in terms of antimicrobial resistance in near future, but we should think about our next generation and act strongly to save as many antibiotics as possible.

CONCLUSION

Pandemic is a global problem, so is the problem of antimicrobial resistance. During the COVID-19 pandemic, several factors have to lead to abuse and overuse of antibiotics. A global coordinated effort led by scientist, politicians, media and clinicians should

be formulated to save us from further harm. AMR does not only impact human life but also other animals on the planet. As a human, it is our duty not to save ourselves only but to save the whole ecosystem of the planet earth.

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CONFLICT OF INTEREST

Author declares no conflict of interest.

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