

Perspective



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One health: harmonizing infection prevention and control, and antimicrobial stewardship in combating antimicrobial resistance to improve patient safety

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Abstract

One of the greatest successes in the fight against infectious diseases is the discovery of antimicrobials. This has remained a cornerstone in subsequent advancements in healthcare delivery. However, the emergence of Antimicrobial Resistance (AMR) dampened the celebrations. Currently, AMR is a major hindrance to patient safety because of the emergence, re-emergence and continued spread of multidrug resistant (MDR) pathogens. The speed and extent of AMR spread is a major threat to human health globally. Several efforts and approaches have been tried at different levels to combat this global menace. However, the continued emergence of different MDR pathogens has escalated the seriousness of the threat, especially the rising burden of healthcare associated infections. Improving antimicrobial stewardship (AMS) has been advocated worldwide to preserve the available antimicrobials for use against the right pathogens. The interrelationship between AMR, AMS, and infection prevention and control (IPC) in the context of Patient Safety can best be understood by integration into the “one health” concept. The one health concept was introduced to break barriers and minimize compartmentalization of efforts without losing the benefit of specialization and expertise in addressing human challenges. We argue that one health concept should be universally embraced and used in harmonizing all efforts at combating AMR

through AMS and IPC to improve Patient Safety and healthcare quality across human, animal and environmental healthcare systems. This perspective is our effort to bring all the components under the one health umbrella.

Perspective

The concept of one health, as coined by William B Karesh was based on the inter-sectoral role of different specialists in contributing to the health of humans, animals and their environment [1]. This idea came from the observation of a common link between humans, animals and their environment regarding distribution and circulation of microorganisms. No individual or specialist has all the attributes needed to overcome the multifaceted challenges facing humans. It is therefore imperative to have a holistic, multidisciplinary approach that accounts for all peculiarities and differences. This laid the foundation for the concept of one health. The concept of one health predates the current coinage and application [2]. It was similarly applied in the same context over 200 years ago initially as One Medicine [2]. Although there is no universally agreed definition across scientific/health organizations and countries, the widely circulated definition by the US Center for Disease Control and Prevention and the one health Commission is one health is defined as a collaborative, multisectional, and transdisciplinary approach-working at the local, regional, national, and global levels-with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment’ [2,3]. Therefore, the one health concept provides a platform for broader understanding and an all-encompassing approach to all healthcare challenges by harnessing from knowledge shared across all disciplines of human endeavor.

Harmonizing the one health concept, with AMR, AMS, IPC and patient safety: currently, the greatest public health threat posed by

microorganisms is AMR, which could be overcome by the one health concept integrating efforts at IPC and AMS to improve patient safety [4]. The rapid development and spread of AMR is a result of failure in multidisciplinary approach to AMR's root causes and drivers as contained in the one health concept [5,6]. The United Nations Sustainable Development Cooperation Framework identified AMR as major public health threat requiring the co-operation of all member states with particular emphasis on one health as an all-inclusive concept [7,8]. The introduction of the concept of "resistome" defined as "a collection of all the antibiotic resistance genes (ARGs) and their precursors in pathogenic and non-pathogenic bacteria" further provided the needed driving force to the idea behind one health being the best umbrella to be used in studying AMR and its public health significance [9]. This provided an important guide to the understanding and conceptualization of many prevention and control measures with respect to transmission and spread of AMR in both adults and children [10].

Patient safety has been defined as "a framework of organized activities that creates cultures, processes, procedures, behaviors, technologies and environments in health care that consistently and sustainably lower risks, reduce the occurrence of avoidable harm, make errors less likely and reduce the impact of harm when it does occur." [11]. Although the word "patient" was used, in the context of reducing healthcare associated harm, everyone can be viewed as potential patient [12]. One of the major threats to patient safety is the emergence and spread of AMR [13]. It hampers efforts of ensuring patient safety irrespective of the setting; hospital or community. Campaigns to ensure patient safety were prominent and prioritized [14]. Consequently, at the 74th World Health Assembly (WHA) in 2021, the Global Patient Safety Action Plan 2021-2030 was adopted, [11] and aimed to provide a coherent and well-articulated road map for patient safety. This is another indication of the importance the international community has

attached to patient safety. One of the strategic objectives of the document was to "put in place rigorous and evidence based measures for IPC to minimize the occurrence of health care-associated infections and antimicrobial resistance" [11]. Despite the emphasis on the link between IPC and AMR in ensuring patient safety, the one health approach that provides a broader platform was virtually left out of the document. There is, therefore, the urgent need to harmonize individual components of AMR, IPC and AMS into the one health approach. This is more so that most IPC programs are linked to and also directed towards the fight against AMR [15].

AMS efforts and strategies have been well-developed and implemented at different levels across the globe [16]. They are aimed at conserving antimicrobial by protecting them from misuse and abuse, thereby preventing the emergence of resistance [17]. Most of the AMS guidelines and strategies lack the one health approach and are mostly skewed towards human health. Compartmentalization of efforts with minimal or no central co-ordination almost two decades after the conceptualization of one health might have contributed to the inefficient fight against AMR. The misuse and abuse of antimicrobial within both hospital and community setting is pushing the development of resistance faster and similarly retarding the efforts at control/prevention. For the world to be ready for any emerging pandemic, the concept of one health must be fully developed and applied uniformly globally [18,19]. An approach that will harmonize all efforts in IPC, AMS, AMR and Patient Safety is best described using the concept of one health, which enables the participation of every human specialist without rigid demarcation (Figure 1). From environmentalists to engineers extending across to veterinarians and linking with humanities and every knowledgeable human, there is a direct or indirect role for everybody and the need for all to work together for maximum benefits [20]. Progress has been made in the development of a multidimensional matrix harmonizing knowledge

and inputs from diverse fields of expertise under the platform of one health [20]. Along these lines, Dalton *et al.* proposed extending the concept of one health to accommodate IPC measures and AMS activities, especially in the hospital setting [21]. Multi-sectoral approach to combating AMR remains the cornerstone to any successful intervention and one health approach enhances the chances for a successful outcome [22]. This is typically obvious by virtue of the fact that AMR leads to the need for AMS which is a major requirement for effective IPC that is necessary for patient safety and all can be harmonized under one-health.

System thinking approach and the one health: although very cardinal, system thinking with optimum citizen participation in the implementation and operationalization of OH is still suboptimal [23,24]. The relatively complex interrelationships between different sectors required to achieve the OH goal must be well integrated for optimum outcomes in tackling health challenges.[23,24] Knowledge integration across all relevant disciplines is key component in the understanding and operationalization of one health [24]. Applying OH in to global health and medicine remains cornerstone to improving the quality of health system of every country that is geared towards better patient safety [25].

Recommendations: the one health concept needs to be incorporated and logically applied in all efforts at combating AMR/AMS, IPC strategies and improving patient safety. At national and subnational levels, the knowledge and applicability of OH should be included in educational curricula of all relevant academic disciplines and to form part of routine continuing professional developments (CPD) of all related professions. Terms of reference (ToR) of IPC/AMS and multidisciplinary patient safety teams (MPSTs) should capture and prioritize the OH approach in all their activities. Monitoring and evaluation of healthcare quality and improvement activities should incorporate the application of OH as one of the yardsticks for optimum performance in

assessments and scoring. There is need to expand the frontiers of OH knowledge in to other sciences and engineering/technological disciplines.

Conclusion

Although there are several evidences linking AMR, AMS, IPC, and patient safety with the concept of one health, there is little or no consideration of all under a common platform. This emphasizes the need for harmonization to improve healthcare quality and patient safety. Committees responsible for patient safety regarding AMR, AMS and IPC should have a common platform under which the one health concept can be practically utilized for maximum and long-lasting impact at all levels. More research is needed to allow evidence-informed policy decision-making on the best strategy to integrate the different activities into the one health concept.

Competing interests

The authors declare no competing interests.

Authors' contributions

All the authors have read and agreed to the final manuscript.

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Figure

Figure 1: an interplay between patient safety, infection prevention and control (IPC), and antimicrobial stewardship (AMS) in response to

the global challenge of antimicrobial resistance (AMR) and the central role of one health in strategic improvement efforts

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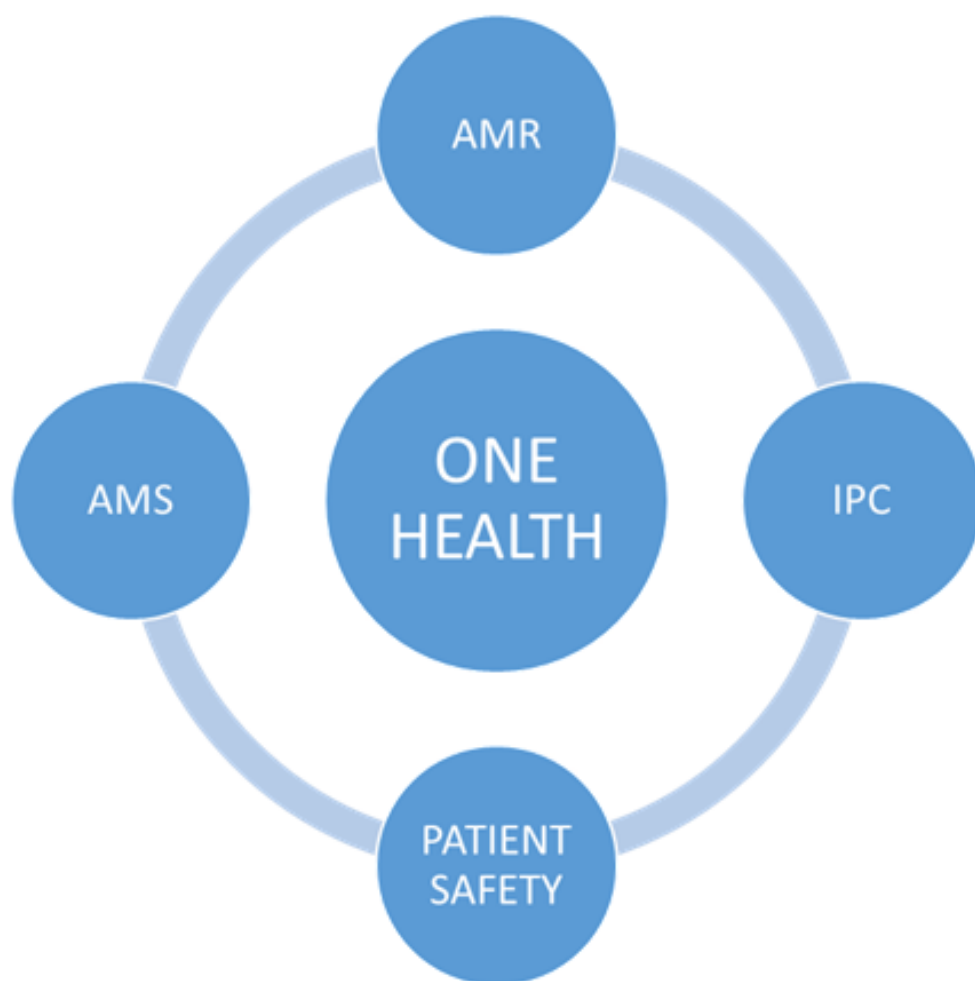


Figure 1: an interplay between patient safety, infection prevention and control (IPC), and antimicrobial stewardship (AMS) in response to the global challenge of antimicrobial resistance (AMR) and the central role of one health in strategic improvement efforts