

The AWaRe point prevalence study index: simplifying surveillance of antibiotic use in paediatrics



The rapid emergence of antimicrobial resistance is limiting our opportunities to treat infections. The global increase in antibiotic consumption and the shift towards the use of broad-spectrum antibiotics are key factors in the rise of antimicrobial resistance, suggesting an urgent need for curtailing their unnecessary and inappropriate use.^{1,2} In 2015, the World Health Assembly adopted a global action plan for the careful and responsible management of antibiotics. In 2017, the WHO Expert Committee on the Selection and Use of Essential Medicines updated the essential medicines list—categorising antibiotics into Access, Watch, and Reserve (AWaRe) groups according to their therapeutic profile and resistance potential.³ Many countries are in the process of developing antibiotic stewardship programmes according to the WHO recommendations, including establishing surveillance for antibiotic consumption. However, in low-income and middle-income countries (LMICs), infrastructure and resource limitations are impeding the progress of these programmes.⁴

Although surveillance of antibiotic consumption is a core component of antibiotic stewardship programmes; it is complex and best practice has not been established.⁵ Several metrics for antibiotic consumption are available, the most commonly applied being the defined daily dose, which represents the daily maintenance dose of a drug in a 70 kg adult (expressed with a population size denominator). The defined daily dose metric is of particularly limited use in paediatric populations for several reasons. Owing to the marked heterogeneity in height and weight, it is not possible to assume an average bodyweight in the paediatric population. Most drugs, including antibiotics, are unapproved for use in children and there are no licensed paediatric dosing recommendations.⁶ Furthermore, the wide availability of substandard and falsified drugs, including in acute care, in LMICs result in variation in dosing and efficacy.⁷

In *The Lancet Global Health*, Yingfen Hsia and colleagues report a cross-sectional AWaRe point prevalence survey (PPS) index that applies the WHO classification of antibiotics to provide a standardised process for mapping the usage of antibiotics in neonates and children in health-care settings.⁸ The study reports major differences

in the patterns of AWaRe antibiotic use, particularly in sepsis and lower respiratory tract infections and a high usage of the Watch category of antibiotics across the WHO regions and countries. Variation in stewardship programmes, shortage of resources, and difficulties in enforcing regulation on access to antibiotics in LMICs can result in greater use of broad-spectrum antibiotics.⁹ The widespread use of Watch antibiotics in many large and economically fast-growing countries such as India and Brazil is alarming.¹⁰ Fear of risk of treatment failure and influence of peers and senior colleagues, together with patient demands and expectations, can contribute to the overprescribing of broad-spectrum antibiotics in these settings.^{9,11} Thus, the inappropriate use of the Watch antibiotics is highest where the burden of antimicrobial resistance is greatest, and controlling the risk of its spread is most crucial where resource limitations impede sustainable implementation of infection prevention and control practices. Effective adoption of the AWaRe PPS index could help in monitoring antibiotic use in vulnerable populations in which surveillance and data has been scant, such as in children and neonates in LMICs.

Globally, a large proportion of children with suspected infection are treated in the outpatient setting.¹² Overprescription of antibiotics in paediatric outpatient departments is very common.¹² To reach its full potential, the AWaRe PPS index needs to be developed further to measure antibiotic consumption across paediatric inpatient and outpatient departments. Furthermore, linking the AWaRe PPS index to the crucial laboratory data to support the correct diagnosis of infection and evaluation of the appropriateness of the prescribed antibiotics is essential. A large multicentre community-based study from south Asia has reported that fewer than 15% of the WHO-defined neonatal sepsis cases are due to bacterial infection.¹³ According to the findings of that study, antibiotics have a minimum role in the treatment of over 85% of suspected neonatal sepsis cases diagnosed in hospital settings. Thus, it will be useful to also link the AWaRe PPS index to laboratory findings such as blood culture results or surveillance data for health-care-associated bacteraemia if available, to understand further the local epidemiology of antimicrobial resistance

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and antibiotic consumption.¹⁴ Health-care-associated infections are a substantial burden and threat to clinical outcomes as well as driving a large proportion of antibiotic use in hospitals. Ideally, to enable the evaluation of the appropriateness of the prescribed antibiotics, the AWaRe PPS index could potentially be linked to clinical diagnosis at the individual patient level.

Whereas the overuse of antibiotics is a concern, restricted access to essential antibiotics in LMICs is still a barrier to effective care. Poor access to affordable and quality-assured narrow-spectrum antibiotics might lead to prescribers choosing broader spectrum agents. For example, the availability of penicillin is restricted in India, with protracted phases of unavailability.¹⁵ Therefore, the value of the AWaRe PPS index will be augmented if it also indicated the availability of the different type of antibiotics in the respective health-care settings, to provide important background context.

The linkage of the AWaRe classification with an antibiotic PPS to create an antibiotic consumption index is a great step towards simplifying the mapping of antibiotic usage in paediatric populations, avoiding the complexities that prevent effective use of other antibiotic consumption measurement tools. This pragmatic approach could be instrumental in antibiotic stewardship programmes across different health-care economies, particularly in providing the much-needed data on antibiotic use in vulnerable paediatric and neonatal populations.

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- 1 Klein EY, Boeckel TP Van, et al. Global increase and geographic convergence in antibiotic consumption between 2000 and 2015. *Proc Natl Acad Sci USA* 2018; **115**: E3463–70.
- 2 WHO. WHO report on surveillance of antibiotic consumption. 2016–2018 early implementation. Geneva: World Health Organization, 2018.
- 3 WHO. The selection and use of essential medicines: executive summary. WHO Technical Report Series. Geneva: World Health Organization, 2017.
- 4 Cox JA, Vlieghe E, Mendelson M, et al. Antibiotic stewardship in low- and middle-income countries: the same but different? *Clin Microbiol Infect* 2017; **23**: 812–18.
- 5 Pulcini C, Binda F, Lamkang AS, et al. Developing core elements and checklist items for global hospital antimicrobial stewardship programmes: a consensus approach. *Clin Microbiol Infect* 2019; **25**: 20–25.
- 6 Liem TB, Heerdink ER, Egberts ACG, Rademaker CMA. Quantifying antibiotic use in paediatrics: A proposal for neonatal DDDs. *Eur J Clin Microbiol Infect Dis* 2010; **29**: 1301–03.
- 7 Grau S, Bou G, Fondevilla E, Nicolás J, Rodríguez-Maresca M, Martínez-Martínez L. How to measure and monitor antimicrobial consumption and resistance. *Enferm Infecc Microbiol Clin* 2013; **31** (suppl 4): 16–24.
- 8 Hsia Y, Versporten A, Yang Y, et al. Using the WHO Access, Watch and Reserve classification to define patterns of hospital antibiotic use (AWaRe): an analysis of survey data from 56 countries. *Lancet Glob Health* 2019; **7**: e861–71.
- 9 Charani E, Smith I, Skodvin B, et al. Investigating the cultural and contextual determinants of antimicrobial stewardship programmes across low-, middle- and high-income countries—a qualitative study. *PLoS One* 2019; **14**: e0209847.
- 10 McGettigan P, Roderick P, Kadam A, Pollock AM. Access, Watch, and Reserve antibiotics in India: challenges for WHO stewardship. *Lancet Glob Health* 2017; **5**: e1075–76.
- 11 Gebretekle G, Haile MD, Abebe W, et al. Opportunities and barriers to implementing antibiotic stewardship in low and middle-income countries: Lessons from a mixed-methods study in a tertiary care hospital in Ethiopia. *PLoS One* 2018; **13**: e0208447.
- 12 Joseph F, Oladele O, Oludare O, Olatunde O. Drug prescribing pattern for under-fives in a paediatric clinic in south-western Nigeria. *Ethiop J Health Sci* 2015; **25**: 73–78.
- 13 Saha SK, Schrag SJ, El Arifeen S, et al. Causes and incidence of community-acquired serious infections among young children in south Asia (ANISA): an observational cohort study. *Lancet* 2018; **392**: 145–59.
- 14 Timsit JF, Soubirou JF, Voiriot G, et al. Treatment of bloodstream infections in ICUs. *BMC Infect Dis* 2014; **14**: 489.
- 15 Kotwani A, Holloway K. Access to antibiotics in New Delhi, India: implications for antibiotic policy. *J Pharm Policy Pract* 2013; **6**: 6.