



Antimicrobial Resistance (AMR) Across a One-Health Framework: Environmental Contamination through Wearing Scrubs in Public by Health Workers

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Abstract

Scrubs worn by most health workers (HW) in public are routine norms by HW indicating that contaminated clothing is being brought into the outside environment hence posing an infection risk. The significant cause of mortality and morbidity due to Antimicrobial Resistance (AMR) is responsible for 1.27 million deaths worldwide resulting in poor health outcomes, increased healthcare expenditure, and affecting food production. Health workers need to be educated on AMR across one health framework due to the high rise of community-acquired resistant antibiotic-resistant infections. This commentary paper aimed to highlight the importance of antimicrobial resistance (AMR) across one health framework: environmental contamination through wearing scrubs in public by health workers.

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Introduction

Almost 1.27 million deaths worldwide were observed in 2023 due to Antimicrobial Resistance (AMR) which results in poor health outcomes, increased healthcare expenditure, and affects food production [1, 2]. In human health, veterinary, and agricultural sectors wrong use of antimicrobials has been seen hence increasing the AMR rate, the whole society and one health approach are required for the prevention and mitigation of AMR within our community [3].

Patients when admitted to the hospital their main hope is to get the best possible treatment hence HW usually protects

them from nosocomial infection and this is usually seen by them wearing protective gear while handling them. Even though the HW always tries their best on this hospital-acquired infection most of them are often seen in public in the same scrubs in grocery shops, hotels, and non-clinical areas within the hospital, carrying their children from school and then returning to the hospital exposing the community members and the patients to this contaminated clothing that poses an infection risk [4, 5].

For the benefit of both hospital staff and patients, a worldwide effort towards hand hygiene among the HW has been observed in our health facility through the introduction of hand wash basins within our working station [6]. Even though almost



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all the HW do observe hand hygiene but hand re-contamination from the microbial-contaminated uniform is observed since it is a common behavior among them to wipe their hands on cloth [7]. Combining that practice with the added requirement for nurses to have pens, tape, Band-Aids, IV supplies, and other valuable equipment in their pockets at all times, nurses are inevitably touching their uniforms with their hands most of the time to access the materials from their pockets [8].

Some of our HW usually carry the scrubs to home hence contaminating the home environment. During the washing of these scrubs, HW usually mixed them with other cloths but due to a complete lack of decontamination instructions, the entire load of clothing are contaminated [4,9,10]. According to the Occupational Safety and Health Administration (OSHA), it has been documented that HW uniforms always become contaminated through perspiration, human secretions of oils, or items handled while on duty. The organization has stated also in its protocol that contaminated scrub attire should not be taken out of the hospital environment for decontamination if contaminated with blood or other potentially infectious materials [4]. From the experience, it has been noted that contamination of HW scrubs always increases due to extended use until saturation like wearing scrubs repeatedly without washing [5,11]. Therefore, home washing of scrubs and lab coats should be further investigated as a possible source of contamination and if good, it should be stopped by the HW [12].

One Health Approach towards the Antimicrobial Resistance

In 2019, the WHO classified only six out of 32 recognized antimicrobials in hospitals as innovative. Currently, contagions due to MRA microorganisms are tough to manage due to increasingly ineffective antimicrobials against such infections hence resulting in higher death rates. The main outlined pathogens by the WHO should be given a lot of consideration hence new antimicrobials should be considered for infection control. The new antimicrobials if not well managed will show the same outcome and become ineffective as the current antimicrobials. Poor infection stoppage and control measures in hospitals, lack of awareness and knowledge towards AMR, and poor access to medicines and vaccines are the main key AMR promoters within our community [13]. Some organizations have united together to develop a Global Action Plan on Antimicrobial Resistance to promote the awareness of surveillance and research towards AMR worldwide [13]. The joined force formed by the World Organization for Animal Health [OIE], WHO, and the Food and Agriculture Organization of the United Nations [FAO] established a guideline to ensure that all regions implement integrated surveillance, proper use of antimicrobials in all the population to provide a better understanding on AMR spreads along different sites and specific regions [14-16]. Global Antimicrobial Resistance Surveillance System- (GLASS) was launched in 2015 by WHO to cover the knowledge gaps at all stages assisting in progressive integrated surveillance data on humans' antimicrobials and understanding the role of AMR in the food chain and the environment. For the development of the new antimicrobial, the WHO established a priority pathogens list in 2017 as a guiding tool for researchers' pathogen management. This awareness was then spread to the private sector through a joint initiative of WHO and the Drugs for Neglected Diseases Initiative (Global Alliance for Antibiotic Research and Development) by partnering with public and private sectors in supporting research and development aiming development and implementation of five new treatments against drug-resistant bacteria iden-

tified by WHO as the greatest threat by 2025 [13].

Uses of antimicrobials in Humans, Animals and Plants

Before resistance developed, most of the antimicrobials such as vancomycin had shown slow resistance development making them the right drug of choice due to their continued capability to act against some infections that had shown AMR to other commonly used antimicrobials. The increasing vancomycin resistance today has raised a concern in our health sectors as some bacteria such as vancomycin-resistant enterococci have contributed to mortality and morbidity greatly in our hospital setup [17]. Antimicrobial consumption has increased worldwide due to its various uses within one health sector for various purposes such as therapeutic, prophylactic, and development promoters in animal production [18].

Easy transfer of AMR has been noted within different ecosystems and populations such as resistant zoonotic bacteria in soil affecting plants, vegetables, and fruits inducing antibiotic-resistant fungi transmitted from the environment to humans due to mixed use of some antimicrobials like tetracycline, triazoles, and streptomycin in both human, animals and plant therapy [19]. Some clinically used drugs such as tetracycline and streptomycin are also used in the treatment of common bacteria that always cause fruit infection, while in aquaculture commonly used antibiotics spread rapidly in water bodies hence exerting selective pressure thus reducing growth promoters in the animal food industry [20-23].

The AMR combat through the One Health approach

The One Health approach to combat AMR can be achieved through the development of policies that govern antimicrobial use, monitoring AMR, and control of infections within our society. Some strategies should be employed such as global public awareness of harms caused by the overuse and misuse of antimicrobials, improvement, and strengthening the hygiene measures important within the society. In the agriculture sector, our farmers should be educated on reducing the unnecessary use of antimicrobials and to improve on the global surveillance of drug resistance. In the health sector, we should reduce the management of a condition before performing the diagnosis hence new and rapid clinical diagnosis tools should be promoted also promoting vaccines and other alternative measures on pathogen management.

Skilled professionals such as microbiologists, pharmacists, infectious disease specialists, nurses, infection control specialists, veterinarians, and epidemiologists should be required to address AMR issues hence the countries must invest in the training of this human resource and also provide global novation funds to support research that are not commercially attractive in drug discovery to develop new treatments.

Conclusions

One Health approach is the key area to be supported to combat the AMR, where human, animal, plant, and environmental health should be deeply looked into through the innovation of new techniques toward condition management without using or overusing antimicrobials within our markets. Health workers should also avoid bringing the contaminated scrubs outside environments but instead maintain the right protocol towards their use, since community-acquired antibiotic resistant infections are on the rise, there are need to educate those in the agriculture sector on the importance of proper use of the

commonly used antimicrobials in the sector.

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