Grading antimicrobial susceptibility data quality – room for improvement

Dear Editor,

We are writing in response to the systematic review of antimicrobial resistance in children in sub-Saharan Africa by Williams and colleagues. [1] The authors remark upon the poor quality of the studies included in their analysis but we would like to highlight specific concerns regarding the reliability of some of the antimicrobial susceptibility data. By our assessment only eight of the eighteen studies included had no detectable errors or non-compliances to the reporting standards stated to have been used. Examples include reporting amoxicillin susceptibility for *Klebsiella* spp., or gentamicin susceptibility for *Streptococcus pneumoniae* and *Salmonella* spp. (see Table). Identification of genuine meticillin resistant *Staphylococcus aureus* was problematic with discordant cloxacillin and cefuroxime susceptibility patterns in two studies, suggesting non-adherence to standard methods.

Currently, assurance of the quality of published microbiology data before publication is not based on any objective criteria, and the GRADE system is not designed to assess them. Microbiology data quality does not necessarily mirror the quality of study design. In this systematic review three studies assessed as low or very low quality (GRADE C or D) would be considered to be of high quality in terms of reliability of the microbiology results, in that they included a robust description of the methodology used which included confirmation of the presence of drug resistance genes.[2-4]

We propose that additional guidelines are needed to provide quality assurance of microbiological data before publication. The gold standard would be laboratory accreditation by the International Organization for Standardization (https://www.iso.org), but this is currently unrealistic for many laboratories, especially those in low- and middle-income countries. Quality improvement initiatives such as SLMTA (Strengthening Laboratory Management Toward Accreditation) and the World Health Organization's Laboratory Quality Stepwise Implementation Tool are supporting laboratories to raise standards. In the meantime, as a minimum we suggest publication should be conditional on reporting of methodology used, laboratory accreditation status, participation in external quality assurance schemes and verification of adherence to accepted standard methods for determining antimicrobial susceptibility (e.g. Clinical and Laboratory Standards Institute (CLSI), The European Committee on Antimicrobial Susceptibility Testing). Reviewers with expertise in microbiology should be able to identify inconsistencies in reporting.

Antimicrobial resistance is a complex issue and there is a general consensus it is getting worse. However there is substantial room for improvement in the quality of the microbiology data that are being published to support this position.

Yours faithfully,

Elizabeth A Ashley MRCP FRCPath, David A.B. Dance FRCPath, and Paul Turner FRCPCH FRCPath

References

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Table. Examples of unusual results or non-compliance with reported antimicrobial susceptibility testing standards in the included studies

Type of error or unusual result	**Number of studies [reference number in review[1]]**	**Example(s)**
Non-compliance with reported methodology for detection of resistance	2 [18,38] 2[28,29]	• Penicillin resistance in *Streptococcus pneumoniae* • Meticillin resistance in *Staphylococcus aureus*
Susceptibilities published for which there are no breakpoints according to the reporting guidelines used	5 [14,16,25,31,38] 3[16,32,38] 3[14,25,28,29] 1[26]	• Gentamicin susceptibility reported for *Salmonella* spp. • Gentamicin susceptibility reported for *Streptococcus pneumoniae* • Amoxicillin/co-amoxiclav/ 2nd generation cephalosporin susceptibility reported for *Pseudomonas* spp. • Amoxicillin/2nd generation cephalosporin susceptibility in *Acinetobacter* spp. isolates
Unexpected/unlikely susceptibility pattern reported (given known intrinsic resistance of organism)	4[25,26,28,29]	• Ampicillin or amoxicillin susceptibility reported for *Klebsiella* spp. isolates[1]

[1] A small number (<5%) of *Klebsiella* isolates may appear susceptible to amoxicillin in vitro. In general susceptibility testing is considered unnecessary and isolates should be reported as resistant (CLSI 2018). In one study 45/100 of isolates were reported as susceptible.[5]