AMR research in a post-pandemic world: Insights on antimicrobial resistance research in the COVID-19 pandemic

Short title: Insights on antimicrobial resistance research in the COVID-19 pandemic

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Highlights:

- Antibiotics were excessively used in hospitalised COVID-19 patients.
- COVID-19 caused major disruptions to AMR surveillance and research.
- Global data on the use of antibiotics during the COVID-19 pandemic is needed.
- Antimicrobial resistance needs continued public and political engagement.

The COVID-19 pandemic is predicted to impact the transmission of bacterial infections and the emergence of antibiotic resistance (AMR). The likely positive influence on antibiotic resistance that social distancing, increased awareness and the use of interventions to prevent the transmission of COVID-19 has had could also be counteracted by the reported excessive use of broad spectrum antibiotics to treat patients infected with SARS-CoV-2. Antimicrobial stewardship programmes and AMR focussed research activities must remain active during
the COVID-19 and future pandemics, in order to safeguard against an uncontrolled rise in AMR.

**Antibiotic use in the COVID-19 pandemic**

The priority during the COVID-19 pandemic has been treating patients and avoiding acquisition of SARS-CoV-2 by healthcare personnel whilst maintaining functionality of the healthcare systems. Within healthcare, there has been a need to redirect personnel, resources and attention to COVID-19 diagnosis and management. AMR surveillance and screening programmes to detect colonisation by resistant organisms have been compromised due to shortage of personnel and the need to redirect molecular diagnostic platforms, reagents, tracking and tracing from AMR surveillance to COVID-19 diagnostics.

It has been reported that only 7-8% of hospitalised COVID-19 patients were diagnosed with a bacterial or fungal infection [1, 2, 3], while antibiotic use in COVID-19 patients has been considerably high: 71.9% (95% CI: 56.1-87.7) [3]. Further studies using molecular techniques on samples from ventilated and non-ventilated COVID-19 patients are needed. Whether new or evolving AMR in COVID-19 patients will emerge in areas with low previous rates should be examined in retrospective and prospective clinical and microbiology studies.

**Simultaneously managing the acute COVID-19 pandemic and escalating AMR**

COVID-19 has illustrated the vulnerability of our healthcare systems. This is even more noticeable in Low and Middle Income Countries (LMICs) and in resource-constrained settings less prepared to deal with pandemics or other emergencies [4-6]. Local, national and international scale resistance data is needed to help researchers better understand potential disruptions in stewardship and surveillance efforts, and highlight the early emergence of resistance due to antibiotic use linked to COVID-19 and secondary infections.

Co-managing multiple infectious disease threats simultaneously is a further challenge for LMICs. Laboratory infrastructure, surveillance and diagnostic capacity for both COVID-19
and AMR are often unreliable and infection prevention and control policies, practice and personnel are sub-optimal and, or, unsustainable [7]. Regulated antibiotic use is difficult to enforce where there is poor access to antibiotics overall, while socio-behavioural interventions such as physical distancing and hand hygiene can be limited, especially in areas with high population densities with limited access to clean water and sanitation services. Thus, an exit strategy from COVID-19 for many LMICs may not be pharmacologically based in the short term and more community-based strategies are currently being explored [8].

**Impact of the COVID-19 pandemic on AMR research**

A critical lesson from the COVID-19 pandemic is the importance of embedding research in the response. Supporting good quality implementation research could help understand not only what has worked, but also how and why an intervention was successful. While research on COVID-19 due to the pandemic has progressed, research in other fields including AMR has been deprioritised, delayed, or even halted. Delays limit scientists to meet deadlines and targets within projects, and restrict sharing of information and networking activities. Funding agencies across the globe have given research grant extensions; however, the long-term impact on AMR research is yet to be understood and factors such as the effect on early career researchers may take years to manifest. As solidarity pledges emerge to address COVID-19, so too must efforts to openly share research and data on AMR, including surveillance data from the pharmaceutical industry, as incentivised by the Access to Medicine Foundation’s AMR Benchmark. In order to ensure that AMR research continues to be adequately supported it is important to prioritise funds for AMR research at both national and international scales.

The COVID-19 pandemic has led to an unprecedented awareness of the importance of infectious diseases, clinical microbiology, and infection control. The AMR research
community is in an ideal position to raise the awareness of the topic of AMR and build on community engagement in the importance of sanitary infrastructures [9], handwashing, disinfection, social distancing when ill, and avoiding unnecessary use of antibiotics. Harnessing the public understanding of the relevance of infectious diseases towards the long-term pandemic of AMR could have major implications for promoting good practices about control of AMR transmission.
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CONFLICTS OF INTEREST

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ETHICAL APPROVAL

Not required,
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