2019

APIC Applied Learning Conference

APIC EDUCATION

How to use the Microbiology Lab

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Disclosures

- Tim Landers: No disclosures

Objectives

- Identify the steps in obtaining and processing microbiologic specimens
- Understand the role of clinical staff, laboratory staff, and IPs in microbiology specimens
- Apply quality improvement concepts to microbiology specimens

Specimen Collection and Handling is Key

Collect from purulent material after cleaning wound surface; avoid adjacent skin or tissue

Collect at optimal time (early morning for TB)

Minimize transport time and use preservative if transport is delayed

Collect prior to administration of antibiotic if possible

Collect enough specimen, the correct number of samples and in the appropriate container

Diagnostic Stewardship

“Coordinated guidance and interventions to improve appropriate use of microbiological diagnostics to guide therapeutic decisions. It should promote appropriate, timely diagnostic testing, including specimen collection, and pathogen identification and accurate, timely reporting of results to guide patient treatment.”

World Health Organization

Diagnostic Stewardship

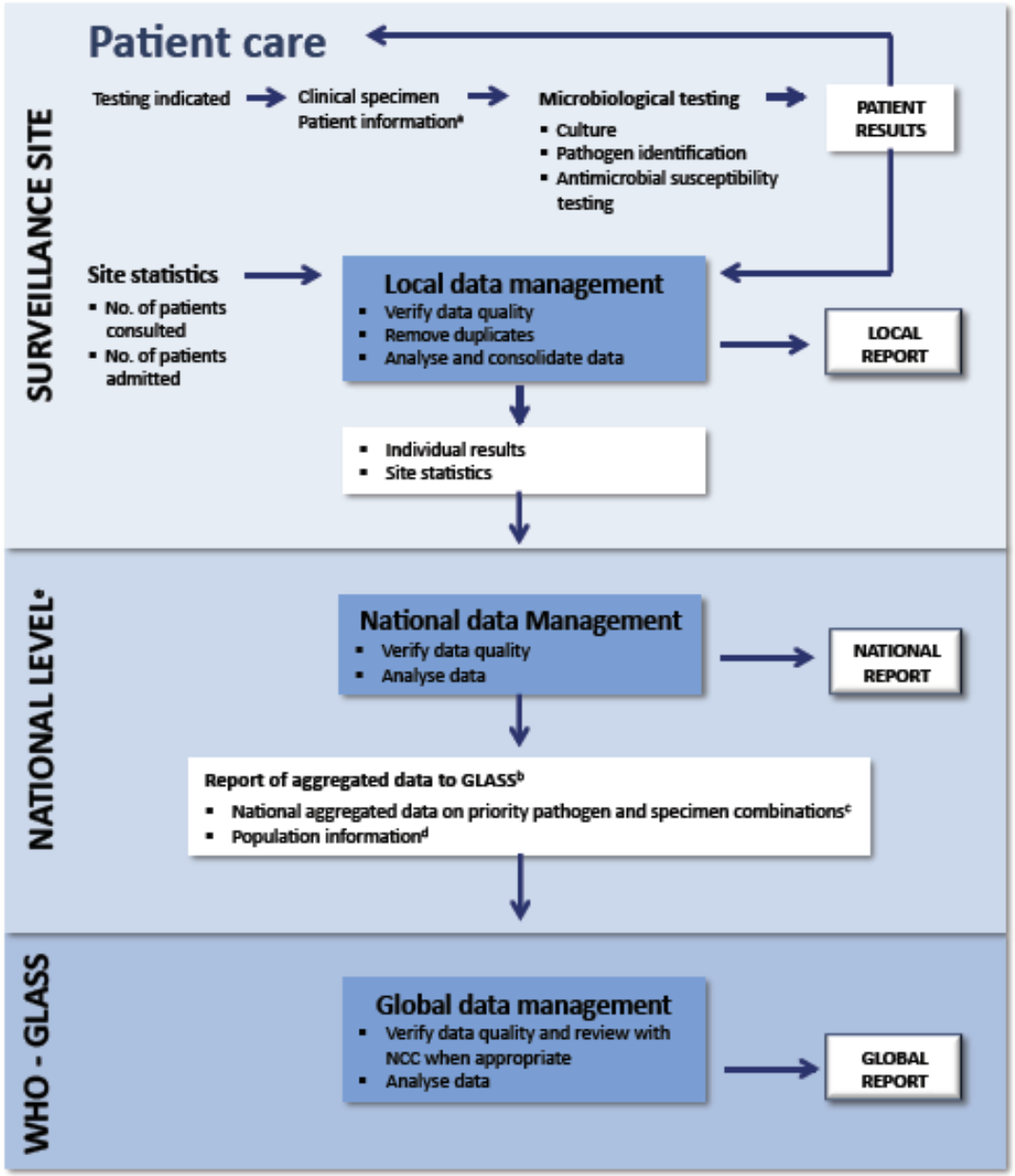
Modifying the process of

ordering

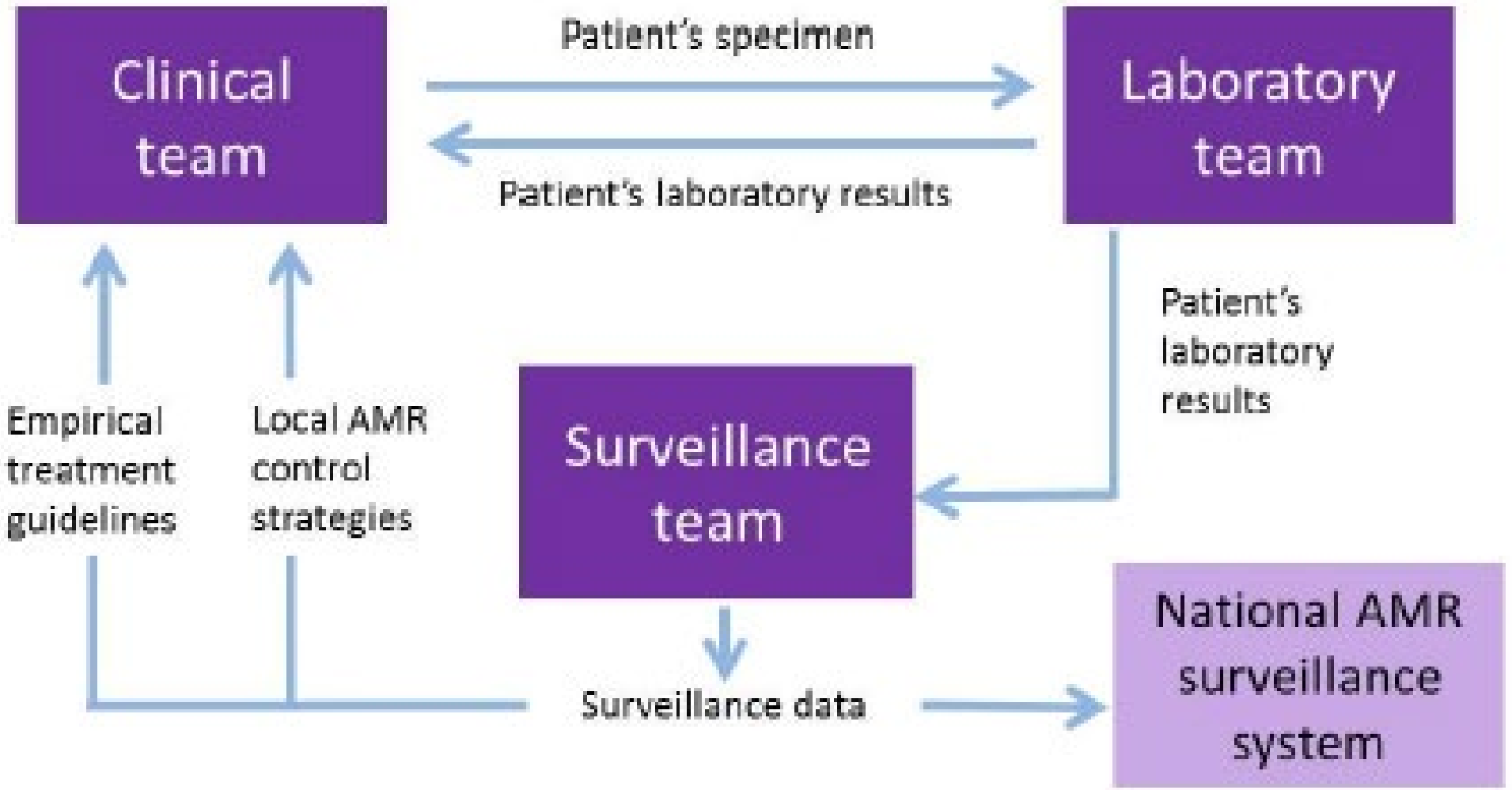
performing

and reporting

diagnostic tests to improve treatment of infections and other conditions.



a. Core patient information: age, date of birth, gender, specimen type, date of specimen collection, hospital or community origin, use of antimicrobial agents (see Annex 2).
b. Structure for reporting aggregated data at country level given in Annex 3.
c. Priority pathogen-specimen combinations are listed in Tables 2 and 3.
d. Population information as described in 2.1.1.
e. National level includes the national surveillance coordinating centre and the national reference laboratories.


Clinical team
Patient's specimen
Patient's laboratory results
Laboratory team
Patient's laboratory results
Empirical treatment guidelines
Local AMR control strategies
Surveillance team
Surveillance data
National AMR surveillance system

Different Questions – Different Groups

- An integral part of antibiotic stewardship
- Essential for infection prevention and control
- Ensures timely & accurate results
- Requires
  - Good laboratory management
  - Capacity and capability

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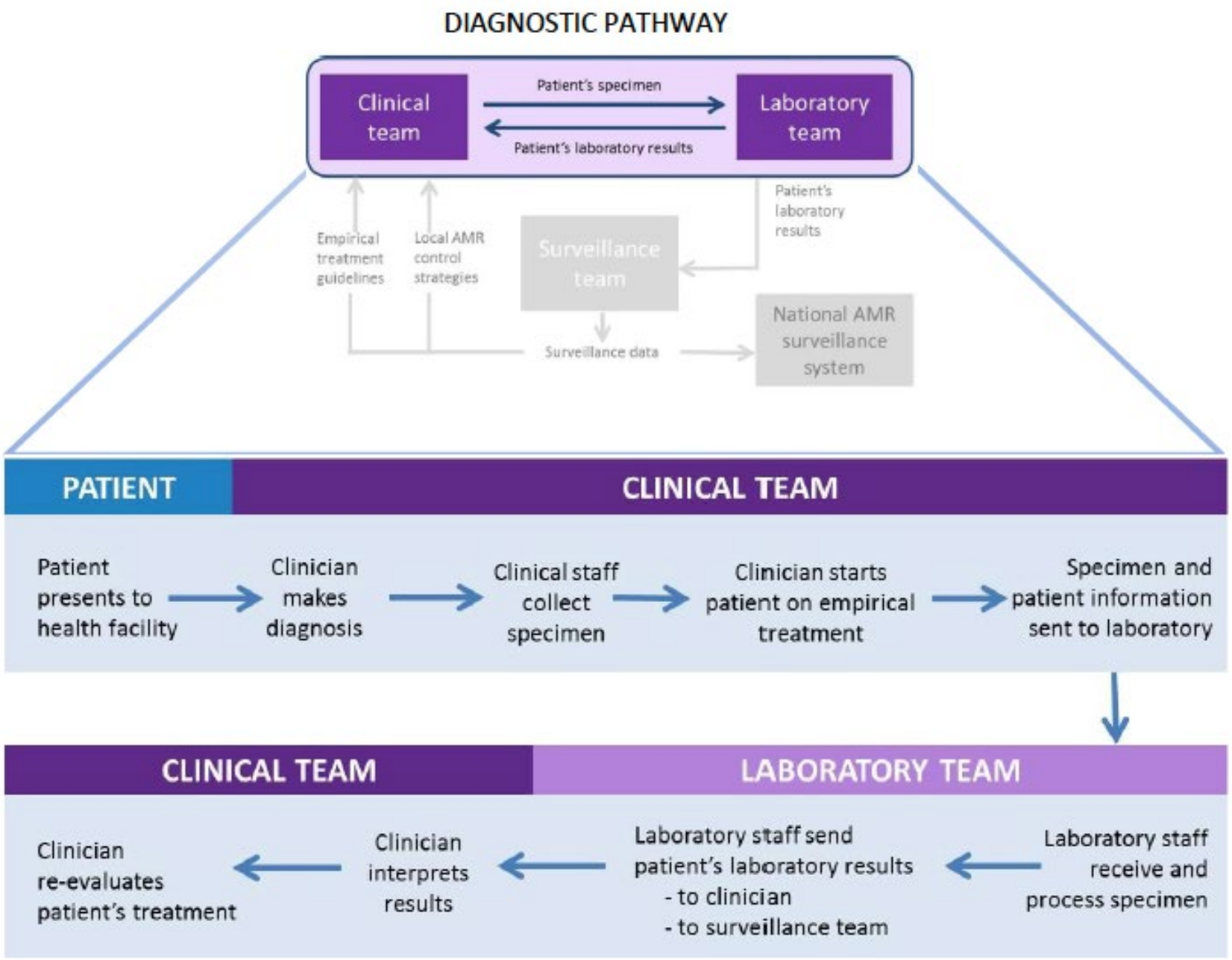
DIAGNOSTIC PATHWAY
Clinical team
Patient's specimen
Patient's laboratory results
Laboratory team
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Surveillance data
PATIENT
CLINICAL TEAM
Patient presents to health facility
Clinician makes diagnosis
Clinical staff collect specimen
Clinician starts patient on empirical treatment
Specimen and patient information sent to laboratory
CLINICAL TEAM
LABORATORY TEAM
Clinician re-evaluates patient's treatment
Clinician interprets results
Laboratory staff send patient's laboratory results
- to clinician
- to surveillance team
Laboratory staff receive and process specimen

Role of surveillance team

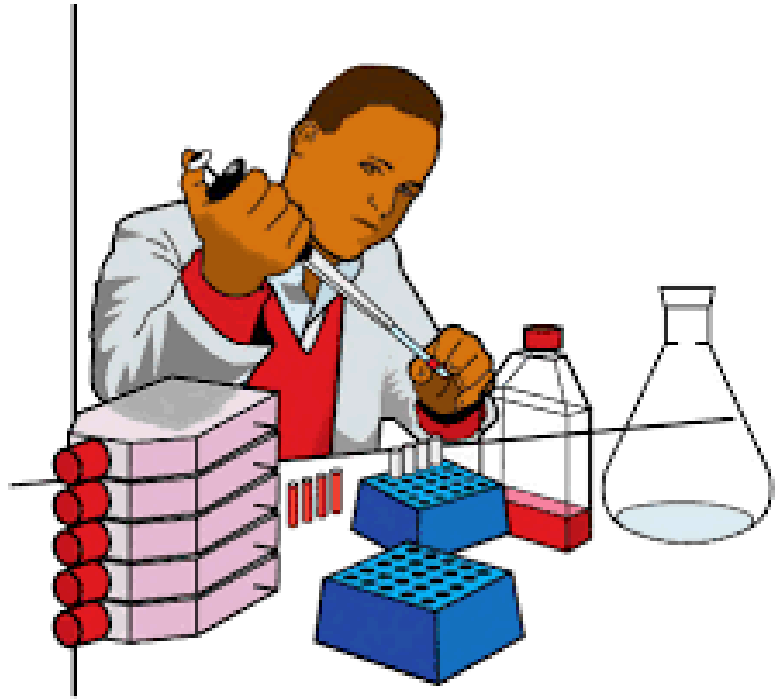
- Include key staff
  - Clinical
  - Laboratory
  - Administrative
- Work is broad
  - Develop, adopt, implement QM and SOPs
  - Review training needs
  - Promote good practices
  - Monitor progress
  - Review issues & identify solutions
  - Link with antibiotic stewardship activities

Role of clinical staff

- Correct indication
- Asccurate & complete patient information
- Interpret & act on results
- Collect specimens
- Identify specimens
- Verify storage and transportation

Role of laboratory staff

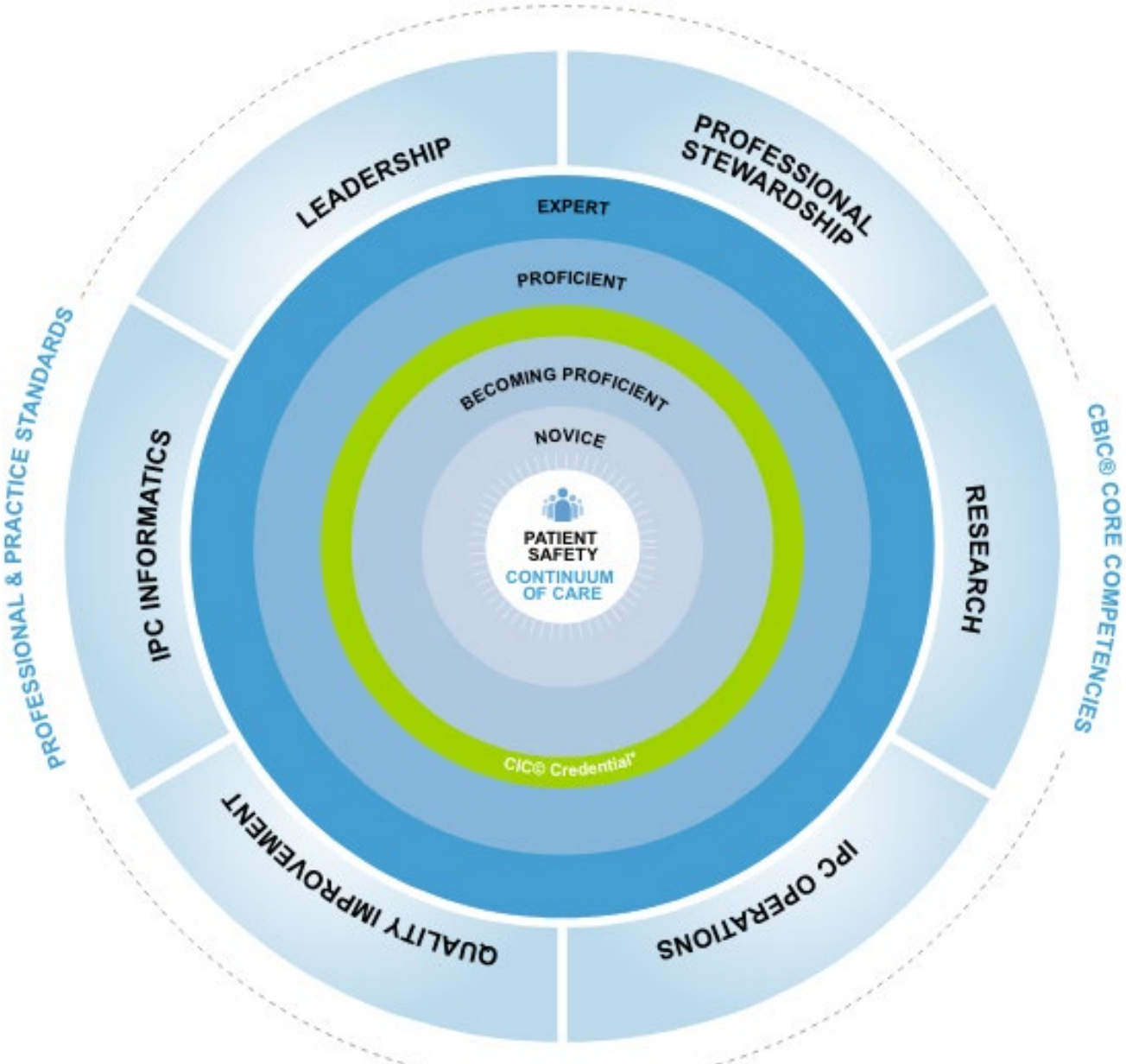
- Log specimens
- Process according to SOPs
- Read & record results
- Provide accurate & timely results
- Follow-up on additional requests & questions
- Provide data to surveillance staff
- Ensure QC procedures



Role of the IP

- Compile and analyze results
- Disseminate results to clinicians & lab staff
- Transmit reports to leadership
- Compile and report to outside agencies

Role of the IP



Infection Prevention Competencies

- Interpret the relevance of diagnostic and laboratory reports
  - Know the different specimen “types”
    - Blood, urine, respiratory
  - Guidelines for specimen collection
  - Transportation best practices, especially time-related
  - Handling to avoid contamination
  - Different storage requirements for different specimen types

Infection Prevention Competencies

- Interpret the relevance of diagnostic and laboratory reports
- Identify appropriate practices for specimen collection, transportation, handling, and storage
- Correlate clinical signs and symptoms with infectious disease process

Types of specimens

- Blood
- Urine
- Stool
- Wound samples
- CSF
- Genital swabs
- Others??

Specimen identification

Patient identification	
a. Unique identification number _____ b. Name: (family name, given name(s)) _____ _____	Gender: Male ❒ Female ❒
Date of birth: (yyyy/mm/dd) _____ Years _____ Months (if < 1 year) _____	
Specimen information: ❒ Blood ❒ Urine ❒ Faeces ❒ Urethral secretion ❒ Cervical secretion ❒ Other	
Date of specimen collection: (yyyy/mm/dd) _____	Had the patient been hospitalized for more than 2 calendar days at the time for sampling? ❒ Yes ❒ No

Sample diagnostic stewardship recommendations

- CAUTI
  - Only obtain cultures in febrile catharized patients
    - When urinary tract is suspected
    - Neutropenic patients
    - Recent surgery
    - Urinary Obstruction

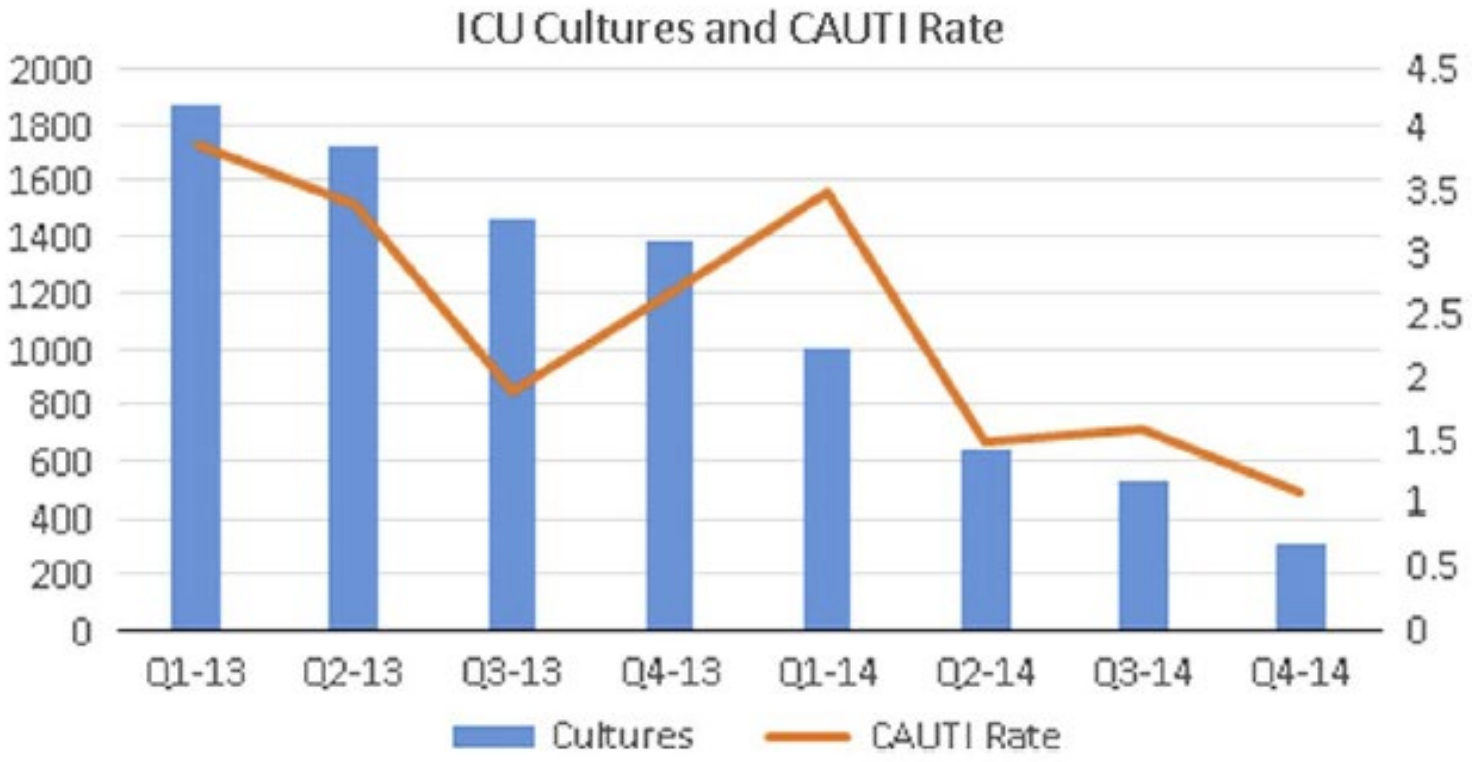
Adopted from Madden, et al. (2018) ICHE

Urine Culture Stewardship

- Reduction in CAUTI Rates
  - Implementation of multidisciplinary Team
  - Applied CDC, ACCCM, IDSA guidelines

Mullin, et al. 2017. ICHE

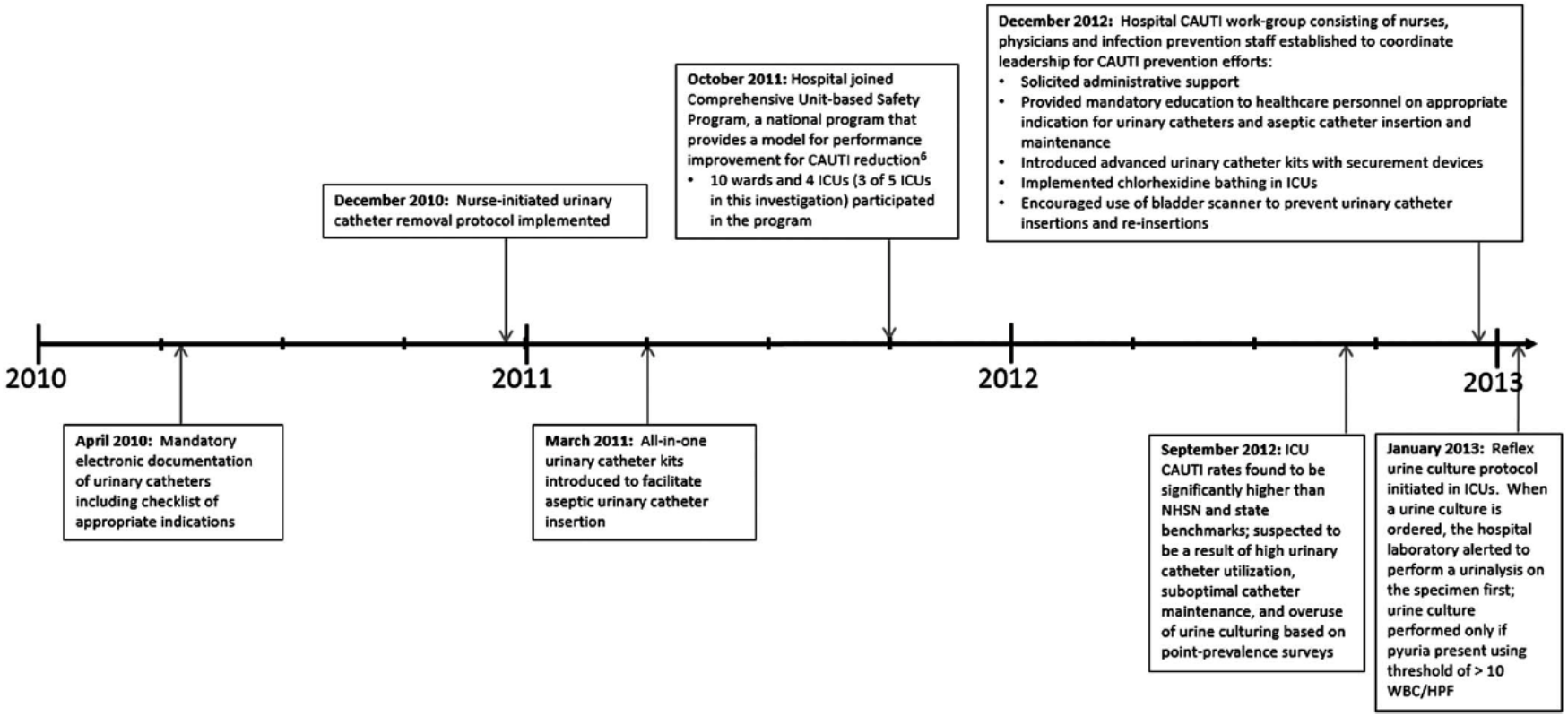
Urine Culture Stewardship



Mullin, et al. 2017. ICHE

- Reduction in CAUTI Rates
  - Urine culture protocols compared
    - Urine culture only
    - Urine dipstick, then culture with pyuria

Adopted from Epstein, et al. (2016) ICHE



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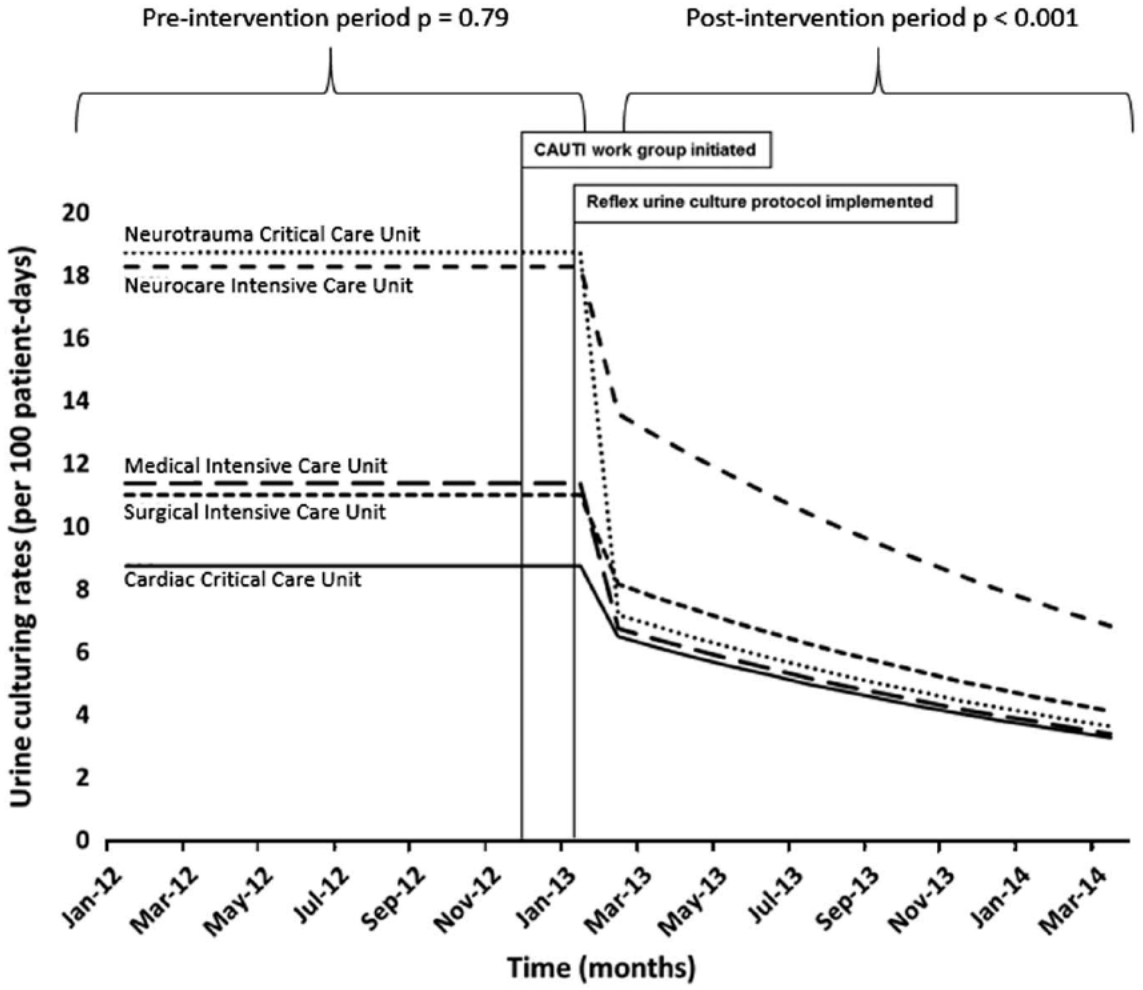


Adopted from Spstein, et al. (2016) ICHE

Sample diagnostic stewardship recommendations

- Clostridium difficile
  - Avoid testing <1 years
  - Test 1-2 years after other causes considered
  - Test only symptomatic patients with diarrhea and suspicion for CDI

Adopted from Madden, et al. (2018) ICHE

Sample diagnostic stewardship recommendations

- Designed CPOE alert to decrease C diff testing
- Clinician education on indications for CDI testing
- Implemented CPOE

Adopted from Nicholson et al. 2017 ICHE

VUMC Guidelines for C. difficile testing:

1) Test only patients with clinically-significant diarrhea (3 or more loose stools per day for at least 1 to 2 days).
2) Testing is only performed on loose or watery stool specimens.
3) Do not order multiple tests for C. difficile on a single patient (*i.e. "C. diff x 3"*). For most patients, only one test should be ordered to rule in or out C. difficile infection, given the test's very high negative predictive value.
4) Repeat stool testing for test of cure is **NOT** recommended.
5) Patients for whom a C. difficile test is ordered are placed on empiric Contact Precautions.
6) A negative test is **NOT** required for removal from isolation precautions.

** Once a patient tests positive for C. difficile, the laboratory will NOT perform testing for C. difficile for the subsequent 7 days. **

** In addition, for patients who have not tested positive for C. difficile,
only two (2) tests will be allowed per patient in a 7 day period. **

****This patient is less than 3 years old****

Clostridium difficile frequently colonizes the gut in children less than age 3 and rarely causes clinical illness. Current guidelines from the American Academy of Pediatrics recommend avoiding testing in children less than age 1 and testing in children ages 1-3 years only after other causes have been excluded.

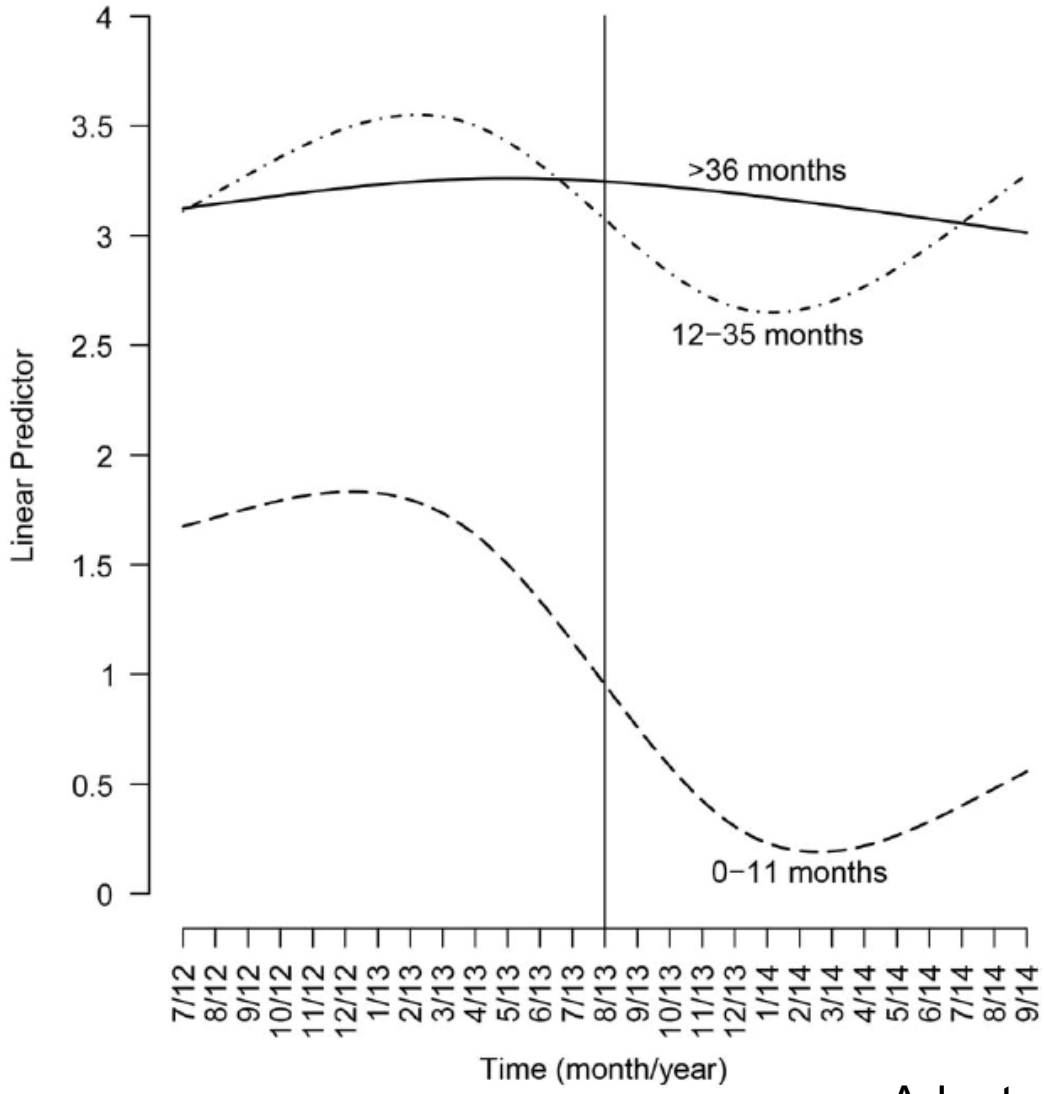
Please select an override reason to continue ordering this test

- ○ Antibiotic use within 30 days of symptom onset
- ○ Hirschsprung's disease or significant gastrointestinal motility disorder
- ○ Bloody diarrhea and close contact with recent C. difficile infection
- ○ Other causes have been excluded
- ○ Other: [ ]

Order Test: Stool for C. Difficile Toxin

TABLE 1. *Clostridium difficile* Tests Ordered per 10,000 Patient Days

Age Group	Before Intervention	After Intervention	*P* Value
0–11 months old, median (IQR)	11.5 (8.2–14.8)	0 (0–6.6)	<.001
12–35 months old, median (IQR)	61.6 (42.6–69.9)	30.1 (27.7–46.7)	<.001
0–35 months old, median (IQR)	30.0 (11.4–61.8)	10.9 (0–31.2)	.009
≥36 months old, median (IQR)	50.9 (45.6–59.6)	46.4 (40.0–56.6)	.300

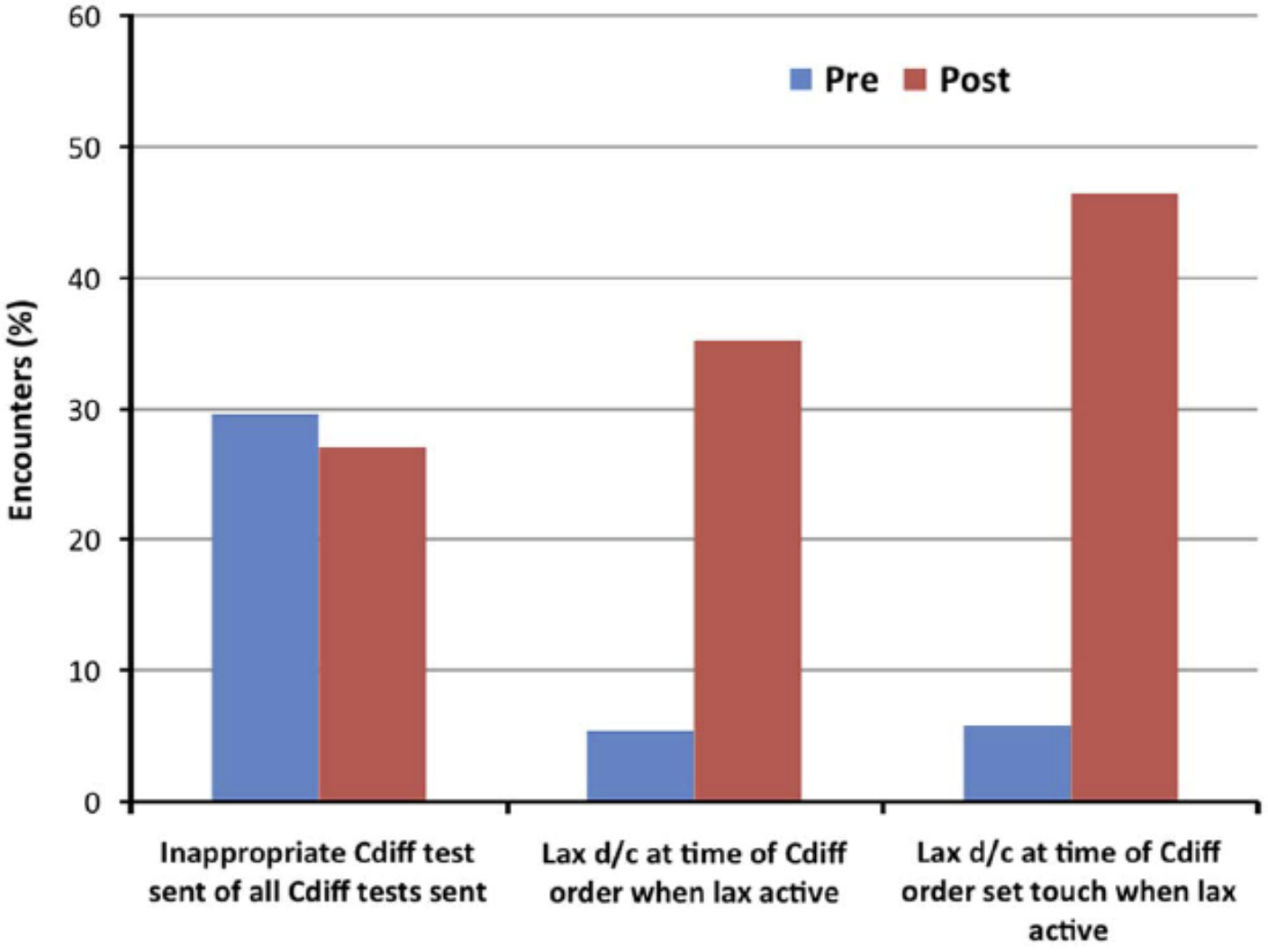


Adopted from Nicholson et al. 2017 ICHE

Sample diagnostic stewardship recommendations

- Order set developed
- Use of laxatives
- “Consider d/c and re-evaluate”

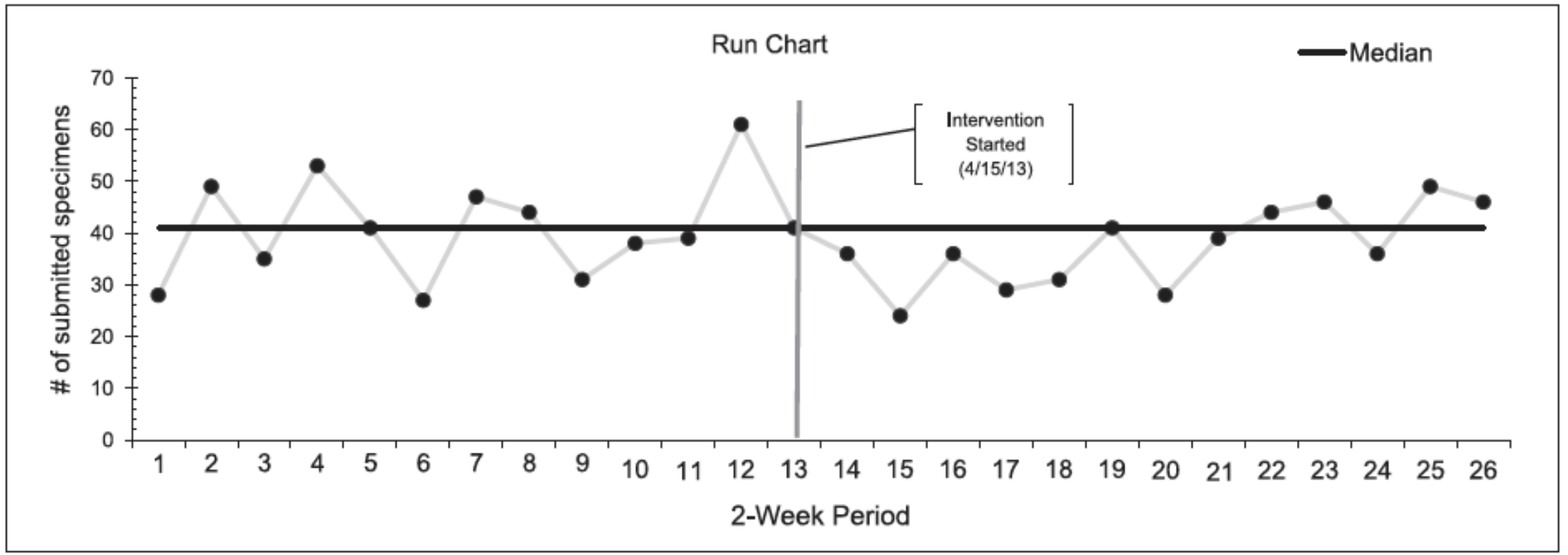
Adopted from White et al 2017. ICHE


60
50
40
30
20
10
0
Encounters (%)
Pre
Post
Inappropriate Cdiff test sent of all Cdiff tests sent
Lax d/c at time of Cdiff order when lax active
Lax d/c at time of Cdiff order set touch when lax active

Sample diagnostic stewardship recommendations

- CDI Initiative
- Multidisciplinary Initiative
- Computerized order entry
- Automatic rejection of non-liquid stool
- Rejection of stool <12 mos

Adopted from Klate et al. 2016. Hosp Peds



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Sample diagnostic stewardship recommendations

- CLABSI
  - Obtain paired high quality specimens
  - Use trained phlebotomist
  - Draw catheter-obtained specimens only when CLBSI is suspected

Adopted from Madden, et al. (2018) ICHE

Sample diagnostic stewardship recommendations

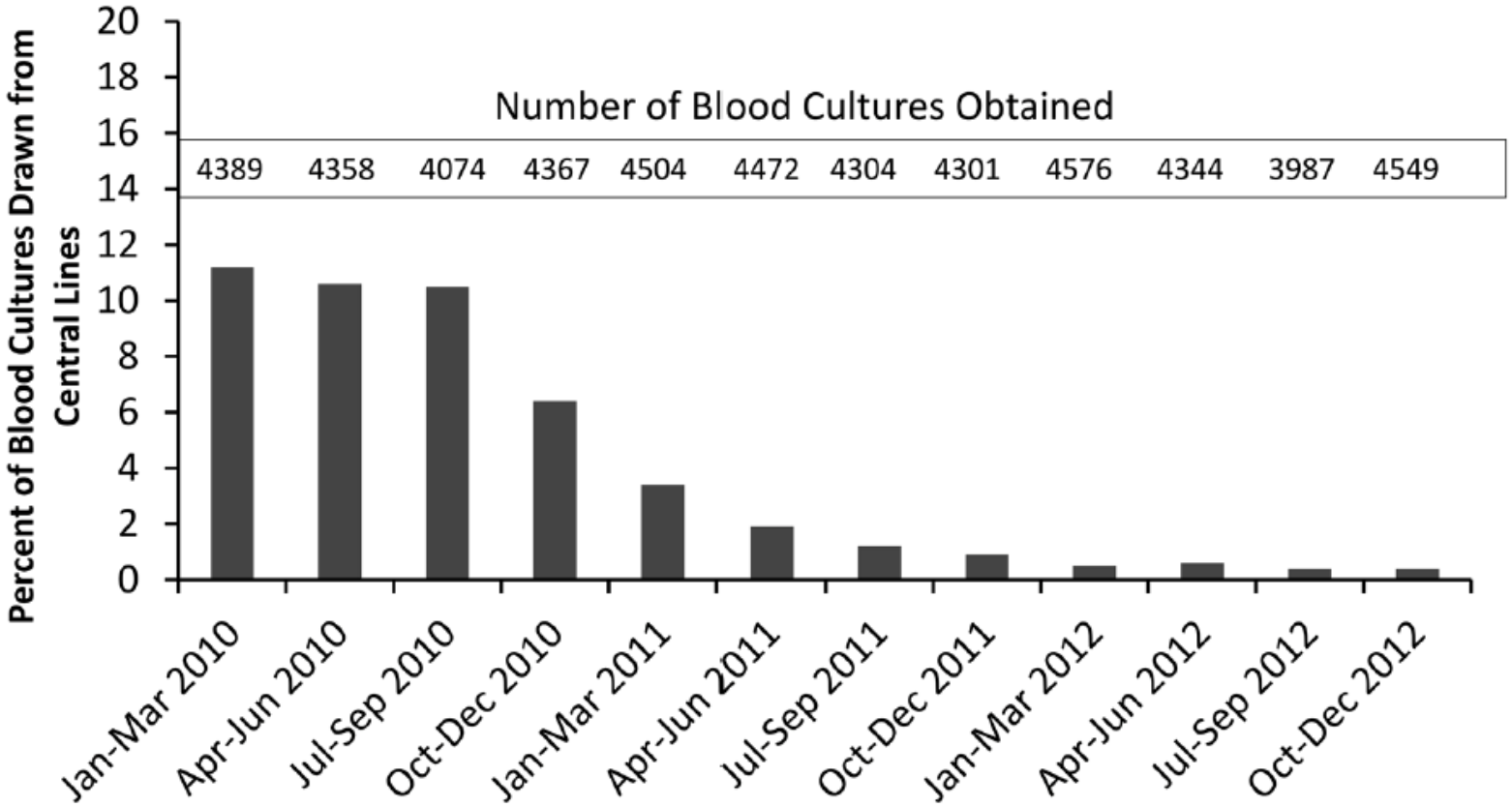
- CLABSI
  - Obtain paired high quality specimens
  - Use trained phlebotomist
  - Draw catheter-obtained specimens only when CLBSI is suspected

Adopted from boyce et al. ICHE. 2013

Sample diagnostic stewardship recommendations

- Revised blood culture collection protocol
- Education of IV team
- Preparation of supply kits
- Rates of contamination monitored

Adopted from Boyce et al. ICHE. 2013



- Adopted from Boyce et al. ICHE. 2

Sample diagnostic stewardship recommendations

- VAP
  - Avoid “surveillance” respiratory specimens
  - Base empiric treatment on local antibiogram

Adopted from Madden, et al. (2018) ICHE

Steps in Diagnostic Stewardship

STEPS	EXAMPLES
PLANNING (baseline)	• Situation analysis, resources and needs assessment conducted
INPUT (needed resources)	• Funding for diagnostic stewardship activities in the surveillance site • Local guidelines and SOPs for diagnostic stewardship • Trained and capacitated staff on local diagnostic stewardship guidelines • Microbiological laboratory facilities with equipment and consumables • Communication protocols and facilities
PROCESS (activities)	• Mobilization and management of funds • Development or adaptation of SOPs • Development and implementation of training materials for diagnostic stewardship • Implementation of training courses • Internal and external quality assurance, regular procurement & maintenance of equipment and consumables • Agreed means and frequency of communication among clinical, laboratory and surveillance staff
OUTPUT (results)	• Sustainable financing and resources available on regular basis • Common understanding of protocols for diagnostic stewardship • Staff trained and capacitated leading to compliance with local diagnostic stewardship protocols and steps • Increase in specimens submitted to the laboratory according to SOPs • Good laboratory practices in place resulting in reliable and timely results • Patient treatment and surveillance actions are informed in a timely manner
OUTCOME	• Patient treatment guided by timely microbiological data resulting in safer and more efficient patient care • Accurate and representative AMR surveillance data to inform treatment guidelines and AMR control strategies

Integrated Stewardship Model (AID Stewardship)

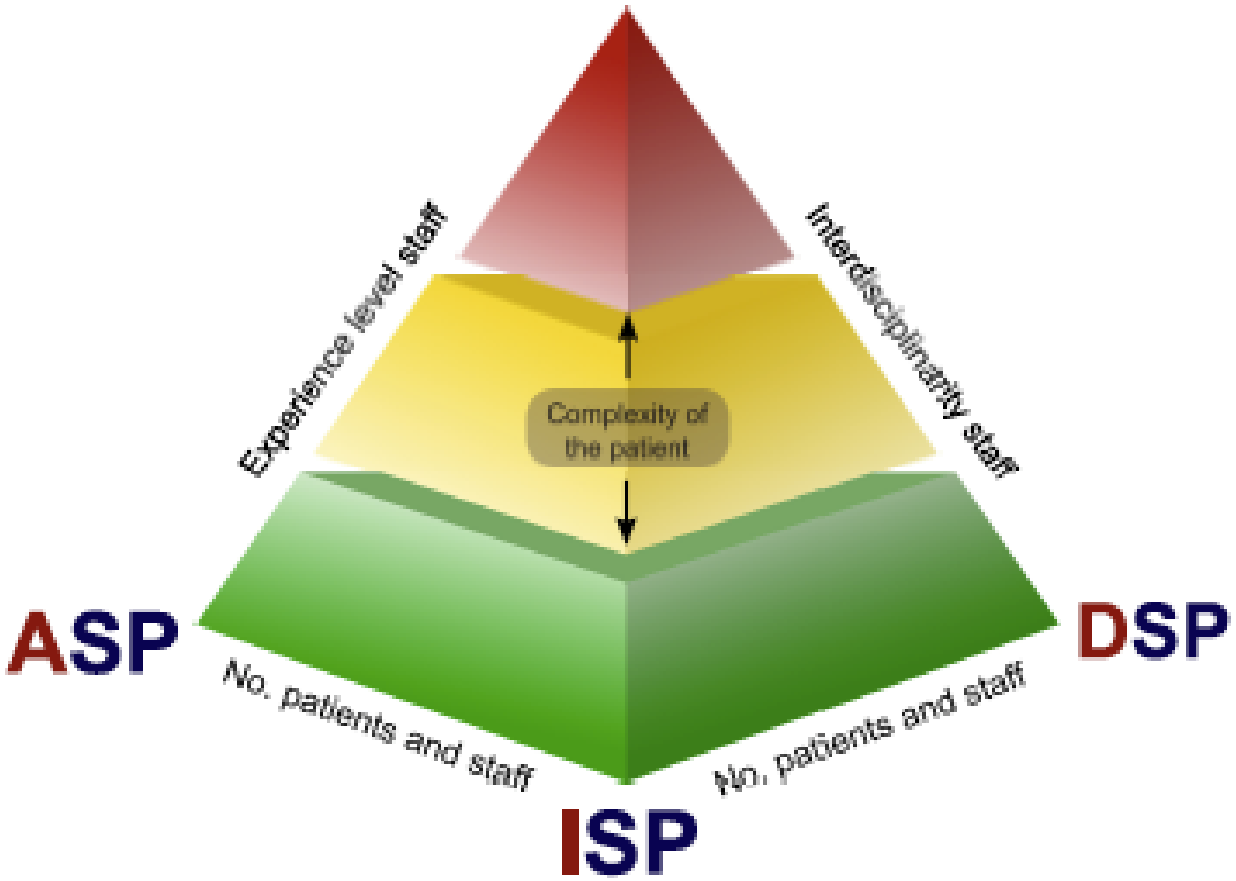


FIG 1 Multistakeholder platform of the AID stewardship model. Pyramid platform showing the interdisciplinary stakeholder connections between the antimicrobial stewardship program (ASP), infection prevention stewardship program (ISP), and diagnostic stewardship program (DSP) within the AID stewardship model as published in reference 2. (Republished from reference 2 with permission of the publisher.)

QUESTIONS?

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Infection Control and Epidemiology