

mHealth and a blended learning approach to antimicrobial stewardship in Abia State: A case study

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The inappropriate use of antibiotics both in health facilities and in the community contributes to the rising prevalence of antimicrobial resistance (AMR) globally (1). AMR often affects cancer patients more because of their compromised immunity. Infections with drug-resistant organisms are known to be associated with poor clinical and economic outcomes in drug therapy (2,3). Up to 22% of Nigerian health-care providers misuse antibiotics in the treatment of malaria, while 46% of parents wrongly use antibiotics for upper respiratory tract infections (3). The use of mobile applications for health (mHealth) as part of antimicrobial stewardship programmes (ASP) to support antibiotics decisions by clinicians is beneficial, but this practice is not common in Nigeria (4). This case study describes the innovative use of mHealth, blended for a multidisciplinary ASP initiative in Nigeria.

The Abia Cancer Control Group (ACCG), a consortium of clinicians, hospitals, academics and non-governmental organizations, has been leading efforts to improve outcomes for cancer patients locally. Using their successful model of an online cancer reporting system, ACCG collaborated with Canadian Firstline to deploy the Abia Antibiotic Guidelines. This provided point-of-care information on antibiotic choices to clinicians. The guidelines were developed by a multidisciplinary team including physicians, pharmacists, nurses and laboratory scientists. Also, the group developed the android-based *Bugs n Drugs* mobile application to report antimicrobial susceptibility testing (AST) from local laboratories and to document antibiotic prescriptions from clinicians.

Bugs n Drugs was developed following extensive testing by local clinical and laboratory experts. Data from the app were designed to be used in creating a local antibiogram that would inform the antimicrobial recommendations provided through Firstline. Before the development of *Bugs n Drugs*, the only publicly available software to document AST was the WHO Windows-based WHONET software. The use of WHONET was limited in Nigeria as it was desktop-based and required a stable power supply to operate sustainably, as compared to the smartphone-based *Bugs n Drugs*.

Following the deployment of Firstline and *Bugs n Drugs*, ACCG organized a multidisciplinary, asynchronous, blended learning course to train clinicians on antimicrobial stewardship and how to use the apps. The online component was delivered through Google Classroom while in-person workshops

were organized to practise clinical skills relevant to ASP. Standardized patients were used during the workshops to simulate different clinical conditions, such as upper respiratory tract infections during cancer treatment. This approach helped providers to improve their competence and confidence in making antibiotic-related decisions, as well as master the use of both applications. Course participants self-registered from across Nigeria.

Outcome

Data from 160 patients, with an average age of 34.82 (± 15.45) years and mostly from the outpatient setting (85%, 136/160), were used in the pilot project. Organisms with high susceptibility (i.e. $\geq 50\%$) were *N. gonorrhoea* (Cephalexin = 100%), *E. coli* (Ampicillin-cloxacillin = 50%) and *S. aureus* (Erythromycin = 50%). Figure 1 shows the pattern of resistance.

Antibiotics with the widest spectrum of cumulative sensitivity were Amoxicillin-Clavulanate (i.e. Augmentin, six out of eight organisms) and Levofloxacin (five out of eight organisms). With the support of Firstline, the proportion of participants who chose to prescribe antibiotics for upper respiratory tract infections or malaria decreased by 22% and 18%, respectively, as shown by the trendline in Figure 2.

Discussion

This project sought to empower participants with knowledge and tools that will improve ASP in Abia State. The results showed that the mHealth approach involving Firstline and *Bugs*

Figure 1: Trends in resistance by drug classification in Abia State

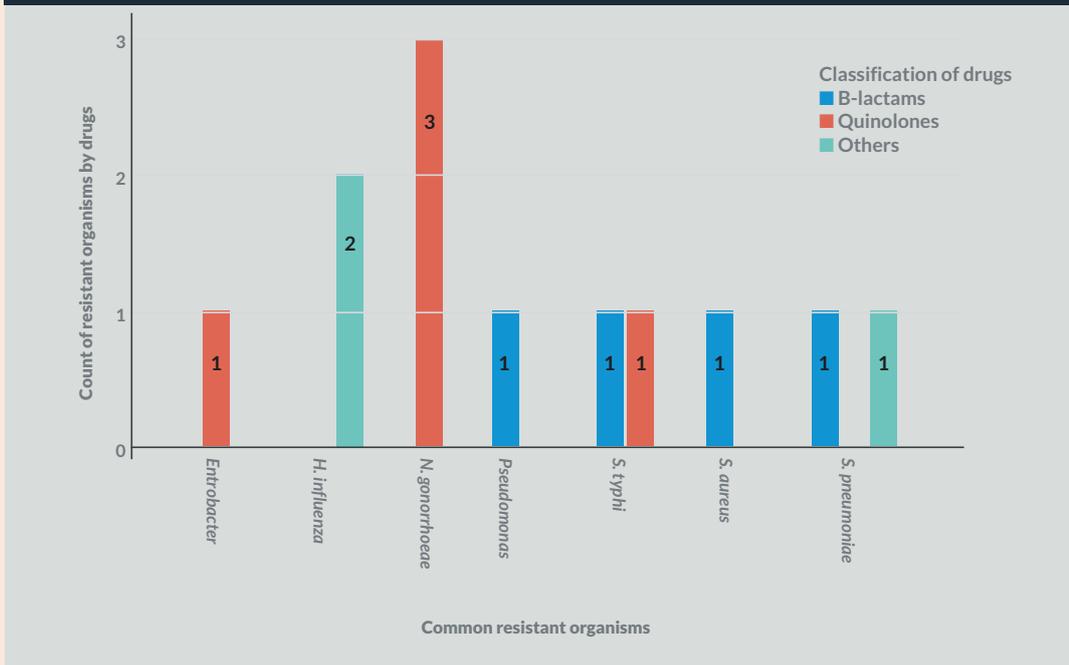
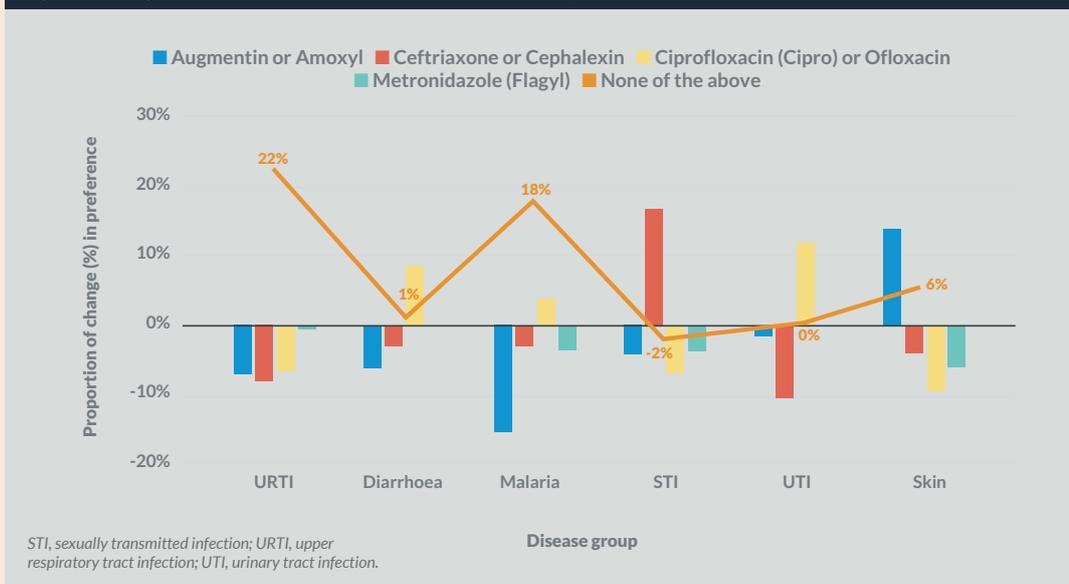


Figure 2: Change in antibiotics preference for common conditions, Abia 2020



n Drugs helped to improve the pattern of appropriate antibiotic use by health-care providers. Collaborative community engagement is being used to expand the use of Bugs n Drugs and Abia antibiotic guidelines through Firstline. Funding is required to sustain this innovative project. ■

References

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Useful links

- Abia Antimicrobial Guideline on Firstline: <https://app.firstline.org/en/clients/297-nigerian-christian-hospital> or <https://bit.ly/3zHM7hZ>
- Abia Antimicrobia Guideline download link: <https://drive.google.com/file/d/12ysV1k7ePSyD-p9HOJre6QQZMOFvXkt/view?usp=sharing>
- Bugs n Drugs App: <https://play.google.com/store/apps/details?id=com.majoriebash.bugsndrugs> or <https://bit.ly/3biSFub>