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Title: Antimicrobial Physician and Pharmacist Experience and Perception of an Antimicrobial Self-Stewardship Time-Out Program (SSTOP) Intervention at 8 Veterans Affairs Medical Centers

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Abstract**Word count: 47/50**

Objective: We explored experiences and perceptions surrounding the SSTOP intervention across implementation sites to improve antimicrobial use. Semi-structured qualitative interviews were conducted with Antibiotic Stewardship physicians and pharmacists. Five key themes emerged and suggest SSTOP may serve as a way to achieve sustainable promotion of antibiotic use improvements.

Introduction

Antimicrobial Stewardship Programs (ASPs) that combine education, clinical guidelines, decision support, restrictions on antimicrobial use, and interventions to change antimicrobial therapy can reduce antibiotic resistance and improve patient outcomes.¹ Continued development of effective implementation strategies to achieve sustainable improvements in antibiotic prescribing is needed.²

Concerns about the consequences of inadequately treated infection often prompt initiation of unduly broad-spectrum and unneeded therapy antimicrobial therapy prior to the availability of microbiological or other data to substantiate infection diagnosis.³⁻⁴ Antibiotic Timeouts, in which a reassessment of the continued need for continuation of initial antibiotic selection are undertaken when more diagnostic information is available,⁵⁻⁶ are one CDC-recommended antibiotic stewardship intervention.

The Antibiotic Self-Stewardship Time Out Program (SSTOP) evaluated the implementation at Veterans Affairs Medical Centers (VAMCs) of an “Antibiotic Timeout” intervention.⁶ Based on dual process theory⁷, the SSTOP intervention requires providers to undertake a deliberative consideration of specific criteria before continuing therapy. Assisting the increased cognitive effort, SSTOP provides patient-specific decisional support by supplying clinical and microbiological information and links to educational guidelines. We assessed ASP physician and pharmacist experiences surrounding the SSTOP intervention across implementation sites.

Methods:

SSTOP Intervention

SSTOP introduced an automated templated note embedded in the Electronic Health Record to prompt providers to review continued use of anti-methicillin resistant *S. aureus* (MRSA) therapy (i.e., vancomycin) and anti-pseudomonal beta-lactam therapy three days after the initiation of antibiotics. SSTOP provided decisional support via an Antibiotic Dashboard that included a summary report of integrated clinical and laboratory data to assist in determining whether and how to adjust antibiotic therapy after three days of treatment. Facility-level quarterly reports on antibiotic de-escalation rates and usage of targeted antibiotics were provided to ASP physician and pharmacists.⁸

Setting and participants

ASP physicians and pharmacists were identified at each site and invited to participate by email. In-person site visits and individual semi-structured interviews with ASP physicians and pharmacists (i.e., ASP champions) were conducted at 8 VAMC facilities from January 2019-January 2021.

The study consent process and procedures were approved by the VA Central Institutional Review Board (CIRB# 18-03) and Research and Development Committee at the Greater Los Angeles VA Health Care System.

Study Design

We iteratively designed interview guides for pre-implementation interviews (existing stewardship programs) and for post-implementation interviews (implementation process and challenges) [Appendix 1]. Interviews were conducted via phone or video conference by the qualitative lead (JB), audio-recorded, and transcribed.

Data Analysis

Transcripts were uploaded into MAXQDA, a qualitative data program (VERBI Software, Berlin, Germany). We performed thematic content analysis via consensus-based inductive and deductive coding⁹ [Appendix 2]. Our analysis team included experienced qualitative researchers (CCG, JJ, JB) with antimicrobial stewardship expertise.

Thirteen percent of transcripts were coded via group consensus (CCG, JJ, JB) a process that involved all team members coding transcripts prior to meetings where the final coding consensus was entered into MAXQDA during group discussion. The remaining 87% were coded by paired members of the analysis team (CCG, JJ). Discrepancies were resolved by the qualitative lead (JB) and/or the PI (MBG).

Results

SSTOP process and timeline are shown in Figure 1. Thirteen pre-intervention and eighteen post-intervention interviews were conducted with ASP physicians (n=7) and pharmacists (n=8) champions. Two sites were unable to launch the note templates due to lack of resources, however they utilized other SSTOP tools and participated in interviews.

Pre-implementation responses informed implementation by identifying perceived intervention barriers and facilitators. Pre/post-implementation barriers and facilitators were similar; thus, this study focuses on the findings related to SSTOP note template feedback, challenges, and opportunities.

Five primary themes emerged. Representative quotations are presented in Table 1.

Theme 1: SSTOP intervention was perceived as valuable and straightforward. Feedback from ASP champions suggests prescribers were critical of aspects of the note template, but overall liked the note template process and deemed it to be straightforward. ASP champions perceived that many providers valued the note template, indicating it was helpful in both

thinking about antibiotics prior to initiation, and for identification of appropriate antibiotics.

The data feedback reports developed and distributed by the SSTOP team allowed sites to see the intervention in action. Comparative rankings motivated sites to view their reports and compare their antimicrobial use. Several sites indicated their intent to continue using the SSTOP templates after study completion.

Theme 2. Strong existing stewardship and local culture facilitated SSTOP implementation.

Facilitators of successful implementation included pre-existing strong stewardship support, participation of local champions (e.g., Infectious Disease (ID) Fellow), and implementation setting (e.g., medicine service). Implementing the templates first in a setting led by a group of clinicians of low resistance helped ensure template success.

Theme 3. Implementation barriers included staff turnover (e.g., rotating residents), service level support (i.e., surgery service), insufficient information technology (IT) support, and the need to remind providers to use the template.

Many facilities involved in the SSTOP intervention were academic/teaching institutions, thus as each new set of residents rotated through their facility extra time/effort was required to ensure everyone was educated on the SSTOP templates and protocols. Installing the SSTOP templates required access and support of clinical applications coordinators (CACs) at each site. Some sites lacked steady access to this resource and therefore experienced challenges and delays in SSTOP implementation. The primary perceived barrier to SSTOP template utilization was lack or loss of a local champion to ensure that the template was completed.

Theme 4. Recommendations largely centered on enhancing note template usability and SSTOP feedback reports (e.g., inclusion of patient/provider-level data). Sites offered suggestions to improve note template usability, such as having an open text field embedded within the note and including provider-level antimicrobial use in feedback reports.

Theme 5. COVID-19 impacted clinical practice and SSTOP implementation. All sites reported that high volumes of COVID-19 cases were a significant challenge. Specific pandemic-related barriers included reduction of stewardship activities such as regular MRSA screening practices, weekly stewardship rounds, and stewardship committee planning as well as changes in workflow due to staff working from home and staff being pulled into multiple directions (e.g., writing COVID-19 policies) thereby complicating the implementation of SSTOP.

Discussion

We identified facilitators, barriers, and COVID-19's impact on SSTOP implementation and related antibiotic stewardship activity.⁷ SSTOP note templates were considered generally valuable and straightforward (Theme 1). Dual Process Theory—a meta-theory explaining one's motivation, attention, and decision-making— was used to design the SSTOP tools to direct clinicians toward System 2 thinking – rule-based, deliberative cognitive processing – while facilitating development of more stewardship-friendly automatic System 1 thinking supporting patterns of thought and behavior that will make appropriate stewardship more intuitive.⁹ As in our prior work, clinicians using SSTOP templates explicitly reported their cognition was guided by use of the templates.⁷

Implementation was facilitated (Theme 2) by local champions and a strong culture of stewardship. Conversely, barriers to implementation (Theme 3) included the complex mission of

facilities with roles in education/training and IT support issues (e.g., coordination with CACs). Many of these barriers may be difficult to overcome, however themes 2 and 3 reflect the importance of a stewardship culture and social and tangible support for attendings/ residents in participating in that culture. The importance of culture is further supported by theme 4, tailoring to the site-specific context.

Clinicians noted the motivating factor of comparison to other facilities, which may point to the important process of social comparison in this context that could be studied further and used to strengthen stewardship interventions.¹⁰ Clinicians indicated the template facilitated earlier involvement with ID specialists, a potential enhancement to collaboration that may strengthen clinician/ASP relations.

The impact of the emergence of COVID-19. (Theme 5) was far-reaching due to temporary cessations of stewardship activities, briefly, at-home work schedules and demands for ID specialists to help develop COVID-19 policies and provide patient care.

This work focused on ASP physician and pharmacist experiences, and thus a limitation is that the experiences of prescribing clinicians were not captured.

Our findings support the value of the SSTOP “time out” intervention as an effective antibiotic stewardship strategy, and identified potential barriers to implementation. Plans for continued utilization of the note templates after project conclusion suggests SSTOP may serve to achieve sustainable promotion of antibiotic use improvements.

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