Anatomy of An Evidence-Based Medicine Laboratory Guideline: Urine Culture Pre-analytics

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Fundamentals of an Evidence-Based Approach

LABORATORY QUALITY GAP/POLICY PROBLEM

ASK

ASSESS

APPLY

ANALYZE

APPRaise

A 6 Cycle

Acquire

Apply

Assess

Ask

A6 Cycle

Acquire

Apply

Assess

Ask
LMBP™ Methodology:
Urine Culture Pre-analytics

Review Question:
Are there pre-analytic practices related to the collection, storage, preservation and transport of urine for microbiological culture that improve the diagnosis and management of patients with urinary tract infection?

LMBP™ Methodology:
Urine Culture Pre-analytics

Relevant PICO elements:
• **Population:** all patients who have urine cultures collected
• **Intervention (practice) vs. Comparison:**
  - Immediate vs. delayed processing of urine held at room temperature
  - Immediate vs. delayed processing of refrigerated urine or urine preserved in boric acid
  - Midstream clean catch collection of urine without cleansing vs. with cleansing (men and women)
  - Midstream clean catch collection of urine without cleansing vs. with cleansing vs. sterile urine bag vs. diaper collection in infants and children
• **Outcomes:** contamination rate and diagnostic accuracy of urine culture

LMBP™ QI Analytical Framework:
Urine Culture Pre-analytics

Quality Problem
Misdiagnosis of UTIs from false positive/negative culture results due to poor specimen collection and handling leads to inappropriate treatment, patient harm and wasted resources.

Preventability/Improvability
Overall false positive rates: 15-42% (CAP)

Interventions
Practice
Urine collection teams:
Clean catch vs. catheterized collection
Time limitations on phlebotomy
Chemical preservation
Temperature preservation

Intermediate Outcomes
Contamination rate:
Number of ID's and ASTs performed
Sample transport time

Healthcare Outcomes
Incorrect diagnosis:
Unnecessary antibiotic use:
Repeat collections/cultures/office visits
Additional testing/follow-up
Increased hospital LOS and/or visits
Healthcare acquired infections:
Costs associated with adverse
Urine Culture Pre-analytics

Expert Panel
- Nancy Cornish, M.D., CDC, Atlanta, GA
  Scientific/Technical Lead
- Colleen Kraft, M.D., Emory University, Atlanta, GA
- Vickie Baselski, Ph.D., University of Tennessee Health Science Center, Memphis, TN
- Bob Sautter, Ph.D., Carolinas Medical Center, Charlotte, NC
- Ed Peterson, Jr. MBA, MT(ASCP), Barnes-Jewish Hospital, St. Louis, MO
- Deb Rodahl, MBA, MLS(ASCP), HealthEast Care System, St. Paul, MN

Urine Culture Pre-Analytics: Literature Search
- Systematic search of multiple electronic data bases
  (PubMed, SCOPUS, CINAHL)
  - English language articles from 1965 – 2014 about human subjects
- Hand searching bibliographies from relevant information sources
- Solicitation of unpublished quality improvement studies
  (Clinmicronet and DivC listservs; LMBP website)
Screening Criteria for Initial Appraisal of Evidence

Exclusion criteria – excluded if one or more of the following were applicable:

- No practice relevant to the topic question was assessed.
- The practice was not sufficiently described or described inconsistent with evidence review practice definition/requirements.
- Commentary or opinion.

Inclusion criteria

- Potentially relevant to at least one aspect of the topic review question.
- In use and available for adoption.
- Reproducible in other comparable settings.
- Addresses a defined population/definable group of patients.
- Has potential impact on outcome related to at least one of the following healthcare quality aims: effectiveness, efficiency, patient-centeredness, safety, timeliness or equity.
Expert Panel:
Abstracting References and Assigning Quality Ratings

• Studies that cleared this initial screening were then abstracted and evaluated by the expert panel.

• Information on study characteristics, interventions, outcome measures, and findings of the study were extracted using a standardized form and assigned a “quality rating” derived from points awarded for meeting quality criteria.

• Individual quality ratings were based on four dimensions: study quality, practice effectiveness, defined outcome measure(s) and findings/results.

• The objective for rating individual study quality was to judge whether sufficient evidence of practice effectiveness was available to support inclusion in an overall body of evidence for evaluation of a “best practice” recommendation (that is, a practice likely to be effective in improving one or more outcomes of interest in comparison to other commonly used practices).

• Final quality rating for each reference is the sum of dimension scores
  • 8-10 points = Good
  • 5-7 points = Fair
  • 0-4 points = Poor (eliminated from further consideration)
What is a Forest Plot?

- Graphical display that illustrates the relative strength of intervention or treatment effects in multiple quantitative scientific studies addressing the same question.

- Means of graphically representing a meta-analysis of the results from multiple trials
Collection, Storage and Preservation of Urine

Key clinical questions:

Storage and Preservation

1. What is the difference in colony counts comparing immediate vs. delayed processing of fresh urine stored at room temperature?
2. What is the difference in colony counts comparing immediate vs. delayed processing of urine kept refrigerated or preserved in boric acid?
   - No recommendation for or against due to overall strength of body of evidence as low, but don't stop doing it!

3. What is the difference in contamination rates between midstream urine collected with cleansing (MSCC) vs. without cleansing (MS) in women?
4. What is the diagnostic accuracy of midstream urine collected with or without cleansing compared to bladder catheterization for the diagnosis of urinary tract infection (UTI) in women?
   - No recommendation but looks intriguing.

5. What is the difference in contamination rates between midstream urine collection, with or without cleansing, compared with uncleansed first void collection (UFV) in men?
   - Midstream collection with cleansing recommended
   - First voided urine not recommended
Collection, Storage and Preservation of Urine

Key clinical questions:

Collection in Men

6. What is the diagnostic accuracy of midstream urine collected, with or without cleansing, compared to bladder catheterization or suprapubic aspiration (SPA) for the diagnosis of urinary tract infection in men?

- No recommendation for or against due to overall low strength of body of evidence

Collection, Storage and Preservation of Urine

Key clinical questions:

Collection in Infants and Children

7. What is the difference in contamination rates between midstream collection with cleansing, midstream collection without cleansing, sterile urine bag (SUB) or diaper collection in children?
Collection, Storage and Preservation of Urine

Key clinical questions:

Collection in Infants and Children

8. What is the diagnostic accuracy of mid-stream clean catch, sterile urine bag or diaper collection compared with suprapubic aspiration or catheterisation for the diagnosis of urinary tract infection in children?
   - Recommended midstream urine with cleansing
   - Collection with sterile urine bags, by diaper or by midstream without collection is not recommended

Sum Up

- Only 3/8 (38%) of our focused questions could be answered because of paucity of quality papers
- What can we do?
  - “Grey” Data
QUESTIONS?

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