MITIGATE Toolkit for Outpatient Antibiotic Stewardship: Enhancing Safe Antibiotic Prescribing Practices

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MITIGATE Toolkit for Outpatient Antibiotic Stewardship: Enhancing Safe Antibiotic Prescribing Practices

Executive Summary

N789 Deliverable for NP Students

Allyssa Marie Montemayor, MPH, RN, PHN, CCRN

Department of Health Professionals, University of San Francisco

DNP Chairperson: Dr. Jo Loomis

DNP Committee Member: Dr. Prabjot Sandhu
Abstract

Background Problem

Clinicians’ attitudes, beliefs and perceptions resulted in unnecessary antibiotic prescriptions in 61.1% of visits for ARTIs in emergency departments (ED) (Donnelly et al., 2014). Literature shows that toolkits offer a cost-effective compilation of evidence base tools and resources that can be individually or holistically adopted to address a specific issue.

Methods & Interventions

In this Doctorate in Nursing Practice (DNP) project, the MITIGATE Toolkit (Multifaceted Intervention to Improve Prescribing for Acute Respiratory Infections for Adults & Children in the Emergency Department and Urgent Care Setting) was featured as a 60-minute online continuing education (CE) module on outpatient antibiotic stewardship for family nurse practitioner (FNP) alumni and students at the University of San Francisco (USF).

Results

Respondents correctly identified at least three clinician resources on antibiotic prescribing; three patient resources on antibiotic therapy and antibiotic stewardship tracking and audit tools. Respondents agreed that displaying commitment posters in patient areas and implementing mandatory staff training are interventions for antibiotic stewardship (ASP).

Conclusion

The implementation of this online training on ASP increased participants’ confidence in using tools and resources that enable adherence to antibiotic guidelines.

Keywords: Antibiotic prescribing, outpatient setting, antibiotic stewardship toolkit, antibiotic resistance
Problem

Setting

Antimicrobial resistance (AMR) is an outcome of unnecessary antibiotic use, resulting in approximately two million illnesses and twenty-three thousand fatalities annually (CDC, 2013). Within a decade, the National Ambulatory Medical Care Survey (NAMCS) captured a 7.5% decrease in national antibiotic prescriptions in outpatient visits for acute pharyngitis after publication of guidelines by the American College of Physicians (ACP) (Hong et al., 2011). In comparison, a survey analysis of 65 million commercially insured members illustrated that 29% pediatric outpatient visits were for ARTIs, in which there was a meagre 5% decrease in antibiotics for ARTIs per year (Agiro et al., 2019). Despite these improvements in antibiotic prescribing, there has only been a 10% national decrease in unnecessary antibiotics for ARTIS, which is short of the White House’s initiative to reduce unnecessary antibiotic prescribing to 50% in 2020.

Context

In several studies, outpatient clinicians’ attitudes, beliefs and perceptions were identified as influential in antibiotic prescribing. Outpatient clinicians can lead ASP in their communities. Toolkits based on the CDC Core Elements of ASP facilitate optimal use of antibiotics. The MITIGATE Toolkit promotes judicious use of antibiotics by offering resources and tools that address clinicians’ common attitudes, perceptions and beliefs about antibiotic prescribing for ARTIs (Yadav et al., 2019). The implementation of the MITIGATE Toolkit resulted in significant reduction in inappropriate prescribing for ARTI visits (Yadav et al., 2019).
Project Aim

The aim of this pilot study is to increase confidence among participants in using resources and tools that enable adherence to local antibiotic guidelines. Upon completion of the online ASP module training, the objectives for participants include correctly identifying at least three clinician and patient resources on antibiotic therapy; three clinical practices that prevent inappropriate antibiotic prescribing and three ASP practices that could be integrated into outpatient practice.

Available Knowledge

PICOT Question

Among FNP students and alumni at USF, does increased education on outpatient antibiotic stewardship affect participants’ confidence in using tools and resources that enable adherence to local antibiotic guidelines and the adoption of the CDC’s Core Elements of Antibiotic Stewardship in their current or future practice?

Search Methodology

A literature search using the keywords, “antibiotic toolkits” narrowed down to studies related to “outpatient” and published in the English language in the US between 2010 and 2020 on Google yielded seven articles that were relevant. Multiple searches using other databases such as Academic Search Complete, CINAHL Complete, Cochrane Register of Controlled Trials, MEDLINE and Health Source Nursing/Academic Edition yielded around one-hundred irrelevant articles despite the assistance of the university librarian and the use of limiters. The Johns Hopkins Nursing Evidence-Based Practice Research and Non-Research Appraisal Tools were used to evaluate the seven articles selected. The evidence level and quality for four of the
research studies were rated the highest at IA. The evidence level and quality for two of the non-
research studies were rated as VA and one of the non-research studies was rated as VB. Please
see appendix C for Critical Appraisal of Evidence.

Literature Review

Perceptions. In semi-structured interviews, clinicians perceived a strong culture of
expectation for antibiotic prescriptions for ARTIs in both pediatric and adult outpatient settings
as more than half (56.2%) of pediatric visits for pharyngitis were associated with antibiotics,
compared to the majority (72.4%) in adults for ARTIs (Fleming-Dutra, et al., 2016; Szymczak et
al., 2016; Yates et al., 2018). Clinicians expressed concerns about patient satisfaction affecting
their evaluations if they did not “cave” into patient demands despite lack of clinical indications
(Dempsey et al., 2014; Sanchez et al., 2014; Szymczak et al., 2016; Yates et al., 2018; Zetts et
al., 2020). Clinicians also identified bureaucracy, time, and finite resources as primary barriers to
adherence to antibiotic guidelines (Yates et al., 2018).

Clinician Preference. Interviews of outpatient clinicians captured a consensus across
various ambulatory care practices that experience is valuable and that patients are unique and
cannot be standardized (Dempsey et al., 2014; Sanchez et al., 2014; Szymczak et al., 2016; Yates
et al., 2018 & Zetts et al., 2020). Clinicians felt that some of their colleagues were “stuck” in the
habit of treating acute bronchitis with antibiotics (Dempsey et al., 2014). Broad-spectrum
antibiotics were often selected due to the clinicians’ perception of “being covered” (Sanchez et
al., 2014) and interestingly, even with diagnostics such as laboratory confirmed influenza (flu),
29% of outpatients were inappropriately prescribed an antibiotic (Havers et al., 2018).
Lack of Accountability. In interviews of outpatient clinicians, participants expressed being over measured and “blamed” for factors beyond their control (Zetts et al., 2020). Although these participants agreed with treatment guidelines for acute bronchitis, they perceived that “other” clinicians were responsible for prescribing unnecessary antibiotics (Dempsey et al., 2014). Outpatient pediatricians perceived AMR as a more significant problem in urgent care or the ED (Szymczak et al., 2016). Clinician perceptions of AMR as a major global health issue that is irrelevant to their immediate or local experience signified a need to increase accountability and commitment to ASP.

Antibiotic Stewardship Toolkits. Clinicians agreed that patient education, such as informative videos on antibiotics in the waiting area and or professional training for clinicians on ASP with educational credits as incentive could increase adherence to guidelines (Dempsey et al., 2014; Hruza et al., 2020; Larissa et al., 2014; Sanchez et al., 2014; Szymczak et al., 2016; Yates et al., 2018 & Zetts et al., 2020). Toolkits such as University of California Davis’ “MITIGATE” include evidence base tools and resources that resulted in significant reduction in inappropriate prescribing for ARTI visits (Yadav et al., 2019).

Summary of Evidence. There was a significant reduction in inappropriate antibiotic prescribing after the implementation of behavioral interventions and the MITIGATE Toolkit in a randomized control trial (RCT) conducted in the ED and urgent care (UC) centers at the University of California Los Angeles (UCLA), University of California Davis (UC Davis) and Children’s Hospital Colorado (CHCO) during the Influenza seasons of 2016 to 2018 (Yadav et al., 2019). In this RCT, inappropriate prescribing for ARTIs decreased by 0.7% in 44,820 ARTI visits among 292 providers (Yadav et al., 2019).
Another quality improvement initiative utilized the MITIGATE Toolkit in ten UC centers, nine primary care clinics and one ED at the University of Washington. Acknowledging differences between provider and patient expectations and then providing clinicians with tools to manage patient expectations were effective (Huang et al., 2021). After the implementation of this quality improvement initiative deploying the MITIGATE Toolkit, inappropriate antibiotic prescribing was cut in half, from 12% across urgent care, ED, and primary care to 7% post-intervention (Huang et al., 2021). Please see appendix C for Critical Appraisal of Evidence.

Rationale

ASP programs can be complex and overwhelming especially for smaller healthcare agencies that have limited staff and resources. Toolkits have been utilized in healthcare agencies of all sizes because it offers a cost-effective compilation of tools, resources and guidelines that can be individually or holistically adopted to address a specific issue. The MITIGATE toolkit offers tools and resources that address the common barriers to optimal antibiotic prescribing. Please see appendix D for Gap Analysis.

Theoretical Framework

The Seven-Step Model of Change by Lippitt, Watson & Westley (1958) is the theoretical framework of this DNP project with the specific aim of changing prescribers’ behaviors and increasing their adherence to antibiotic guidelines. The Seven-Step Model of Change (Mitchell, 2013) is summarized as: 1) Diagnosing the change arising from the need for change; 2) Assessing the motivation and capacity to change and establishing the change relationship; 3) Determining resources and clarifying assessment for change; 4) Establish intentions and goals for an action plan; 5) Examine alternatives; 6) Transform intentions into actual change and maintaining it and 7) Generalize and stabilize change; and 8) Terminate the helping relationship.
of the change agent. The concepts in the MITIGATE Toolkit touch upon the specific aims of the Seven-Step Model of Change.

**Ethical Considerations**

This DNP pilot study did not require Institutional Review Board (IRB) for the Protection of Human Subjects approval. USF is committed to Jesuit values that promote a global perspective that educates leaders to deliver more humane care by drawing on the rich tradition of Ignatian spirituality and reflection upon the good of all humanity. Patient expectations are prevalent in outpatient encounters, the ethical consideration for clinicians was to promote patient safety by providing education on appropriate use of antibiotics. Emphasizing education, which upholds the ethical consideration of informing the clinician and patient meets the common goal of therapeutic antibiotic use. Participation in this DNP pilot project was voluntary and uncompensated. No other ethical considerations have been identified for this educational intervention pilot study. Please see appendix J for the *Institutional Review Board (IRB) for the Protection of Human Subjects Approval*.

**Implementation**

This DNP pilot study deployed training on the MITIGATE Toolkit. The MITIGATE toolkit embodies the CDC’s Core Elements of Outpatient Antibiotic Stewardship (2014) and offers clinicians’ the tools, resources and techniques that address the common barriers to optimal antibiotic prescribing. The MITIGATE Toolkit is written in a manual or guide format that can be obtained as a hard-copy or digital copy at no cost from CDC website, [https://stacks.cdc.gov/view/cdc/80653](https://stacks.cdc.gov/view/cdc/80653). Please see appendix K for the *MITIGATE Toolkit*. 
Invitations were delivered via USF electronic mail from the first week of December 2021 to the last week of January 2022 to current FNP graduate students, alumni and faculty. Please see appendix F for Work Breakdown System/Communication Plan. Respondents were asked to complete a pre-survey at the beginning of the online module training that evaluated the participant’s current knowledge, beliefs, perceptions and practices in ASP. The online module training was deployed on the USF CANVAS online platform from the first week of January 2022 to the last week of March 2022. After completing the online module training, participants were asked to complete a post-training survey located at the end of the module. Data analysis was completed by the first week of April 2022. Please see appendix E for GANTT Chart.

Financial Analysis

In 2014, the CDC reported 266.1 million outpatient antibiotic prescriptions of which 30% were unnecessary with sinusitis as the diagnosis and the estimated annual cost of $38 to $137 million for antibiotic therapy (Johns Hopkins Medicine & Armstrong Institute for Quality Improvement, 2017). The return on investment in utilizing toolkits for outpatient ASP is increasing clinician adherence to antibiotic guidelines, improving patient safety and reducing unnecessary antibiotic prescriptions. This DNP pilot study did not entail additional cost to facilities as it could be used as online training for CE units through the school’s intranet. Please see appendix I for Proposed Budget & Expected Revenue.

Outcome Measures.

The pre-training surveys provided an assessment of the respondents’ current knowledge, attitudes and perceptions on antibiotic prescribing and the post-training survey evaluated the effectiveness of the training. Upon completion of this online module training on outpatient ASP; outcomes were qualitatively measured with respondents indicating increased confidence in using
tools and resources that enable adherence to antibiotic guidelines. All participants successfully identified at least three:

- Clinician resources on antibiotic guidelines
- Patient resources on antibiotic therapy
- Clinical practices that prevent inappropriate antibiotic prescriptions
- ASP practices that can be integrated into outpatient practice

**Data Collection Tools.** USF’s online CANVAS site was used to analyze the data collected in this pilot study. Data from the pre- and post-training surveys were compared to determine whether there were improvements in participants’ confidence in using tools and resources that enable adherence to antibiotic guidelines and ASP practices. Data analysis consisted of qualitative interpretation of the respondents’ questionnaires. Please see appendix G for Pre- and Post-Surveys.

**Results**

At the conclusion of the pilot study in March 2022, two FNP students and two alumni who practiced in outpatient settings piloted the online module training on MITIGATE Toolkit for Outpatient Antibiotic Stewardship. In the post-survey, 75% of respondents indicated increased confidence in using tools and resources that enable adherence to antibiotic guidelines. Upon evaluating the section on “Provider & Patient Education,” 100% of respondents were able to identify at least three clinician resources on antibiotic prescribing and three patient resources on antibiotic therapy. Upon evaluating the section on “Tracking & Monitoring Antibiotic Prescribing,” 75% of respondents correctly identified antibiotic stewardship tracking and audit tools, medical records reviews, prescriber reports, provider score cards and other quality
improvement tools as clinical practices that track and report antibiotics. For the section on “Action for Policy & Practice,” 75% of participants correctly indicated that displaying commitment letters or posters in the patient areas, donning badge reels or pins with logos for antibiotic stewardship and implementing mandatory staff training were appropriate interventions. 100% of participants strongly agreed that antibiotic resistance is a public health problem in the United States and that inappropriate antibiotic use contributes to antimicrobial resistance.

The two FNP student respondents indicated that they “feel antibiotics are being overused,” whereas one practicing FNP alumnus indicated that he “feels antibiotics are being moderately used in his practice” and the other FNP alumnus “feels antibiotics are being moderately overused in his practice” by indicating “8/10” on a scale of 1 to 10 with 1 being underused and 10 being overused. One of the practicing FNP alumnus indicated that in his practice, antibiotics are being frequently overprescribed for the following conditions: sinusitis, otitis media, pharyngitis, acute bronchitis, bronchiolitis, asthma, skin & soft tissue, gastrointestinal infection and urinary tract infection, whereas the other practicing FNP alumnus only indicated the common cold, sinusitis, influenza, urinary tract infection and other. The FNP student respondents indicated that antibiotics were under-prescribed for the following conditions: sinusitis, skin & soft tissue and urinary tract infection and other. However, the same respondent indicated these conditions for the previous question, which was about antibiotics being overused. All participants agreed that ASP programs are important to optimize antibiotic use. Please see appendix B for Survey Results.
Conclusions

Benefits of Pilot Study

This pilot online CEU module identified additional resources that respondents requested to see as part of an ASP program including: recurrent training, visible information (bulletin board) in employee areas, videos of testimonials by patients and staff to promote ASP and influence more clinicians and the general public. Both the FNP alumni agreed that outpatients do not receive adequate education about the use and duration of antibiotics, whereas one of the FNP student respondents was neutral and the other indicated that outpatients do receive adequate education. The two FNP alumni participants identified patient preferences, lack of access to primary care outside of regular offices hours and prior use of antibiotics as common barriers in appropriate prescribing for ATRIs.

Limitations

The MITIGATE Toolkit was originally designed to be implemented as a quality improvement initiative in a live clinic and due to the lack of implementation sites available because of the COVID pandemic, training on the MITIGATE Toolkit was implemented online as a CEU module. The pre-training survey included in the MITIGATE Toolkit requires respondents to collect data on antibiotic prescribing practices in their facilities, therefore it is not a valid pre-training survey for this DNP pilot study. The pre-training survey obtained from the CDC webpage on antibiotic stewardship presented patient vignettes and evaluated the participant’s current knowledge, attitudes and perceptions on antibiotic prescribing for ARTIs.

Implications for Practice
Healthcare toolkits are a collection of tools, resources and guidelines that are adaptable to various settings. Although the studies vary in size and may have implemented a few or all of the CDC’s Core Elements of ASP, the general outcome is a decrease in unnecessary antibiotic prescriptions for ARTIs that were more significant in intervention groups than in control groups.

**Sustainability**

The overall goal after this pilot study was to increase the confidence of outpatient clinicians to use tools and resources that enable the adherence to antibiotic guidelines. The return on investment in utilizing toolkits for outpatient ASP is improving patient safety and reducing unnecessary antibiotic prescriptions. This DNP pilot study would not entail additional cost to facilities as it could be used as online training for CEs through the school’s intranet. Please see appendix H for *SWOT Analysis*. 
REFERENCES


MITIGATE TOOLKIT FOR ANTIBIOTIC STEWARDSHIP

urgent care centers. Cambridge University Press

(CUP). https://doi.org/10.1017/ice.2020.1394


Szymczak, J. E., Feemster, K. A., Zaoutis, T. E. &., & Gerber, J. S. (2016). Pediatrician perceptions of an outpatient antimicrobial stewardship intervention. *Infection Control and Hospital Epidemiology, 35*(S3), S69-S78. 10.1086/677826


APPENDICES

Appendix A

Statement of Non-Research Determination

UNIVERSITY OF SAN FRANCISCO  School of Nursing and Health Professions

Doctor of Nursing Practice  Statement of Non-Research Determination (SOD) Form

The SOD should be completed in NURS 7085 and NURS 791/E or NURS 749/A/E

General Information

<table>
<thead>
<tr>
<th>Last Name:</th>
<th>Montemayor</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Name:</td>
<td>Alyssa Mane</td>
</tr>
<tr>
<td>CWID Number:</td>
<td>11321503</td>
</tr>
<tr>
<td>Semester/Year:</td>
<td>Fall 2020</td>
</tr>
<tr>
<td>Course Name &amp; Number:</td>
<td>NURS 749 Qualifying Project</td>
</tr>
<tr>
<td>Chairperson Name:</td>
<td>Dr. Jo Loomis</td>
</tr>
<tr>
<td>Advisor Name:</td>
<td>Dr. Jo Loomis</td>
</tr>
</tbody>
</table>

Project Description

1. Title of Project

Toolkits: Translating Guidelines into Practice for Outpatient Antimicrobial Stewardship

2. Brief Description of Project

Clearly state the purpose of the project and the problem statement in 250 words or less.

Outpatient clinicians are at the forefront of healthcare services for communities and are called to lead and practice outpatient antimicrobial stewardship (AMS). Healthcare toolkits have been implemented in agencies across the United States and its use have increased adherence to guidelines and improved patient outcomes. Toolkits based on the framework, CDC Core Elements of Antimicrobial Stewardship promote stewardship and judicious use of antibiotics. This change in practice DNP project targets Bay Area outpatient clinicians. It uses online education training on toolkits based on the CDC’s framework – Core Elements of Antimicrobial Stewardship, which are evidenced based practices.

3. AIM Statement: What are you trying to accomplish?

- What do you hope to accomplish with this project? Aims should be SMART, specific, clear, well-defined, and at a minimum describe the target population, the desired improvement, and the targeted timeframe.
- To improve (your process) from (baseline)% to (target)%, by (timeframe), among (your specific population)
**Complete this statement:**

To increase: clinicians’ confidence in adhering to antimicrobial stewardship practices and antibiotic guidelines from baseline to: at least 50% by: the end of training in: Bay Area outpatient clinicians recruited in this project

4 Brief Description of Intervention (150 words).

There will be sections that elaborate on sample toolkits such as Quality Improvement Organization’s “A Field Guide to Antimicrobial Stewardship in Outpatient Settings” (2018), University of California Davis’ (UCD) “MITIGATE” (2016) and Greater New York Hospital Association’s “Antimicrobial Stewardship Toolkit” (2011) are examples of toolkits that embody the CDC’s Core Elements of AMS framework. These toolkits include evidence-based guidelines and have been funded by the CDC and promoted by the American Board of Internal Medicine. There will be sections that will also provide on-line simulation training on communicating with simulated patients about antibiotics and links to other clinical resources on antibiotic guidelines. Upon voluntary completion of the online module training on outpatient antimicrobial stewardship, the participant will complete and submit a post-survey and be awarded CEU/CME credits.

4a. How will this intervention be implemented?

- Where will you implement the project?
- Attach a letter from the agency with approval of your project.
- Who is the focus of the intervention?
- How will you inform stakeholders/participants about the project and the intervention?

In this DNP project, clinician members from chapters in the California Association of Nurse Practitioners (CANP) will be invited via electronic messaging to participate in an online module training on outpatient antimicrobial stewardship. Participants who volunteer to complete the online module training will be asked to complete a pre-survey that evaluates the participant’s current knowledge, beliefs, perceptions and practices in relation to ASP. The online module training will consist of sections that examine the CDC’s Core Elements of Antimicrobial Stewardship.

5. Outcome measurements: How will you know that a change is an improvement?

- Measurement over time is essential to QI. Measures can be outcome, process, or balancing measures. Baseline or benchmark data are needed to show improvement.
- Align your measure with your problem statement and aim.
- Try to define your measure as a numerator/denominator.
  - What is the reliability and validity of the measure? Provide any tools that you will use as appendices.
  - Describe how you will protect participant confidentiality.

Upon completion of this online module training that introduces toolkits based on the CDC’s core elements on outpatient antimicrobial stewardship, the participant will be able to report increased confidence in adhering to antibiotic guidelines; identify three clinician resources on antibiotic guidelines; identify three patient resources on antibiotic therapy; identify at least three clinical practices that prevent inappropriate antibiotic prescriptions and identify at least three AMS practices that can be integrated into his/her outpatient practice.
DNP Statement of Determination
Evidence-Based Change of Practice Project Checklist*

The SOD should be completed in NURS 7005 and NURS 791E/P or NURS 749/A/E

Project Title:
Toolkits: Translating Guidelines into Practice for Outpatient Antimicrobial Stewardship

<table>
<thead>
<tr>
<th>Mark an “X” under “Yes” or “No” for each of the following statements:</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>The specific aim is to improve performance on a specific service or program and is a part of usual care. All participants will receive standard of care.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>The project is not designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control. The project does not follow a protocol that overrides clinical decision-making.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does not develop paradigms or untested methods or new untested standards.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does not seek to test an intervention that is beyond current science and experience.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>The project has no funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., not a personal research project that is dependent upon the voluntary participation of colleagues, students and/or patients.</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: “This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.”</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

Answer Key:
- If the answer to all of these items is “Yes”, the project can be considered an evidence-based activity that does not meet the definition of research. IRB review is not required. Keep a copy of this checklist in your files.
- If the answer to any of these questions is “No”, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used: [http://answers.hhs.gov/ohrp/categories/1569](http://answers.hhs.gov/ohrp/categories/1569)
DNP Statement of Determination
Evidence-Based Change of Practice Project Checklist Outcome
The SOD should be completed in NURS 7005 and NURS 791E/P or NURS 749A/E

Project Title:

Toolkits: Translating Guidelines into Practice for Outpatient Antimicrobial Stewardship

☐ This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.
☐ This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

Student Last Name: Montemayor
Student First Name: Allyssa Marie

CVID Number: 11321503
Semester/Year: Fall 2020

Student Signature: YSSA.M.1460396170
Date: 17 August 2020

Chairperson Name:
Chairperson Signature:
Date:

DNP SOD Review Committee
Member Name:

DNP SOD Review Committee
Member Signature:
Date:
## Survey Results

*Please indicate which statements exemplify "Action For Policy & Practice" in Antibiotic Stewardship at your clinical practice setting:*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enforcing rapid point of care testing appropriately.</td>
<td>3 respondents</td>
<td>75%</td>
</tr>
<tr>
<td>Integrating antibiotic prescribing order sets into the EMR.</td>
<td>3 respondents</td>
<td>75%</td>
</tr>
<tr>
<td>Delayed prescribing or &quot;watchful waiting.&quot;</td>
<td>4 respondents</td>
<td>100%</td>
</tr>
<tr>
<td>Ordering diagnostics</td>
<td>2 respondents</td>
<td>50%</td>
</tr>
<tr>
<td>Displaying a ranking of clinicians who are &quot;top performers&quot; or who utilize antibiotic prescribing guidelines in their treatment plans.</td>
<td>3 respondents</td>
<td>75%</td>
</tr>
</tbody>
</table>

*Please indicate which of the statements exemplify "Commitment & Leadership" in Antibiotic Stewardship at your clinical practice setting:*

<table>
<thead>
<tr>
<th>Statement</th>
<th>Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display commitment letters or posters in waiting rooms, exam rooms and clinician work stations.</td>
<td>2 respondents</td>
<td>67%</td>
</tr>
<tr>
<td>Give monetary incentives to clinicians who have the lowest antibiotic prescribing rates.</td>
<td>0 respondents</td>
<td>0%</td>
</tr>
<tr>
<td>Badge reels or pins with a logo for antibiotic stewardship.</td>
<td>3 respondents</td>
<td>100%</td>
</tr>
<tr>
<td>Appoint senior leader or expert to serve as a &quot;champion.&quot;</td>
<td>2 respondents</td>
<td>67%</td>
</tr>
<tr>
<td>Implement mandatory staff training on antibiotic stewardship and patient communication about antibiotic treatment and resistance.</td>
<td>1 respondent</td>
<td>33%</td>
</tr>
</tbody>
</table>
Please indicate which statements exemplify clinical practices that can be used to track & report antibiotics:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimating antibiotic prescribing rates on a quarterly basis.</td>
<td>3</td>
<td>75 %</td>
</tr>
<tr>
<td><strong>Antibiotic Stewardship Tracking &amp; Audit Tool</strong></td>
<td>4</td>
<td>100 %</td>
</tr>
<tr>
<td>Medical records review.</td>
<td>3</td>
<td>75 %</td>
</tr>
<tr>
<td>Comparing prescriber reports can motivate behavior change at the provider level.</td>
<td>3</td>
<td>75 %</td>
</tr>
<tr>
<td>Provider scorecards and other quality improvement tools to assess antibiotic stewardship program successes and illuminate opportunities for improvement.</td>
<td>4</td>
<td>100 %</td>
</tr>
</tbody>
</table>

Please indicate which statements exemplify clinician resources on antibiotic prescribing or three patient resources on antibiotic therapy:

<table>
<thead>
<tr>
<th>Resource</th>
<th>Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Facility Training on Antibiotic Prescribing</strong></td>
<td>2</td>
<td>67 %</td>
</tr>
<tr>
<td><strong>CDC Treatment Algorithms for Common Illnesses</strong></td>
<td>3</td>
<td>100 %</td>
</tr>
<tr>
<td>Wikipedia</td>
<td>0</td>
<td>0 %</td>
</tr>
<tr>
<td>Prescription pads for viral diagnosis, “delayed prescribing,” “watchful waiting” and symptom relief patient instructions into clinician processes.</td>
<td>3</td>
<td>100 %</td>
</tr>
<tr>
<td><strong>Face-to-face discussion.</strong></td>
<td>2</td>
<td>67 %</td>
</tr>
</tbody>
</table>
How willing are you to change your practices based on audit and feedback, with 1 being unwilling and 10 being very willing?

<table>
<thead>
<tr>
<th>Score</th>
<th>Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>4 respondents</td>
<td>100%</td>
</tr>
</tbody>
</table>

Attempts: 4 out of 4

Do you believe that outpatient antibiotic stewardship programs interfere with the usual approach to clinical decision-making in treatment of infectious diseases?

<table>
<thead>
<tr>
<th>Agreement Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly agree</td>
<td>0%</td>
</tr>
<tr>
<td>Agree</td>
<td>25%</td>
</tr>
<tr>
<td>Neutral</td>
<td>50%</td>
</tr>
<tr>
<td>Disagree</td>
<td>25%</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>0%</td>
</tr>
</tbody>
</table>

Attempts: 4 out of 4

In your opinion, what are the best strategies to decrease inappropriate use of antibiotics? Check all that apply.

<table>
<thead>
<tr>
<th>Strategy Description</th>
<th>Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better education in pre-clinical training (medical/nursing school)</td>
<td>3 respondents</td>
<td>75%</td>
</tr>
<tr>
<td>Better education in residency training</td>
<td>2 respondents</td>
<td>50%</td>
</tr>
<tr>
<td>Developing rigorous practice guidelines for empiric antibiotic treatment of common infections</td>
<td>2 respondents</td>
<td>50%</td>
</tr>
<tr>
<td>Developing more order sets or decision support tools for the ED or urgent care</td>
<td>3 respondents</td>
<td>75%</td>
</tr>
<tr>
<td>Other</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>
Has taking part in the stewardship intervention changed or improved your clinical practices?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>True</strong></td>
<td>3 respondents</td>
<td>75%</td>
</tr>
<tr>
<td><strong>False</strong></td>
<td>1 respondent</td>
<td>25%</td>
</tr>
<tr>
<td>Citation</td>
<td>Conceptual Framework</td>
<td>Design/Method</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
</tbody>
</table>
| Metlay et al., 2007      | CDC Core Elements of Antibiotic Stewardship                                           | Cluster randomized trial (CRT)         | 8 Veterans Affairs (VA) medical centers and 8 non-VA academic medical centers in metropolitan areas across the United States (US) | Performance feedback, clinician education, and patient educational materials  
Medical records were reviewed at each site  
Return visits and visit satisfaction | Percentage of visits for upper respiratory tract infections (ARTI) and acute bronchitis that were treated with antibiotics       | Alternating logistic regression models were used to adjust for baseline treatment rates, case mix differences, and provider characteristics | Within two years, antibiotic prescriptions decreased from 45% to 43% for bronchitis in control sites and from 59% to 49% in the intervention groups  
Multidimensional educational interventions can reduce antibiotic overuse in the treatment of patients with upper respiratory tract infections and acute bronchitis in Eds |
| Gerber et al., 2013      | None                                                                                  | Cluster randomized trial (CRT)         | Network of 25 pediatric primary care practices in Pennsylvania and New Jersey | Broad-spectrum antibiotic prescribing  
Off-guideline prescribing for children | Rates of broad-spectrum (off-guideline) antibiotic prescribing for bacterial ARTIs and antibiotics for viral ARTIs | Statistical models for a repeated cross-sectional design  
Bootstrap-based $P$ | Broad-spectrum antibiotic prescribing decreased from 26.8% to 14.3% in the intervention group, compared to 28.4% to 22.6% in the control group  
Non-concordant prescribing for pneumonia in children |
<p>| Meeker et al., 2016 | Behavioral Psychology | Cluster randomized trial (CRT) | 248 clinicians in 47 primary care practices in Boston and Los Angeles | Intervention 1: suggested alternative treatments | Intervention 2: accountable justification | Antibiotic prescribing rates for visits with antibiotic-inappropriate diagnoses from 18 months preintervention | Mean antibiotic prescribing decreased from 24.1% pre-intervention to 13.1% 18 months post-intervention for controls; from 22.1% to 6.1% for suggested alternatives; from 23.2% to 5.2% for accountable justification and... |
| Guzik et al., 2019 | None | Observational Study | 34 outpatient clinics from 2 hospitals and health systems in New York City | Hospital, patient demographics, Patient diagnosis and antibiotic type | Antibiotic prescribing for ARTIs pre and post intervention | Chart abstraction utilized the same randomization and data collection tools previously described | Overall antibiotic prescribing for ARTIs decreased from 62% to 43.4% for &quot;bronchitis, not specified&quot; and 77.6% to 68% for acute sinusitis | Broad-spectrum also shifted as the proportion of macrolide and... | prompted clinicians to enter free-text justification for prescribing antibiotics. Intervention 3: peer comparison sent emails to clinicians that compared their antibiotic prescribing rates with those of “top performers” from 19.9% to 3.7% for peer comparison. The results show that accountable justification and peer comparison resulted in lower rates of inappropriate antibiotic prescribing for ARTIs. |
| 902 visits for acute respiratory infections (ARTI) were evaluated after implementation of stewardship interventions | Data were analyzed using SAS, version 9.4 software (SAS Institute, Cary, North Carolina); χ² tests assessed prescribing variation by patient characteristics, and t tests assessed changes in prescribing rates | fluoroquinolone prescriptions decreased from 55.1% to 45.5% and from 12.2% to 7% respectively. This quality improvement initiative resulted in an overall decrease in antibiotic prescribing for ARTIs in participating sites |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Setting</th>
<th>Participants</th>
<th>Interventions</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatima. de Lima Corvino, D. et al., 2019</td>
<td>Quality Improvement</td>
<td>Miami Veterans Affairs</td>
<td>2843 encounters for ARTIs in outpatient care settings</td>
<td>Stakeholder support, Antibiotic stewardship champions, Academic detailing, Appropriate coding, and reporting</td>
<td>At baseline 58% of encounters for ARTIs were associated with antibiotic prescriptions. 24 months post-intervention, a decline to 39% in antibiotic prescribing for ARI diagnosis was observed, indicating that the implementation of a multi-faceted ARI campaign was influential in the reduction of antibiotic prescriptions for ARI</td>
</tr>
<tr>
<td>Yadav et al., 2019</td>
<td>Cluster Randomized Trial</td>
<td>Emergency departments and urgent care centers</td>
<td>44,820 ARTI visits among 292 providers</td>
<td>Provider education, patient education, provider commitment, champions, departmental feedback and peer comparison</td>
<td>Antibiotic prescribing for 44,820 ARTI visits among 292 providers dropped from 6.2% (baseline) to 2.4% (post-intervention) compared to a reduction in inappropriate prescribing for ARTI visits from 2.2% at baseline to 1.5% post-intervention</td>
</tr>
<tr>
<td>Huang et al., 2021</td>
<td>CDC Core Elements of Antibiotic Stewardship</td>
<td>Quality Improvement</td>
<td>10 urgent care clinics, 9 primary care clinics and 1 emergency department affiliated with the University of Washington in 2014</td>
<td>Collecting and reporting data</td>
<td>Antibiotic prescribing post quality improvement initiative</td>
</tr>
</tbody>
</table>

| | | | | Diagnosis codes | Effective communication | | |

| | | | | | | | |
## Gap Analysis

<table>
<thead>
<tr>
<th></th>
<th>Gap in Prescriber Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lack of statistics on the percentage of clinicians who prescribe antibiotics in the Bay Area.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Gap in Standardized Training</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>If training on outpatient ASP is being implemented in an outpatient practice, it may be different from what is being implemented in another outpatient practice.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Gap in Leadership</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Numerous independent outpatient clinics do not have adequate staff, resources or leadership to start a formal ASP program in their facility.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Gap in Patient Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Lack of statistics or data on what patients perceive about antibiotic therapy in their Bay Area communities.</td>
</tr>
</tbody>
</table>
MITIGATE TOOLKIT FOR OUTPATIENT ANTIBIOTIC STEWARDSHIP

Appendix E

GANNT Chart for Outpatient Antimicrobial Stewardship
Appendix F

Work Breakdown System/Communication Plan

<table>
<thead>
<tr>
<th>Color Coding</th>
<th>Outpatient ASP Toolkit Project</th>
<th>Due Date</th>
<th>Assigned To</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest Priority</td>
<td>Manuscript</td>
<td>08/17/2021</td>
<td>DNP S</td>
<td>Completed</td>
<td>Graded</td>
</tr>
<tr>
<td></td>
<td>Prospectus</td>
<td>04/17/2021</td>
<td>DNP S</td>
<td>Completed</td>
<td>Graded</td>
</tr>
<tr>
<td>3</td>
<td>Conduct Literature Reviews</td>
<td>04/13/2021</td>
<td>DNP S</td>
<td>Completed</td>
<td>Waiting for Grade</td>
</tr>
<tr>
<td>4</td>
<td>DNP Residency</td>
<td>04/20/2022</td>
<td>DNP S</td>
<td>Completed</td>
<td>Waiting for Grade</td>
</tr>
<tr>
<td>5</td>
<td>DNP Project</td>
<td>04/20/2022</td>
<td>DNP S</td>
<td>Completed</td>
<td>Waiting for Grade</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color Coding</th>
<th>Outpatient ASP Toolkit Project</th>
<th>Due Date</th>
<th>Assigned To</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium Priority</td>
<td>Coordinate with Stakeholders</td>
<td>09/01/2021</td>
<td>DNP S</td>
<td>Exempt</td>
<td>Exempt due to COVID</td>
</tr>
<tr>
<td></td>
<td>Present Workshop Curriculum to</td>
<td>09/01/2021</td>
<td>DNP S</td>
<td>Exempt</td>
<td>Exempt due to COVID</td>
</tr>
<tr>
<td></td>
<td>Stakeholders</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Outpatient Antimicrobial Stewardship Toolkits

<table>
<thead>
<tr>
<th>Color Coding</th>
<th>Outpatient ASP Toolkit Project</th>
<th>Due Date</th>
<th>Assigned To</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Send Pre-Intervention Survey to Participants</td>
<td>01/07/2022</td>
<td>DNP S</td>
<td>Completed</td>
<td>Analysis in Executive Summary</td>
</tr>
<tr>
<td></td>
<td>Coordinate with Stakeholders on Workshop Implementation</td>
<td>01/07/2022</td>
<td>DNP S</td>
<td>Completed</td>
<td>Analysis in Executive Summary</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Color Coding</th>
<th>Outpatient ASP Toolkit Project</th>
<th>Due Date</th>
<th>Assigned To</th>
<th>Status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Send Post-Intervention Survey</td>
<td>04/30/2022</td>
<td>DNP S</td>
<td>Completed</td>
<td>Waiting for approval from advisors</td>
</tr>
<tr>
<td>2</td>
<td>Collect Data</td>
<td>04/30/2022</td>
<td>DNP S</td>
<td>Completed</td>
<td>Waiting for approval from advisors</td>
</tr>
<tr>
<td>3</td>
<td>Data Analysis</td>
<td>04/30/2022</td>
<td>DNP S</td>
<td>Completed</td>
<td>Waiting for approval from advisors</td>
</tr>
<tr>
<td>4</td>
<td>Present Findings</td>
<td>05/18/2022</td>
<td>DNP S</td>
<td>Pending</td>
<td>Waiting for approval from advisors</td>
</tr>
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</table>
### Communication Matrix

<table>
<thead>
<tr>
<th>Information Type</th>
<th>Preparer</th>
<th>Distribution</th>
<th>Frequency</th>
<th>Transmittal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Outline</td>
<td>DNP Student</td>
<td>DNP Committee</td>
<td>As needed during the project life cycle</td>
<td>Email</td>
</tr>
<tr>
<td>Project Kickoff</td>
<td>DNP Student</td>
<td>DNP Committee</td>
<td>Weekly</td>
<td>Email &amp; Zoom</td>
</tr>
<tr>
<td>Online Training</td>
<td>DNP Student</td>
<td>DNP Committee and Participants/Stakeholders</td>
<td>Weekly</td>
<td>Email &amp; Zoom</td>
</tr>
<tr>
<td>Debrief Sessions</td>
<td>DNP Student</td>
<td>DNP Committee and Participants/Stakeholders</td>
<td>Weekly</td>
<td>Email &amp; Zoom</td>
</tr>
<tr>
<td>Project Issues</td>
<td>DNP Student</td>
<td>DNP Committee</td>
<td>As needed during the project life cycle</td>
<td>Email &amp; Zoom</td>
</tr>
<tr>
<td>Project Updates</td>
<td>DNP Student</td>
<td>DNP Committee and Participants/Stakeholders</td>
<td>Monthly</td>
<td>Email &amp; Zoom as needed</td>
</tr>
<tr>
<td>Updates to DNP Chair</td>
<td>DNP Student</td>
<td>DNP Chair</td>
<td>Monthly</td>
<td>Email &amp; Zoom</td>
</tr>
<tr>
<td>Project Wrap Up &amp; Evaluation</td>
<td>DNP Student</td>
<td>DNP Committee</td>
<td>Once</td>
<td>Final Meeting with DNP Committee</td>
</tr>
</tbody>
</table>
### Appendix H

**SWOT Analysis**

<table>
<thead>
<tr>
<th><strong>STRENGTHS</strong></th>
<th><strong>WEAKNESSES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• The DNP student experienced first-hand the debilitating effects of AMR in the community in her work in the ICU with COVID 19 patients with co-existing infections caused by multi-drug resistant organisms</td>
<td>• The current social and political climates due to the COVID 19 pandemic</td>
</tr>
<tr>
<td>• This first-hand experience provided the motivation to pursue this prospectus</td>
<td>• It is difficult to find outpatient practices to become stakeholders for the prospectus, because all healthcare efforts are geared towards managing the COVID 19 crisis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>OPPORTUNITIES</strong></th>
<th><strong>THREATS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increasing the confidence and knowledge of outpatient clinicians in the Bay Area to use tools, resources and guidelines related to antibiotic therapy and antimicrobial stewardship</td>
<td>• Due to the COVID 19 pandemic, resources, staff and efforts are focused to managing the crisis and supporting DNP students and projects are not the priority</td>
</tr>
<tr>
<td>• Enable clinicians, leaders and healthcare facilities to start AMS program</td>
<td>• Upcoming influenza season may increase anxiety among patient populations</td>
</tr>
</tbody>
</table>
Appendix I

*Proposed Budget (Expenses) & Expected Revenue*

**Online Training on Outpatient Antimicrobial Stewardship**

<table>
<thead>
<tr>
<th>Participants</th>
<th>Estimated Fair Market Rate in Bay Area, California Per Hour</th>
<th>Estimated Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse Practitioner (NP)</td>
<td>$74.89 x 8 Hours</td>
<td>$599.12</td>
</tr>
<tr>
<td>Physician’s Assistant (PA)</td>
<td>$71.21 x 2 Hours</td>
<td>$569.68</td>
</tr>
<tr>
<td>Facilitator</td>
<td>$50 x 240 Hours</td>
<td>$12,000</td>
</tr>
</tbody>
</table>

Facilities would be saving money, because the online training is free, but fulfills CEU/CME costs.
Pre & Post Intervention Surveys

Interview Structured Questions and Vignette (Clinicians)

1. You are here because you work in emergency medicine, urgent care, primary care or any other outpatient practice and make antibiotic prescribing decisions for patients presenting with respiratory complaints. Please give a brief overview of your role in the department.

Participants will read the ADULT or PEDS vignette

ADULT Vignette:
A 27-year-old woman with no known underlying lung disease presents with a 10-day history of cough that is productive of yellow mucus and dyspnea. Her symptoms began with nasal congestion and a sore throat, but these initial symptoms resolved after a few days. Her remaining symptom is cough which is less productive than it was several days ago. She has some nasal congestion as well. She denies any known sick contacts. Her cough does not occur in long fits, and she is not short of breath. On physical examination she is not in respiratory distress, afebrile, and has normal vital signs. Lung exam is normal.

PEDIATRIC Vignette:
A 2 year old male with no known underlying lung disease presents with a 4-day history of cough and intermittent fever with max Temp of 101. Child is in daycare with multiple sick contacts and is fully immunized. On physical examination child is afebrile, there is clear rhinorrhea, both ThTs are red but not bulging, and vital signs are otherwise normal. Lung exam reveals scattered expiratory wheezes.

How would you manage this patient/these patients?
Would you consider antibiotics for this patient? Under what circumstance?
What instructions would you give the patient or parent?
What discussions would you anticipate around antibiotic use?

2. Let’s talk about the work flow you would expect for this patient.
   a. What would the usual wait time for this patient be?
   b. What is the triage process for this patient?
   c. What would be your assessment process?
   d. What is the discharge process?

3. How do you use the EHR in this process? (Probe for type, fit in workflow, escribing, order sets if they don’t come up.)

4. Tell me about how you would talk to the patient about antibiotic use in this case?
   a. Would this be different based on patient expectation about antibiotics? How would this be assessed?
   b. Probe for any education to patients about antibiotic use

5. What is the general culture around antibiotic stewardship in your department?
   a. What are the barriers to antibiotic stewardship and patient education?
   b. What might facilitate antibiotic stewardship and patient education?

6. Tell me about training you have received in any stewardship programs. In your opinion, what types of training and patient education works and what doesn’t?
   a. Discuss features of training in stewardship you sustained over time.
   b. Discuss features of training in stewardship you did not sustain over time.

MITIGATE Antimicrobial Stewardship Toolkit
### ADULT

**OTC medications grouped:**
Of the drug choices below, please indicate which drugs you would choose in treating this patient. You may select up to three options.

- [ ] Albuterol inhaler
- [ ] An antibiotic of your choice
- [ ] Robitussin with codeine
- [ ] Benzonatate

**Over-the-counter drugs:**
- [ ] Cough lozenge
- [ ] Cough spray
- [ ] Cough syrup

**OTC medications listed individually:**
Of the drug choices below, please indicate which drugs you would choose in treating this patient. You may select up to three options.

- [ ] Cough lozenge
- [ ] Cough spray
- [ ] Cough syrup

**Prescription drugs:**
- [ ] Albuterol inhaler
- [ ] An antibiotic of your choice
- [ ] Robitussin with codeine
- [ ] Benzonatate

### Peds

**OTC medications grouped:**
Of the drug choices below, please indicate which drug you would choose in treating this patient. You may select up to three options.

- [ ] Albuterol inhaler
- [ ] An antibiotic of your choice
- [ ] Robitussin with codeine
- [ ] Benzonatate

**Over-the-counter drugs:**
- [ ] Cough lozenge
- [ ] Cough spray
- [ ] Cough syrup

**OTC medications listed individually:**
Of the drug choices below, please indicate which drug you would choose in treating this patient. You may select up to three options.

- [ ] Cough lozenge
- [ ] Cough spray
- [ ] Cough syrup

**Prescription medications:**
- [ ] Albuterol inhaler
- [ ] An antibiotic of your choice
- [ ] Robitussin with codeine
- [ ] Benzonatate
Structured Interview Questions and Vignette (Nurse)

1. You are here because you work in emergency medicine, urgent care, primary care or any other outpatient practice and make antibiotic prescribing decisions for patients presenting with respiratory complaints. Please give a brief overview of your role in the department.

Participants will read the ADULT or PEDS vignette

**ADULT Vignette**

A 27-year-old woman with no known underlying lung disease presents with a 10-day history of cough that is productive of yellow non bloody sputum. Her symptoms began with nasal congestion and a sore throat, but these initial symptoms resolved after a few days. Her remaining symptom is cough which is less productive than it was several days ago. She has some nasal congestion as well. She denies any known sick contacts. Her cough does not occur in long fits, and she is not short of breath. On physical examination she is not in respiratory distress, afebrile, and has normal vital signs. Lung exam is normal.

**PEDIATRIC Vignette**

A 2 year old male with no known underlying lung disease presents with a 4-day history of cough and intermittent fever with max Temp of 101. Child is in daycare with multiple sick contacts and is fully immunized. On physical examination child is afebrile, there is clear rhino, both TMs are red but not bulging, and vital signs are otherwise normal. Lung exam reveals scattered expiratory wheezes.
2. Let’s talk about the workflow you would expect for this patient.
   a. What would the usual wait time for this patient be?
   b. What is the triage process for this patient?
   c. How would this patient move through the department? Who would talk with the patient?
   d. What is the discharge process?

3. How does the team use the EHR in this process? (Probe for type, fit in workflow, eprescribing, order sets if they don’t come up)

4. Tell me about how the team would handle antibiotic prescription for this patient?
   a. Would this be different based on patient beliefs about antibiotics?
   b. Probe for any education to patients about antibiotic use
   c. What is the nursing role in patient education at triage and/or discharge for antibiotic use?

5. What is the general culture around antibiotic stewardship in your department?
   a. What are the barriers to antibiotic stewardship and patient education?
   b. What might facilitate antibiotic stewardship and patient education?

6. Tell me about training you have received in any stewardship programs. In your opinion, what types of training and patient education works and what doesn’t?
   a. Discuss features of training in stewardship you sustained over time.
   b. Discuss features of training in stewardship you did not sustain over time.
Structured Interview Questions and Vignette [Administrator]

1. You are here because you work in emergency medicine, urgent care, primary care or any other outpatient practice and make antibiotic prescribing decisions for patients presenting with respiratory complaints. Please give a brief overview of your role in the department.

Participants will read the ADULT or Peds vignette

**ADULT Vignette:**
A 27-year-old woman with no known underlying lung disease presents with a 10-day history of cough that is productive of yellow non-bloody sputum. Her symptoms began with nasal congestion and a sore throat, but these initial symptoms resolved after a few days. Her remaining symptom is cough which is less productive than it was several days ago. She has some nasal congestion as well. She denies any known sick contacts. Her cough does not occur in long fits, and she is not short of breath. On physical examination she is not in respiratory distress, afebrile, and has normal vital signs. Lung exam is normal.

**PEDIATRIC Vignette:**
A 2 year old male with no known underlying lung disease presents with a 4-day history of cough and intermittent fever with max Temp of 101. Child is in daycare with multiple sick contacts and is fully immunized. On physical examination child is afebrile, there is clear rhinorrhea, both TMIs are red but not bulging, and vital signs are otherwise normal. Lung exam reveals scattered expiratory wheezes.

What expectations or discussions would you anticipate with this scenario?
What types of educational materials or other resources might be available in these discussions?
If the patient or parent leaves without an antibiotic Rx and is upset:
What are barriers to patient provider communication?
What if the patient or parent files a complaint?
2. Let's talk about the workflow you would expect for this patient.
   a. What would the usual wait time for this patient be?
   b. What is the triage process for this patient?
   c. How would this patient move through the department? Who would talk with the patient?
   d. What is the discharge process?
   e. What is the oversight or regulatory process?

3. How does the team use the EHR in this process? (Probe for type, fit in workflow, eprescribing, order sets if they don’t come up.)

4. Tell me about how the team would handle antibiotic prescription for this patient?
   a. Would this be different based on patient beliefs about antibiotics?
   b. Probe for any education to patients about antibiotic use
   c. What quality metrics might apply to this visit
   d. What support would be available to providers during this encounter to support clinical decision making?

5. What is the general culture around antibiotic stewardship in your department?
   a. What are the barriers to antibiotic stewardship and patient education?
   b. What might facilitate antibiotic stewardship and patient education?
   c. What quality measures are currently being monitored?

6. Tell me about training you have received in any stewardship programs. In your opinion, what types of training and patient education works and what doesn’t?
   a. Discuss features of training in stewardship you sustained over time.
   b. Discuss features of training in stewardship you did not sustain over time.
Antimicrobial Stewardship Pre-Implementation Provider Survey

The following are considered acute upper respiratory infections: the common cold, viral pharyngitis, acute bronchitis, bronchiolitis, croup, laryngitis, acute sinusitis, and acute otitis media.

Practice:

1. How frequently do you prescribe antibiotics to patients with acute bronchitis?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

2. How frequently do you prescribe antibiotics to patients with acute bronchiolitis?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

3. How frequently do you prescribe antibiotics to patients with laryngitis?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

4. How frequently do you prescribe antibiotics to patients with croup?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time
5. How frequently do you prescribe antibiotics to patients with acute *sinusitis*?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

6. How frequently do you prescribe antibiotics to patients with acute *otitis media*?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

7. How frequently do you empirically prescribe antibiotics to patients with *pharyngitis* (without testing for group A strep)?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

8. How frequently do you think other clinicians in your practice prescribe antibiotics for the treatment of non-specific URIs?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

9. In some online studies, a small number of participants do not pay close attention to all of the items they are answering. To indicate that you are paying close attention, please do not mark any of the choices for the following question: How frequently do you think physicians prescribe decongestants for non-specific URIs?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

MITIGATE Antimicrobial Stewardship Toolkit
10. Does your emergency department or urgent care center provide guidelines for prescribing antibiotics for acute respiratory infections?
   a. Yes, please specify __________________________
   b. No
   c. I don’t know

11. Under what clinical conditions would you consider prescribing antibiotics that are non-adherent to professional society practice guidelines?
   Comments:

12. Which guidelines/resources do you use to make decisions for prescribing antibiotics?
   a. Infectious Diseases Society of America (IDSA)
   b. American Academy of Pediatrics
   c. Centers for Disease Control and Prevention
   d. Up to Date
   e. Podcasts (e.g. FMAPR)
   f. Local or institutional guidelines
   g. Other, please specify __________________________

13. In your opinion, what are current barriers to appropriate prescribing for acute respiratory infection? Check all that apply.
   □ Lack of access to guidelines or information on prescribing
   □ Lack of clear evidence and evidence based recommendations
   □ Patient expectations
   □ Psychosocial barriers
   □ Electronic Health Record
   □ Other, please specify __________________________

14. How often do you consult with other colleagues before prescribing antibiotics for acute upper respiratory infections?
   a. <10% of the time
   b. 10-25% of the time
   c. 26-50% of the time
   d. 51-75% of the time
   e. More than 75% of the time

15. To the best of your knowledge, which of the following resources for outpatient antibiotic prescribing are currently present in your emergency department? Check all that apply.
   a. Pharmacist
   b. Direct physician feedback for antibiotic prescribing
   c. Formulary restriction/Required antibiotic approval by Infectious Disease (for any antibiotics)
   d. Published hospital-wide antibiogram (accessible via web, intranet or in print)
   e. Other, please specify __________________________

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f. I do not know

**Attitudes:**

16. Antibiotic resistance is a public health problem facing the United States.
   - a. Strongly Agree
   - b. Agree
   - c. Neutral
   - d. Disagree
   - e. Strongly Disagree

17. Inappropriate antibiotic use contributes to antimicrobial resistance.
   - a. Strongly Agree
   - b. Agree
   - c. Neutral
   - d. Disagree
   - e. Strongly Disagree

18. To what extent do you feel antibiotics are over or underused for acute infections with 1 being very underused and 10 being very overused?

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**Frequently underused**

**Frequently overused**

19. For which conditions are antibiotics most frequently over-prescribed (either inappropriate use or overly broad spectrum use)? Check all that apply.
   - a. Common cold
   - b. Sinusitis
   - c. Otitis media
   - d. Pharyngitis
   - e. Influenza
   - f. Acute bronchitis
   - g. Bronchiolitis
   - h. Asthma
   - i. Skin and Soft Tissue
   - j. Gastrointestinal infection
   - k. Urinary tract infection
   - l. NON-
   - m. Other

**Comments:**

20. For which conditions are antibiotics most frequently under-prescribed (either inappropriate use or overly narrow spectrum use)? Check all that apply.
   - a. Common cold
   - b. Sinusitis
   - c. Otitis media
   - d. Pharyngitis
   - e. Influenza
   - f. Acute bronchitis
   - g. Bronchiolitis
   - h. Asthma
i. Skin and Soft Tissue
j. Gastrointestinal Infection
k. Urinary tract infection
l. NONE
m. Other

Comments:

21. Antibiotic Stewardship programs are important to optimize antibiotic use in the ED and urgent care.
   a. Strongly Agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

22. ED and urgent care patients receive adequate education about the use and duration of antibiotic prescriptions prior to discharge.
   a. Strongly Agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

23. What resources do you use to stay up to date on current approaches to antibiotic prescribing?
   a. Departmental lectures/CME
   b. Web-based resources (Up to Date or other)
   c. Smartphone App or pocket guide (EMRA, Sanford Guide)
   d. Other lectures
   e. Other, Please specify __________________________

24. ED and urgent care based antibiotic stewardship programs would interfere with my usual approach to clinical decision-making in treatment of infectious diseases.
   a. Strongly agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree
   If yes, why: __________________________

25. In your opinion, what are the best strategies to decrease inappropriate use of antibiotics? Check all that apply.
   □ Better education in pre-clinical training (medical/nursing school)
   □ Better education in residency training
   □ Developing rigorous practice guidelines for empiric antibiotic treatment of common infections
   □ Developing more order sets or decision support tools for the ED or urgent care
   □ Other, Please specify __________________________

26. Based on your preference, please rank, in order (1 being the most preferable), the following methods to implement antimicrobial stewardship for the emergency department or urgent care?
   ___ Provider continuing education
   ___ Published institutional or local guidelines
__ Point-of-care clinical decision support via the electronic health record

__ Individual feedback clinicians

__ Other, Please specify ________________________________

If you have any comments about ED or urgent care based antimicrobial stewardship, please provide the

Demographics:

27. Gender
   a. Male
   b. Female

28. What is your clinical role within your hospital ED or urgent care?
   a. Attending physician
   b. Fellow physician
   c. Resident physician
   d. Nurse practitioner
   e. Physician assistant
   f. Other, Please specify ________________________________

29. For how many years have you worked in this position? ____________

30. Proportion of pediatric patient’s ages 0-17 seen?
   □ 100%
   □ >75%
   □ 50-74
   □ 26-49
   □ 11-25
   □ <10

31. What is your training? Check all that apply.
   □ Internal medicine
   □ Emergency medicine
   □ Pediatrics
   □ Pediatric emergency medicine
   □ Specialized residency
   □ Other, Please specify ________________________________

32. Board Certified? Y/N

33. Board Eligible? Y/N

34. How long have you been practicing as an independent provider (since completion of training)?
   ____________ months or years
Antimicrobial Stewardship Post-Implementation Provider Survey

Attitudes:

1. Antibiotic resistance is a public health problem facing the United States.
   a. Strongly Agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

2. Inappropriate antibiotic use contributes to antimicrobial resistance.
   a. Strongly Agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

3. Do you feel antibiotics are overused or underused in your emergency department or urgent care center with 1 being very underused and 10 being very overused?

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Frequently underused  Frequently overused

4. For which conditions are antibiotics most frequently over-prescribed (either inappropriate use or overly broad spectrum use)? Check all that apply.
   a. Common cold
   b. Sinusitis
   c. Otitis media
   d. Pharyngitis
   e. Influenza
   f. Acute bronchitis
   g. Bronchiolitis
   h. Asthma
   i. Skin and Soft Tissue
   j. Gastrointestinal infection
   k. Urinary tract infection
   l. NONE
   m. Other

Comments:

5. For which conditions are antibiotics most frequently under-prescribed (either inappropriate use or overly narrow spectrum use)? Check all that apply.
   a. Common cold
   b. Sinusitis
   c. Otitis media
   d. Pharyngitis
   e. Influenza
   f. Acute bronchitis
   g. Bronchiolitis
   h. Asthma
   i. Skin and Soft Tissue
j. Gastrointestinal infection
k. Urinary tract infection
l. NONE
m. Other

Comments:

6. Antibiotic Stewardship programs are important to optimize antibiotic use in the ED and urgent care.
   a. Strongly Agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

7. ED and urgent care patients receive adequate education about the use and duration of antibiotic prescriptions prior to discharge.
   a. Strongly Agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

8. What resources do you use to stay up-to-date on current approaches to antibiotic prescribing?
   a. Departmental lectures/CMF
   b. Web-based resources (Up to Date or other)
   c. Smartphone App or pocket guide (EMRA, Sanford Guide)
   d. Other lectures
   e. Other, Please specify ___________________________

ED/Urgent Care Stewardship Experience:

9. Did you take part in the ED or urgent care stewardship program for acute respiratory infections?
   a. Basic intervention (education materials)
   b. Enhanced intervention (individual audit and feedback, peer to peer comparisons)
   c. I don't know

10. Which components of our stewardship intervention did you receive?
    a. Educational presentations at Academic forum or other venues
    b. Distribution of clinical practice guidelines in person
    c. Distribution of clinical practice guidelines electronically
    d. Emails from stewardship program
    e. Departmental feedback on overall prescribing
    f. Individualized audit and feedback on your practice patterns
    g. I don't know

11. Did you participate in the individual audit/feedback portion of the ED or urgent care stewardship program?
    a. Yes
    b. No
    c. I don't know
Please answer the following three questions if you participated in the audit and feedback portion of the program.

12. Did you find it the audit and feedback portion of the program:
   a. Very useful
   b. Mostly useful
   c. Somewhat useful
   d. Marginally useful
   e. Not at all useful

13. How bothersome was the audit and feedback?
   a. Extremely intrusive
   b. Very intrusive
   c. Somewhat intrusive
   d. A little intrusive
   e. Not at all intrusive

14. How willing were you to change your practices based on the audit and feedback, with 1 being unwilling and 10 being very willing?

   1 2 3 4 5 6 7 8 9 10

   Unwilling           Very willing

15. Do you believe that ED and urgent care based antibiotic stewardship programs would interfere with my usual approach to clinical decision-making in treatment of infectious diseases.
   a. Strongly agree if yes, why: __________________________
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

16. In your opinion, what are the best strategies to decrease inappropriate use of antibiotics? Check all that apply.
   □ Better education in pre-clinical training (medical/nursing school)
   □ Better education in residency training
   □ Developing rigorous practice guidelines for empiric antibiotic treatment of common infections
   □ Developing more order sets or decision support tools for the ED or urgent care
   □ Other, Please specify __________________________

17. Based on your preference, please rank, in order (1 being the most preferable), the following methods to implement antimicrobial stewardship for the emergency department or urgent care?
   ___ Provider continuing education
   ___ Published Institutional or local guidelines
   ___ Point-of-care clinical decision support via the electronic health record
   ___ Individual feedback clinicians
   ___ Other, Please specify __________________________

18. What barriers do you see in appropriate prescribing for acute respiratory infections?

MITIGATE Antimicrobial Stewardship Toolkit
Appendix K

MITIGATE Antimicrobial Stewardship Toolkit

https://stacks.cdc.gov/view/cdc/80653

MITIGATE ANTIMICROBIAL STEWARDSHIP TOOLKIT

A guide for practical implementation in adult and pediatric emergency department and urgent care settings

Larissa May, Kabir Yadav, Samuel D. Gaona, Rakesh Mistry, Aubyn Stahmer, Daniela Meeker, Jason Doctor, and Ross Fleischman.

Version 4/13/18