Using audit and feedback to encourage primary healthcare prescribers to record indications for antimicrobial prescriptions: a quality improvement initiative

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INTRODUCTION

In many countries, most antimicrobial use for human consumption occurs in primary healthcare (PHC), making this sector an important focus for antimicrobial stewardship (AMS). It is important to know the indications for antimicrobial use to design targeted AMS interventions. Studies have shown that approximately 15% of PHC-associated antimicrobial prescriptions in England and 18% of ambulatory care-associated antimicrobial prescriptions in the USA lack a documented indication. Locally, in Regina, Saskatchewan, Canada, we have seen that the proportion of undocumented indications can be much higher among PHC prescribers, although there is a paucity of data to determine how this compares among other Canadian jurisdictions.

Audit and feedback is a well-documented tool for improving clinical practice. The COM-B model of behaviour (Capability + Opportunity + Motivation = Behaviour) provides the rationale for our approach to behaviour change. That is to say, providing PHC prescribers with information about their clinical performance allows those with a low percentage of documented indications to become aware of this discrepancy in their practice (opportunity for change). Comparing their own performance against that of their peers (or a benchmark goal) may provide the motivation to perform better. These factors, combined with the capability of individual prescribers to increase their proportion of documented indications, allow for a change in behaviour.

For this quality improvement project, we used audit and feedback to provide PHC prescribers with information about the proportion of their monthly antimicrobial prescriptions that included a documented indication in the electronic medical record (EMR). The goal was to increase the proportion of antimicrobial prescriptions with documented indications in order to design more targeted AMS interventions.

METHODS

Context

Regina, Saskatchewan is a community of approximately 258,000 people. There were 11 clinics (approximately 74 prescribers) involved in this quality improvement project including both privately owned and academic-affiliated family clinics in Regina and the surrounding area. Clinic locations were a mixture of urban and rural settings with reimbursement models including fee-for-service and salary-based or daily-based payments. All clinics used the same EMR (MedAccess, Telus Health) instance owned by the provincial Saskatchewan Health Authority (SHA). Members of the SHA’s Stewardship and Clinical Appropriateness and Digital Health Departments (research scientist and analysts) were responsible for collecting, analysing, and communicating the data to the clinics via email at monthly intervals. The AMS Programme in Regina (a programme within the Stewardship and Clinical Appropriateness Department) has been operating since June 2016 and has had an active role working with PHC clinics to improve antimicrobial prescribing including activities such as development of an audit and feedback dashboard for antimicrobial prescribing, promotion of clinical tools to improve antimicrobial prescribing, and other quality improvement and research projects.
Hello,

Please see the attached Excel file for distribution to prescribers in your clinics. If anyone has questions about their data or requires their code, please have them email XXXX@saskhealthauthority.ca. Thank you.

**Interventions**

At the beginning of each month, the number of antimicrobial prescriptions and their associated indications for the previous month were retrieved from the EMR. All prescriptions >14 days, renewed prescriptions, and prescriptions from residents/learners and ‘non-steady’ locum physicians were excluded. Data were presented in Microsoft Excel as a time series graph showing the monthly percentage of antimicrobial prescriptions with a documented indication for each prescriber, starting in March 2020—August 2021. The orange line in the line graph represents the minimum target of 80% of antimicrobial prescriptions with a documented indication.

**Figure 1** Example of the monthly email and data sent to clinics for audit and feedback. Emails with attached Excel files were sent to a contact in each clinic who distributed the files to prescribers within their clinics. The Excel file included a filter allowing prescribers to select their individual number to view their percentage of indications over time (line graph) and the number of antimicrobial prescriptions compared with the number of indications for those prescriptions (histogram) each month. The orange line in the line graph represents the minimum target of 80% of antimicrobial prescriptions with a documented indication.

**Figure 2** Upward trend in the percentage of antimicrobial prescriptions with indications. The data in this control chart highlight an upward trend (green data points indicate an unstable trend in the preferred direction) in the postintervention data (i.e., following a process change). Prior to the intervention, 21.4% of prescriptions had a documented indication (blue line; January 2019–February 2020). Following the initiation of the monthly audit and feedback report, the monthly percentage of indications increased and the postintervention average was 37.8% (March 2020—August 2021). Red and green data points indicate unstable points and trends identified by the software (QI Macros, KnowWare International). CL, central line; LCL, lower control limit; UCL, upper control limit.
RESULTS

During our intervention period, the total proportion of indications provided with antimicrobial prescriptions increased from a preintervention average of 21.4%–37.8% (figure 2). Using a mixed effects logistic regression model, with individual prescribers as a random effect and the intervention period as a fixed effect, the postintervention period had 3.0 (95% CI 2.7 to 3.4) greater odds of having prescriptions with recorded indications compared with the preintervention period. Figure 3 shows the differences in preintervention and postintervention proportion of prescriptions with indications among prescribers with at least ten antimicrobial prescriptions in each period. Prescribers with fewer than ten prescriptions were excluded from the figure 3 analysis to eliminate large variations in the percentage of indications based on a low number of prescriptions. Additionally, prescribers with so few prescriptions may be less likely to remember to include indications with antimicrobial prescriptions compared with those who prescribe antimicrobials more frequently.

DISCUSSION

Unfortunately, our audit and feedback intervention launched just as the COVID-19 pandemic caused clinic closures and gathering restrictions in our area. As a result, we had to modify the original rollout plan (which included in-person meetings with clinics to introduce the EMR changes, re-engage prescribers in discussions about AMS and the importance of including indications with prescriptions, and then launch the audit and feedback intervention. Unfortunately, by the time we were able to begin this work in the spring of 2020, COVID-19 had reached Saskatchewan and we had to shift to email communication.

Analysis

Analysis for this manuscript includes statistical control charts, logistic regression and descriptive statistics. For these analyses, additional prescribing data were included for 2019 (2019 data were not included in the data presented to prescribers). Prescribers did not have to provide informed consent to participate and they were aware of the collection of antimicrobial prescribing data as this had been ongoing operational work as part of regular AMS Programme activities. No patient information was collected. It was not appropriate to involve patients or the public in this project. This manuscript is formatted according to SQUIRE 2.0 guidelines.
The EMR system itself was another factor in this project, as prescribers’ workflow with respect to when an indication would be entered did not align with the workflow in the EMR. An earlier component of this intervention included a standard work document that was made available to prescribers to inform them of the proper procedure for entering prescription information. In addition, the EMR vendor applied a change which ensured the indication was included with the prescription when it was sent to the pharmacy, which provided further motivation for prescribers to include this information in the correct field in the EMR. Providing another reason for prescribers to properly enter an indication is important because, according to the COM-B model, motivation is a key aspect of behaviour change.8

As seen in figures 1 and 3, the intervention has not been uniformly successful across all prescribers. There are several factors that could affect uptake and behaviour change with this initiative. We cannot be certain that the monthly emails are being forwarded to prescribers in each clinic or that every prescriber is reviewing their data. Not all prescribers have reached out to receive their code, indicating some are likely not reviewing their data. Different clinics had varying levels of engagement with the AMS Programme prior to the pandemic, which may also play a role in uptake of this initiative among prescribers. These factors will be addressed in the future using the evidence outlined by Ivers et al (eg, engaging with a clinic AMS champion, providing feedback in person as well as virtually),7 however, modifications to the audit and feedback strategy are currently on hold due to the limited availability of prescribers as the pandemic continues to affect healthcare resources.

One limitation to this study is the difficulty deciphering the degree of impact attributed to the audit and feedback on its own. The AMS Programme worked with the clinics for several years prior to this specific intervention, including reviewing prescribing data, implementing tools, and discussing the prescribers’ role in AMS. It is possible that some behaviour change may be attributed to previous work, although as seen in figure 2, the major increase in the percentage of antimicrobial prescriptions with indications coincides with the implementation of the audit and feedback initiative.

In conclusion, despite the limitations imposed by the COVID-19 pandemic, our data suggests our audit and feedback intervention helped increase the number of indications documented with antimicrobial prescriptions in PHC clinics. Future work will endeavour to further increase the percentage of documented indications and improve this metric for all prescribers. A better understanding of the indications for antimicrobial use will allow the AMS Programme to design more targeted future interventions.

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Contributors JRV, SP, DP and RP conceived the study; JRV and SP performed the intervention. CH supported the roll out and technical aspects of the intervention. WB and MLD performed the statistical analyses. All authors reviewed the final manuscript.

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