Be AWaRe: new metrics for paediatric antibiotic stewardship

Between 2000 and 2015, global antibiotic consumption increased by 65%. Although this increase was driven by use in lower-income and middle-income countries, the rapid increase in the use of last-resort antibiotics occurred across all countries.[1] The urgent need to improve use of antibiotics throughout health care includes the prerequisite to develop appropriate stewardship metrics in the outpatient setting. Realistic standardised measurement tools and indices to monitor the effect of broad national community interventions with regards to which paediatric-specific antibiotics should be targeted have not been described before.

In *The Lancet Infectious Diseases*, Yingfen Hsia and colleagues[2] used the WHO Access, Watch, Reserve (AWaRe) antibiotic categories to present a novel, pragmatic benchmarking strategy, using three metrics to evaluate national oral consumption of child-appropriate formulations (CAFs). The metrics are based on wholesale data for antibiotics from 70 countries. The authors generated in-depth information about country-specific patterns by describing, among all CAFs sold, the percentage of Access group use, amoxicillin use (amoxicillin index), and the relative use of Access and Watch antibiotics (access-to-watch index).

Recognising the need for practical tools for antibiotic stewardship at national and international levels, and to encourage use of narrower-spectrum antibiotics, WHO updated the Model List of Essential Medicines for Children (EMLc) in 2017.[3,4] Three categories of antibiotics used for empiric treatment were established. Access (first-choice and second-choice antibiotics that are generally narrow spectrum with less resistance potential—eg, amoxicillin), Watch (antibiotic classes with broader spectrum and hence resistance potential—eg, fluoroquinolones and macrolides), and Reserve (last-resort option antibiotic classes, which should require the highest level of monitoring).

The relative proportions of each antibiotic group used forms the basis of the AWaRe index proposed previously[4] by the same authors. The intention is that stewardship programmes will prioritise the use of first and second empiric choice antibiotics—ie, those in the Access group—for the management of infection syndromes described in the EMLc. The strategy should result in fewer Watch and Reserve class antibiotics being used globally. Evidence for classifying specific antibiotics and classes into the three categories is relatively weak. Specific challenges remain; particularly, how to interpret unclassified antibiotics such as fixed-dose combinations that are not currently included, but which comprise a substantial percentage of antibiotic use in some countries.[5]

The median access percentage among 70 countries was 76·3% (IQR 62·6–84·2), confirming the key role of this antibiotic group in treating young children globally. However, in a quarter of countries, Watch antibiotics accounted for over a fifth of total consumption and the amoxicillin index was low (median 30·7%, IQR 14·3–47·3). Notably, China and India, the two most populous countries, were among those with the lowest access percentage, the highest watch percentage, and considerable use of unclassified antibiotics.

Given the complexity and resources required to determine paediatric age-specific and indication-specific antibiotic use, dosing, and duration determinants, and other outpatient prescribing quality indicators, without universal national electronic health records, in our opinion Hsia and colleagues have provided a comprehensible picture of the general trends of global community childhood antibiotic prescribing across different countries. Despite many limitations, including measuring sales volume reported in standard units rather than conventional population-based standardisation consumption, these three metrics together might serve as a simple index or measure of antibiotic selection pressure for resistance at the community level. Health-care professionals should easily understand the concept. Furthermore, because amoxicillin is the first or second choice treatment for most infection syndromes in children younger than 5 years, targets could be set for all three metrics, but particularly for the amoxicillin index.

Although a novel standard of measurement such as the AWaRe metrics might facilitate benchmarking of outpatient antibiotic use, similar to the new standardised antimicrobial administration ratio for in-hospital use,[6] the AWaRe metrics are not a definitive measure of inappropriate use. Rather, they highlight areas for initiating further investigations and potentially identifying intervention strategies to expand the access index and amoxicillin index in children.

Outpatient antimicrobial stewardship is a novel area for improvement and optimal metrics of antimicrobial use in this setting are unknown. The first laudable attempt to develop simple metrics of global child community antibiotic use, based on the WHO AWaRe classification, is a necessity that was until now a challenge in most lower-income and middle-income countries.[7]

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We declare no competing interests.

1   Klein EY, Van Boeckel TP, Martinez EM, et al. Global increase and geographic convergence in antibiotic consumption between 2000 and 2015. *Proc Nat Academy Science* 2018; **115:** E3463–70.

2   Hsia Y, Sharland M, Jackson C, Wong ICK, Magrini N, Bielicki JA. Consumption of oral antibiotic formulations for young children according to the WHO Access, Watch, Reserve (AWaRe) antibiotic groups: an analysis of sales data from 70 middle-income and high-income countries. *Lancet Infect Dis* 2018; published online Dec 3. http://dx.doi.org/10.1016/S1473-3099(18)30547-4.

3   WHO. WHO model list of essential medicines for children (6th list). Geneva: World Health Organization, 2017.

4   Sharland M, Pulcini C, Harbarth S, et al. Classifying antibiotics in the WHO Essential Medicines List for optimal use—be AWaRe. *Lancet Infect Dis* 2018; **18:** 18–20.

5   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.

6   van Santen KL, Edwards JR, Web AK, et al. The Standardized Antimicrobial Administration Ratio: a new metric for measuring and comparing antibiotic use. *Clin Infect Dis* 2018; **67:** 179–85.

7   Schellack N, Benjamin D, Brink A, et al. A situational analysis of current antimicrobial governance, regulation, and utilization in South Africa. *Int J Infect Dis* 2017; **64:** 100–06.