Project Title

ABxSG mobile application: All about Antimicrobials at your Fingertips

Project Lead and Members

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Organisation(s) Involved

Singapore General Hospital

Healthcare Family Group(s) Involved in this Project

Allied Health, Healthcare Administration, Medical

Applicable Specialty or Discipline

Pharmacy

Project Period

Start date: March 2022

Completed date: December 2023

Aims

ABxSG aims to bring pertinent antimicrobial prescribing information to the fingertips of the clinicians with the goal to improve appropriate antimicrobial prescribing. ABxSG was launched in March 2023.

Background

See poster appended/ below

Methods

See poster appended/ below

Results

See poster appended/ below

Conclusion

ABxSG has proven to be an innovative solution to reduce the proportion of inpatients prescribed with antibiotics. Additionally, the number of antibiotic related interventions made by pharmacists has reduced, suggesting that antibiotics are more appropriately prescribed.

In this digital age, it is important to leverage on innovative digital solutions to engage, educate and empower clinicians. ABxSG will continue to expand its content to enhance its capabilities in providing customized information, adopted to local practice to drive antimicrobial stewardship efforts to combat rising bacterial resistance and improve patient outcomes.

Project Category

Technology

Mobile Health, Digital Apps

Digitalisation, Digitisation

Keywords

Antibiotic use, Antimicrobial app

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ABxSG mobile application
All about Antimicrobials at your Fingertips

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INTRODUCTION

It is well-known that prevalent antibiotic use drives antibiotic resistance, limits treatment options and increases healthcare costs. Based on current projections on rising resistance rates, there will be 10 million people dying annually from infections due to resistant bacteria, costing up to US$100 trillion by 2050[1].

50% of SGH inpatients are prescribed antimicrobials – higher than Europe/North America (<40%) and on par with Africa[2]. Audits conducted by SGH Antimicrobial Stewardship Unit (ASU) show that approximately 20% of antibiotic prescriptions are inappropriate. Hence, antimicrobial stewardship efforts must continue to push boundaries and integrate innovative solutions into prescribing workflows to combat inappropriate antibiotic prescribing.

In 2020, 100% of doctors surveyed at SGH expressed that they prefer accessing hospital-based guidelines through a mobile application to save considerable time seeking out advice from internet or calling fellow doctors/pharmacists. 97.5% of them stated that they would prescribe antibiotics more confidently with a mobile application, which would lead to less work frustration and improve job satisfaction.

INNOVATIVE SOLUTION

SGH ASU developed the ABxSG mobile application in collaboration with the SingHealth Office of Digital Strategy (ODS), Axrail (vendor), Synapxe (system integrator), and with inputs from SKH and CGH ASU. ABxSG aims to bring pertinent antimicrobial prescribing information to the fingertips of the clinicians with the goal to improve appropriate antimicrobial prescribing. ABxSG was launched in March 2023.

Information includes:
- hospital-based prescribing guidelines
- drug monographs with commonly-used medical calculators for dosing customization,
- evidence-based clinical pearls to help clinicians better manage common infective conditions (e.g. types of monitoring parameters to ensure safety and efficacy of the antibiotics).

The information will be regularly reviewed by ASU and updated with the latest evidence available from international resources.

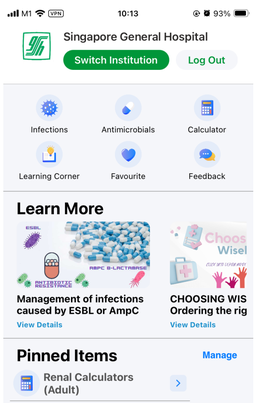

Figure 1: Landing page of ABxSG

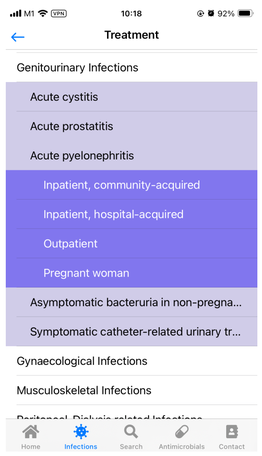

Figure 2: Prescribing guidelines based on body system and indication

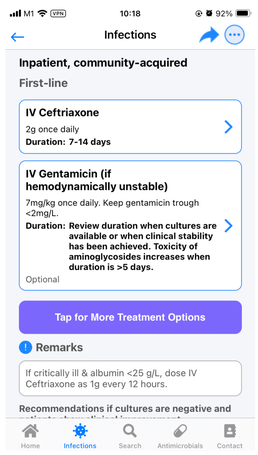

Figure 3: Prescribing guidelines for inpatient, community-acquired pyelonephritis

Figure 4: Drug monograph for Amikacin

Figure 5: Vancomycin therapeutic drug monitoring calculator

Figure 6: Clinical pearls on procalcitonin to guide antibiotic use in acute pancreatitis

METHODOLOGY FOR ANALYSIS OF RESULTS

We conducted an interrupted time series analysis using autoregressive integrated moving average model with an autoregressive term of 1 to adjust for any possible auto-correlation of data over time (IBM SPSS Statistics for Windows, Version 20.0), to evaluate the impact of ABxSG on the proportion of inpatients on antibiotics and the number of antibiotic-related interventions by inpatient pharmacists. The time-period analysed included 1-year before (Mar-2022 to Feb-2023) and 9-months after (Apr-2023 to Dec-2023) ABxSG launch.

RESULTS

Proportion of inpatients on antibiotics

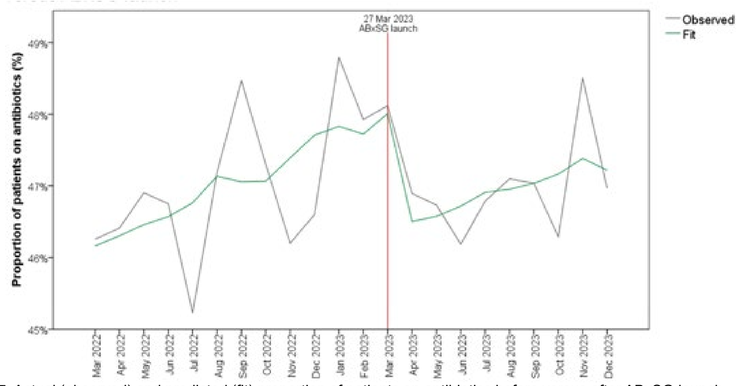

Figure 7: Actual (observed) and predicted (fit) proportion of patients on antibiotics before versus after ABxSG launch

At baseline, the proportion of inpatients on antibiotics was rising at 0.15%/month. Post-launch, there was trend towards slowing down of the increase in proportion of patients on antibiotics. At 9-months, there was an estimated reduction of 2.83% of patients on antibiotics (p=0.09).

Antibiotic-related interventions performed by inpatient pharmacists

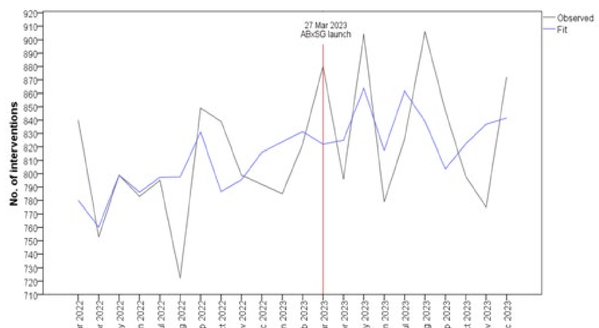

Figure 8: Actual (observed) and predicted (fit) number of interventions by inpatient pharmacists before versus after ABxSG launch

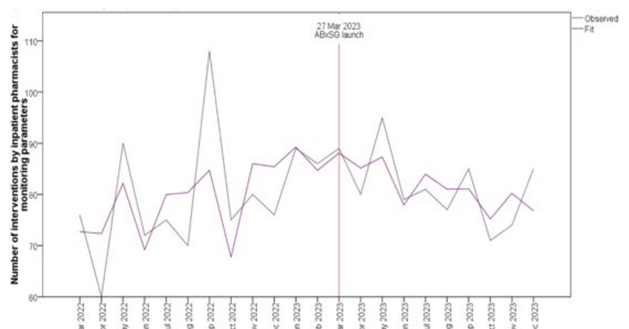

Figure 9: Actual (observed) and predicted (fit) number of interventions for monitoring parameters by inpatient pharmacists before versus after ABxSG launch

Before launch, there was a small increase of 3.6 inpatient pharmacists' interventions per month (Figure 8), but this trend was reversed after ABxSG launch (p=0.21). At 9-months, there was a decrease of 70 interventions (p=0.30). This suggests that ABxSG reduced the number of interventions by almost 10%.

For interventions related to monitoring parameters (Figure 9), there was an increase of 1.26 interventions per month at baseline, but this trend was reversed after launch (p<0.05). At 9-months, there was a reduction of 37 interventions (p<0.05). This suggests that ABxSG has reduced the number of interventions for monitoring parameters by nearly 50%.

DISCUSSION

ABxSG was well received by clinicians. It was downloaded by 1,335 users within 1 month of launch, and after 9 months there were a total of 2,396 downloads.

Being better equipped with guideline and e3ducation materials on the go, we postulate that clinicians are more likely to be proactive in stopping antimicrobials when patient has completed sufficient duration or holding off antimicrobials when patient's symptoms and/or investigations are not suggestive of an infection, leading to a significant reduction in proportion of patients on antimicrobials.

At 9-months, the reduction of 2.83% in proportion of inpatients on antibiotics translates to an approximate reduction of 600 patient-days on antibiotics in a month, which is a clinically significant outcome. There is an estimated savings per month of nearly $50,000 in intravenous antibiotics and infusion kit use along with an estimated 540 hours of nursing time saved.

We also observed that ABxSG reversed the up-trending number of antibiotic-related interventions and postulate that with improved accessibility to the in-house guidelines, prescribers are better equipped to prescribe more appropriately, and hence fewer interventions are performed. At 9-months post-launch, there was a reduction of about 10%, potentially freeing up 23 hours a month of pharmacists' time.

Among the many types of interventions made, a significant reduction in interventions pertaining to monitoring parameters was observed after the launch of ABxSG. With better accessibility to guidelines including IV vancomycin therapeutic drug monitoring guidelines and drug monographs highlighting common side effects or drug interactions, we believe that prescribers are more cognizant to order up the necessary monitoring parameters.

CONCLUSION

ABxSG has proven to be an innovative solution to reduce the proportion of inpatients prescribed with antibiotics. Additionally, the number of antibiotic related interventions made by pharmacists has reduced, suggesting that antibiotics are more appropriately prescribed.

In this digital age, it is important to leverage on innovative digital solutions to engage, educate and empower clinicians. ABxSG will continue to expand its content to enhance its capabilities in providing customised information, adopted to local practice to drive antimicrobial stewardship efforts to combat rising bacterial resistance and improve patient outcomes.

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