



# Toolkit and Comprehensive User Guide to Enhance Nursing Antibiotic Stewardship Activities: Nurses Take Antibiotic Stewardship Action Initiative

Despite discussions at the national level about the need to integrate nurses into antibiotic stewardship (AS) activities, there are limited tools and resources for Antimicrobial Stewardship Programs (ASPs), nursing, or hospital leadership to facilitate implementation of nurse-based AS interventions in acute care hospitals. This toolkit provides materials to: (a) engage front-line nurses in AS, (b) obtain leadership support to implement nurse-driven AS activities, and (c) implement a nurse-driven diagnostic stewardship intervention to improve urine and respiratory culturing practices and a penicillin allergy algorithm to improve penicillin allergy documentation.

This toolkit and guide were developed by the Johns Hopkins University with collaboration from the Johns Hopkins Hospital Department of Antimicrobial Stewardship, with support from a U.S. Centers for Disease Control and Prevention (CDC) contract.

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## Introduction to the Emergent Role of Nursing in AS and Potential Outcomes of Nursing Involvement

Participation of nurses in Antibiotic Stewardship (AS) activities is recommended by the American Nurses Association and the Centers for Disease Control and Prevention [1]. However, there is a paucity of information on how or what nursing interventions lead to improved antibiotic use in acute care settings. Nurses have indicated that some activities that may impact antibiotic use (e.g., providing input on the necessity of bacterial cultures) are within their scope of practice [2]. While clinical pathways to optimize urine and respiratory culturing adopted by nurses in the long-term care (LTC) setting have improved patient care [3, 4], such approaches have not been employed in most acute care settings.

In the hospital, most AS interventions occur after patients have microbiology cultures or infectious diagnostic tests sent and empiric antimicrobial therapy started, when the opportunity to review the necessity of microbiology cultures, or a *Clostridioides difficile* stool test or a patient's antibiotic allergy history to ensure prompt receipt of the best empiric therapy has passed. Nurses generally interact with patients before the AS team and often before primary prescribers; thus, they are in a unique position to positively influence decisions about sending microbiology cultures, a *C. difficile* stool test and obtaining initial antibiotic allergy histories. Nurses have been instrumental in reducing hospital-acquired infections such as catheter-associated urinary tract infections (CAUTI) and central line-associated bloodstream infections (CLABSI) by implementation of checklists and bundle interventions.

While bedside nurses are not responsible for prescribing antibiotics themselves, nurses can still play a role in AS. There are many proposed ways in which nurses can enhance AS activities [1, 5]. In this toolkit, we provide tools and resources to implement nurse-driven interventions aiming at (1) reducing unnecessary urine culture with the ultimate goal of reducing inappropriate antibiotic treatment of asymptomatic bacteriuria (ASB), (2) reducing unnecessary respiratory cultures with the ultimate goal of reducing inappropriate antibiotics for positive respiratory cultures without clinical evidence of bacterial pneumonia, (3) reducing unnecessary testing for *C. difficile* with the goal of reducing unnecessary treatment in patients who are likely colonized in who *C. difficile* antibiotic therapy may enhance toxin production at the same time of affecting the patient's gut microbiota and (3) improving penicillin allergy documentation with the goal of increasing  $\beta$ -lactam use whenever possible and indicated.

### Facilitator Guide to Obtain Support from Stakeholders

One of the first steps in engaging front-line nurses in AS activities is to obtain support from both nursing and physician groups. We recommend starting the conversation with the unit manager to assess feasibility, learn about competing initiatives, understand unit priorities and define the best time to implement new initiatives. In some hospitals the unit manager may need to

consult/obtain approval with the director of nursing before any quality improvement project is initiated to ensure appropriate approvals are in place.

The initial contact may be via electronic mail; however a follow up in-person meeting is strongly recommended.

- An email template to start the conversation with providers is provided [here](#).
- An email template to start the conversation with nurses is provided [here](#).
- Talking points regarding the importance of integration of nurses in AS are provided here:
  - [The Role of the Bedside Nurse in AS Slide Deck](#)
  - [The Role of the Bedside Nurse in AS Script](#)

## Implementation Checklist

This checklist will assist the individual considering to implement a nurse-driven AS intervention in ensuring all basic steps have been considered before launching the initiative.

- Checklist provided [here](#).

## Implementation Framework

In order to integrate staff nurses into AS activities in a meaningful and sustainable way, nurses need to: a) learn the principles of AS and particular topics most relevant to them such as best culturing practices or obtaining accurate penicillin allergy histories, b) be able to communicate effectively with the rest of the medical team about these topics, and c) be familiar with an implementation framework. The Plan-Do-Study-Act cycle is a commonly used quality improvement framework that is an iterative process beginning with developing a plan to test a proposed improvement change (Plan), carrying out the test (Do), observing and learning from the consequences (Study), and determining what modifications should be made to the test (Act). Some advantages of adopting such framework include: opportunity to examine if the proposed change is leading to the desired improvement and opportunity to address concerns of those involved to prevent major setbacks.

To assess the progress of the intervention, the team will need to think of how this will be tracked. In the case of microbiologic cultures, the team may be able to get a report from either the electronic medical record or from the microbiology laboratory. Temporal trends can be performed in Microsoft Excel (Microsoft Office Professional Plus 2016). Run charts and control charts present data over time and enable quick identification of variation that is unlikely due to chance (special-cause variation)[6]. Run charts display data over time with a median line that indicates the central tendency. Control charts have advantages over run charts in that they define expected variation in a process; they provide an upper and lower control limits defined by the distribution of the data with 3 standard deviations above or below the centerline.

Additional discussion on how to best display and analyze data can be found here:

- [Introduction to Quality Improvement](#)
- [Displaying and Analyzing Quality Improvement Data](#)

Additionally, depending on resources the team may want to review cases to provide feedback on appropriateness and ongoing inappropriate reasons for testing. Likewise for the penicillin allergy documentation improvement project, providing feedback on specific areas of documentation will be helpful for nurses to know where the gaps are (e.g., review some cases and report percentage of cases with non-specified skin rash).

A more in-depth reading regarding a practical approach to integrate bedside nurses in AS can be found here:

- [A Practical Approach to Integrating Bedside Nurses into Antibiotic Stewardship](#)

## Educational Material

Nurses have previously identified limited formal education on antibiotics and microbiology as a barrier to their participation in AS activities [7, 8]. In this toolkit, you will find four 15–30 minute topic-specific modules with accompanying scripts:

- Urinary Tract Infection 101 for Nurses
  - [Slide Deck](#)
  - [Script](#)
- Pneumonia 101 for Nurses
  - [Slide Deck](#)
  - [Script](#)
- Penicillin Allergy 101 for Nurses
  - [Slide Deck](#)
  - [Script](#)
- *Clostridioides difficile* 101 for Nurses
  - [Slide Deck](#)
  - [Script](#)

These presentations were developed for nurses; however, the materials can be used by other health care providers (e.g., physicians in training, medical students, medical assistants, respiratory therapists, occupational and/or physical therapy).

Key points regarding urine and respiratory cultures and documentation of penicillin allergy have been summarized into one-page documents and are available here:

- [Urine Cultures One Pager](#)
- [Respiratory Cultures One Pager](#)
- [Penicillin Allergy One Pager](#)

## Algorithms

Prior to algorithm implementation, a meeting should be held with nurses to ensure they understand the content of the algorithms and feel comfortable using them. The algorithms are intended for use by nurses primarily but not exclusively (the algorithms can be used by any healthcare provider with authority to document allergy histories and or order urine and respiratory cultures).

### Instructions for Urine Culture Algorithm Use

- The algorithm can be found [here](#).
- This algorithm is for use in hospitalized adult patients *with or without* an indwelling urinary catheter.
- The algorithm should not be used for the following patients: pregnant women and those undergoing urologic procedures associated with mucosal bleeding.
- We recommend not using this algorithm for patients with neurogenic bladder given that symptoms in these patients may be unusual and not addressed in the algorithm or for patients with renal transplant < 1 month since the role of treatment of ASB in the early post-transplant period remains under investigation.
- An additional resource recommended for use in conjunction with this algorithm is the [SBAR Tool](#) (Situation-Background-Assessment-Recommendation) to aid nurses in communicating their assessments to the respective ordering provider. The tool is also provided in Additional Resources below.

### Instructions for Respiratory Culture Algorithm Use

- The algorithm can be found [here](#).
- This algorithm is for use in hospitalized adult patients in *intensive care units*.
- If the pathway in the algorithm ends in “do no collect a respiratory specimen for bacterial culture, communicate with ordering provider”, review the need for the respiratory culture with the rest of the primary team.
- An additional resource recommended for use in conjunction with this algorithm is the [SBAR Tool](#) (Situation-Background-Assessment-Recommendation) to aid nurses in communicating their assessments to the respective ordering provider. The tool is also provided in Additional Resources below.

### Instructions for Penicillin Allergy Algorithm Use

- Use this algorithm for patients who report an allergy to penicillin and/or aminopenicillins (amoxicillin, ampicillin), or for patients who develop a reaction to penicillin during their hospital stay in order to accurately document the reaction type.
- The algorithm with pictures of most common skin reactions can be found [here](#).
  - If utilizing this version, print in color for maximum impact. This algorithm contains a list of most common  $\beta$ -lactams to help your patient in recalling the antibiotic they were allergic to, or any  $\beta$ -lactams they have taken successfully subsequent to their allergic episode.

- The same algorithm without pictures and can be printed in black and white and can be found [here](#).

The instructions for algorithm use are also available as attachments and are provided here:

- [Instructions for Urine Culture Algorithm Use](#)
- [Instructions for Respiratory Culture Algorithm Use](#)
- [Instructions for Penicillin Allergy Algorithm Use](#)

## Troubleshooting Guide

This guide provides common scenarios with solutions that may be encountered when implementing a nurse-driven AS intervention. It outlines some barriers and solutions that may be encountered during the process of involving nurses in antibiotic stewardship activities. For an additional resource on implementation of nurse-driven stewardship interventions, refer to the article below (also present in Implementation Framework).

- [Troubleshooting Guide](#)
- [A Practical Approach to Integrating Bedside Nurses into Antibiotic Stewardship](#)

## Additional Resources

- A [focus group guide](#) to assess baseline knowledge and perceptions regarding antibiotic use and antibiotic stewardship.
- Progress report templates:
  - [Urine Progress Report Template](#)
  - [Respiratory Progress Report Template](#)
  - [Penicillin Allergy Documentation Progress Report Template](#)
- A logo for nurse antibiotic stewardship activities and initiatives:
  - [Proud to be a Nurse Antibiotic Steward Logo](#)
- [SBAR Communication Tool](#)
- Penicillin allergy materials for unit floor:
  - Interpretation guides to most commonly seen skin reactions to antibiotics:
    - [Skin Reaction Interpretation Form for Nurses](#)
    - [Skin Reaction Interpretation Form for Patients](#)
  - An assessment tool for nurses: [Penicillin Allergy Assessment Tool for Nurses](#)
  - Penicillin allergy documentation reminders to place on workstations:
    - [Penicillin Allergy Trigger for Workstations](#)

## References

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