A One Health Approach to Combat Antimicrobial Resistance: A Necessity for Countries Such as Bangladesh

Addressing antimicrobial resistance (AMR) is a public health priority, especially among low-and middle-income countries (LMICs).[1-5] Bacterial infections are now the second leading cause of death globally,[3] with AMR rates higher in LMICs than in high-income countries.[6-8] AMR rates will continue to grow among LMICs unless considerable inappropriate use of antibiotics across all sectors, including in agriculture as well as among both animals and humans, is reduced.[9-14] Inappropriate use includes increasing utilisation of antibiotics from the World Health Organization (WHO) Watch and Reserve list among LMICs with their greater resistance potential.[2,12,13,15,16]

Bangladesh is no exception among LMICs with currently high rates of inappropriate antibiotic use across all sectors alongside high rates of AMR.[17-25] This includes high rates of prescribing and dispensing of antibiotics from the Watch and Reserve list among patients, which includes for self-limiting infections.[22,24-28] There have also been concerns with high inappropriate use of critically important antibiotics in animal production in Bangladesh, which includes Reserve antibiotics such as colistin, adding to AMR.[13,29-32]

As a result of growing concerns with AMR, there have been International as well as National initiatives to reduce unnecessary use of antibiotics, especially among LMICs, which include for prophylaxis as well as growth promotion in animals.[1,7] International initiatives include the development of the One Health approach by the WHO, which includes a joint research agenda incorporating improved AMR surveillance as well as multiple interventions to enhance the appropriate use of antibiotics.[4,5,33] Suggested activities include improved AMR surveillance under the Global Antimicrobial Resistance and Use Surveillance System initiative.[34,35] The coordination of activities under the WHO Global Action Plan launched in 2015,[36] and its subsequent development into National Action Plans (NAP), also provides a framework both nationally and internationally to reduce AMR rates, especially among LMICs.[37-40] However, there are concerns with the implementation of NAPs, particularly among LMICs, due to resource and personnel issues, which have resulted in appreciable heterogeneity in their implementation.[39,41-43] This needs to be urgently addressed going forward in LMICs such as Bangladesh.

Other global initiatives include the categorisation of antibiotics into Access, Watch and Reserve (AWaRe) in 2018, led by the WHO, with each category depending on their resistance potential.[16] More recently, the WHO providing guidance on the management of 35 infectious diseases seen across both hospital and primary care sectors.[44,45] It is likely that quality indicators to improve future antibiotic use will be based on the AWaRe system, with its growing use across LMICs to monitor antibiotic use.[46,47] Alongside this, there are ongoing global and regional initiatives to reduce the extent of falsified and substandard antibiotics, which add to AMR, through improved coordination with agencies across countries and continents, which build on the WHO Lomé agreement, coupled with increased fines, prison sentences and revocation of licences where such practices are identified.[48-54] Shortages of antibiotics are also a concern across LMICs that need addressing to reduce AMR.[49,55] However, shortages of antibiotics are more prevalent in hospitals compared with primary care, especially given the extent of Watch and Reserve antibiotics available in LMICs, where branded generics are available.[49,56,57]

Recent research in Bangladesh has demonstrated considerable resistance to critically important antibiotics, including colistin, among the faeces of animals arising from their overuse despite legislation and other initiatives.[58-63] For instance, it has been estimated in Bangladesh that over 94% or more of poultry farmers administer antimicrobials in their farms for both disease prevention and for accelerating animal growth, adding to AMR.[29,59,60,62,64] There is now considerable resistance to important antibiotics in humans in Bangladesh as a result of their overuse across all sectors.[19-21,64] Their overuse is not helped by concerns with limited knowledge of antibiotics, including their lack of effectiveness for viral infections, AMR and antimicrobial stewardship among all key stakeholders, which includes dispensers, farmers, prescribers, patients, the public and veterinarians in Bangladesh, similar to other countries.[65-76] We are also seeing concerns with limited knowledge among health care and veterinary students in Bangladesh, again, similar to other countries.[74,77-80] Alongside this, there concerns with the appreciable number of informal sellers of antibiotics in Bangladesh due to issues of affordability with medicines including antibiotics,[26] potentially exacerbating AMR with their more limited knowledge regarding antibiotics and AMR

compared with community pharmacists and higher likelihood of dispensing Watch and Reserve as well as substandard and falsified antibiotics.[28,49]

Consequently, a coordinated approach is needed across all key stakeholder groups in Bangladesh to reduce AMR, including Government Agencies, notably the Directorate General of Drug Administration and the Department of Livestock Services, as well as prescribers, dispensers and users of antibiotics. Government activities include strengthening the regulatory system to reduce the extent of falsified and substandard antibiotics where these occur.[49,81] Suggested activities include working with other regulatory agencies in the Region to reduce duplication, similar to Pan-African initiatives, alongside instigating fines, removing licences and other activities where substandard and falsified antibiotics are found, especially among informal sellers.[49,54,55,82-85] These activities can be part of initiatives to increase the priority given to the goals and activities within the Bangladesh NAP to reduce AMR, including activities among veterinarians.[85-87] This is important given concerns with the implementation of NAPs among LMICs, including Vietnam, and a lack of priority given to initiatives to reduce AMR.[40-42,87-89]

Key activities to improve future antibiotic use across all sectors include the introduction of antimicrobial stewardship programmes (ASPs), which incorporate professionals treating both animals and patients, building on previous concerns and activities in Bangladesh.[71,90-96] Activities include developing and implementing key quality indicators, which will increasingly be centred around the AWaRe classification and guidance, and monitoring subsequent antibiotic use.[16,44-46,97,98] Indicators among patients are increasingly likely to include adherence to the WHO AWaRe guidance, given concerns with the robustness of current antibiotic guidelines among LMICs.[99,100] However, adapted to take account of local AMR patterns.[101] Patients and the public are also key targets for ASP activities going forward, given their considerable influence on antibiotic utilisation in LMICs.[74,102,103] We are aware that issues of language are important to reduce inappropriate antibiotic use, especially in countries where there are multiple official languages and where there are no direct terms for antibiotics and AMR.[103-106] Alongside this, the continued development of real-time low-cost quantitative PCR methods to improve the monitoring of antibiotic resistance patterns, especially in LMICs such as Bangladesh, and the subsequent guidance on antibiotic use.[63]

We have previously published Editorials and Reviews giving examples and suggested initiatives to improve antibiotic utilisation among all key stakeholder groups across LMICs, including Bangladesh, as well as reduce the extent of substandard antibiotics and shortages, including in Advances in Human Biology.[49,55,74,93,97,103,107,108] These suggestions can be used going forward among key groups in Bangladesh to reduce AMR. Suggestions include increased AWaReness among all key stakeholder groups, starting in universities and carried on post-qualification, as well as among patients and the public.[49,74]

Suggested activities to reduce antibiotic prices where there are issues of affordability, as well as limit the attractiveness of informal sellers along with the substandard and falsified antibiotic market, also include encouraging the utilisation and doses of antibiotics suggested in the WHO AWaRe guidance book, alongside discouraging through education and ASPs the excessive use of antibiotics in animals.[49,63,74,85,91] Together with this, encourage the use of International Non-Proprietary Name (INN) drug names throughout health and animal care rather than branded generic names.[109-111] We are aware that in countries such as Pakistan that there are a considerable number of branded generics on the market, including Watch and Reserve antibiotics, with the manufacturers seeking high prices, as well as their increased utilisation. To cover their costs and enhance their profits.[56,109] Increasing INN prescribing and dispensing will help to counteract this situation, reduce possible confusion among patients if different branded generics are regularly dispensed with different names and this is not explained to them, as well as reduce the attractiveness of the substandard and falsified medicine market.[49,109,110,112] In addition, improve stock control and forecasting, as well as reduce costs, with reducing the number and doses of antibiotics that need to be stocked among public facilities as well as community pharmacies. Alongside this, reduce regulatory activities with the efforts of regulatory officers switched to improve the monitoring of the quality of antibiotics available for human and animal care in Bangladesh, as well as educate all key stakeholders of the quality of approved generics given concerns that can exist in LMICs.[110,113]

In conclusion, there are multiple coordinated activities that all key stakeholder groups can undertake in Bangladesh to improve future antibiotic use and reduce AMR. Increased AWaReness in all activities has a central role going forward, and we will continue to monitor the situation.

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