

Monash University, Melbourne, VIC, Australia (AS)

- 1 Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *Lancet* 2022; **399**: 629–55.
- 2 Thomson KM, Dyer C, Feiyan L, et al. Effects of antibiotic resistance, drug target attainment, bacterial pathogenicity and virulence, and antibiotic access and affordability on outcomes in neonatal sepsis: an international microbiology and drug evaluation prospective substudy (BARNARDS). *Lancet Infect Dis* 2021; **21**: 1677–88.
- 3 Pezzani MD, Tornimbene B, Pessoa-Silva C, et al. Methodological quality of studies evaluating the burden of drug-resistant infections in humans due to the WHO Global Antimicrobial Resistance Surveillance System target bacteria. *Clin Microbiol Infect* 2021; **27**: 687–96.
- 4 Ackers L, Ackers-Johnson G, Seekles M, Odur J, Opi S. Opportunities and challenges for improving anti-microbial stewardship in low- and middle-income countries; lessons learnt from the maternal sepsis intervention in western Uganda. *Antibiotics (Basel)* 2020; **9**: 315.



Christopher J L Murray and colleagues<sup>1</sup> report on the dramatically high burden of antimicrobial resistance (AMR) worldwide, particularly in low-income and middle-income countries. The authors also emphasise the insufficient data on the prevalence of bacterial infections and AMR in low-resource settings. Although the figures presented are striking, they do not sufficiently depict the suffering of patients living in these locations and the frustration of clinicians unable to treat an infection that is typically easily curable elsewhere. As clinicians working in eastern Democratic Republic of the Congo, our fear is the imminent unavailability of active antibiotics.

Among the interventions commonly proposed to contain AMR, laboratory diagnosis is regularly depicted as a crucial but difficult-to-implement part of the solution. We do not share this fatalistic vision, and instead believe that Mini-Lab<sup>2</sup>, which we consider to be one of the most emblematic examples of reverse innovation, could be the way forward.<sup>3,4</sup> This self-contained, quality-assured, stand-alone clinical bacteriology laboratory, which was initially developed by Médecins Sans Frontières to facilitate

sepsis diagnosis in its fields of intervention, allows for the expansion of bacteriology testing to district hospitals. Because the Mini-Lab is based on unexpensive technologies,<sup>5</sup> it could make bacteriology tests affordable for patients. Along with individual care, the Mini-Lab could also contribute to AMR surveillance in rural areas and, ultimately, to the elaboration of antibiotic guidelines based on local epidemiological data.<sup>6</sup>

We ask public health authorities and international partners (eg, The Africa Centres for Disease Control and Prevention or the Foundation for Innovative New Diagnostics) to actively promote the evaluation of such small-scale laboratories in other low-resource settings. Such equitable access to laboratory diagnosis will make targeted antibiotic treatments at the district hospital level possible and will strengthen population confidence in the African health system. If action is not taken now, we will soon be back in the darkness of the pre-antibiotic era, with its health insecurity and social unrest.

We declare no competing interests.

Denis Mukwege, Prudence Mitangala, Aline Byabene, Emmanuel Busha, Yves Van Laethem,

\*Olivier Vandenberg

olivier.vandenberg@ulb.be

Department of Gynaecology and General Surgery (DM) and Department of Internal Medicine (AB), Panzi General Referral Hospital, Bukavu, Democratic Republic of the Congo; Faculty of Medicine, Evangelical University in Africa, Bukavu, Democratic Republic of the Congo (DM); Laboratoire Provincial du Nord-Kivu, Goma, Democratic Republic of the Congo (PM); Faculty of Medicine, Université Officielle de Ruwenzori, Goma, Democratic Republic of the Congo (PM); Faculty of Medicine, Université Libre des Pays des Grands Lacs, Goma, Democratic Republic of the Congo (EB); Samaritan Paediatric Centre/Samaritan Doctors, Goma, Democratic Republic of the Congo (EB); Department of Infectiology, Saint-Pierre University Hospital, Université Libre de Bruxelles, Brussels, Belgium (YVL); Centre for Environmental Health and Occupational Health, School of Public Health, Université Libre de Bruxelles, Brussels, Belgium (OV); Division of Infection and Immunity, Faculty of Medical Sciences, University College London, London, UK (OV); Innovation and Business Development Unit, Laboratoire Hospitalier Universitaire de Bruxelles–Universitaire Laboratorium Brussel, Université Libre de Bruxelles, 1000 Brussels, Belgium (OV)

- 1 Antimicrobial Resistance Collaborators. Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *Lancet* 2022; **399**: 629–55.
- 2 Natale A, Ronat JB, Mazoyer A, et al. The Mini-Lab: accessible clinical bacteriology for low-resource settings. *Lancet Microbe* 2020; **1**: e56–58.
- 3 Jacobs J, Hardy L, Semret M, et al. Diagnostic bacteriology in district hospitals in sub-Saharan Africa: at the forefront of the containment of antimicrobial resistance. *Front Med (Lausanne)* 2019; **6**: 205.
- 4 Natale A, Ronat J-B, Mazoyer A, et al. The Mini-Lab: accessible clinical bacteriology for low-resource settings. *Lancet Microbe* 2020; **1**: e56–58.
- 5 Ronat JB, Natale A, Kesteman T, et al. AMR in low-resource settings: Médecins Sans Frontières bridges surveillance gaps by developing a turnkey solution, the Mini-Lab. *Clin Microbiol Infect* 2021; **27**: 1414–21.
- 6 Tornimbene B, Eremin S, Escher M, Griskeviciene J, Manglani S, Pessoa-Silva CL. WHO Global Antimicrobial Resistance Surveillance System early implementation 2016–17. *Lancet Infect Dis* 2018; **18**: 241–42.

Christopher J L Murray and colleagues<sup>1</sup> evidence the global burden of antimicrobial resistance (AMR), which disproportionately affects low-income and middle-income countries (LMICs).

The strategic empowerment of pharmacy professionals (pharmacists and pharmacy technicians) in antimicrobial stewardship (AMS) remains an under-recognised and under-utilised AMR solution for LMICs. In particular, pharmacists across all sectors possess the capability (specialist knowledge of medicines), opportunity (contact with prescribers and patients), and motivation (professional commitment to the rational use of medicines) to promote AMS (appendix).<sup>2–5</sup> These professionals are, therefore, uniquely positioned to drive urgently required behaviour change in infection prevention and control practices and appropriate antimicrobial use.

Good practice examples by pharmacy professionals include, but are not limited to, optimising treatment of infections through good prescribing practices, educating health-care workers and patients on AMR and AMS, managing antimicrobial agents, surveilling antimicrobial use and consumption, administering and promoting vaccines,

See Online for appendix

For more about Mini-Lab see  
<https://fondation.msf.fr/en/projects/mini-lab>