Evidence-Based Order Sets:
the link between best practice and clinical care

Elizabeth A. Crabtree, MPH, PhD (c)
Director of Evidence-Based Practice, Quality Management
Assistant Professor, Library & Informatics
Medical University of South Carolina

Emily A. Brennan, MLIS
Research Informationist
Assistant Professor, Library & Informatics
Medical University of South Carolina
Is keeping up-to-date Mission Impossible?
Impact of searching on correctness of answers to clinical questions:

<table>
<thead>
<tr>
<th></th>
<th>Right to Right</th>
<th>Wrong to Right</th>
<th>Right to Wrong</th>
<th>Wrong to Wrong</th>
</tr>
</thead>
<tbody>
<tr>
<td>McKibbon (GP or IM)</td>
<td>28%</td>
<td>13%</td>
<td>11%</td>
<td>48%</td>
</tr>
<tr>
<td>Quick Clinical (GPs)</td>
<td>21%</td>
<td>32%</td>
<td>7%</td>
<td>40%</td>
</tr>
<tr>
<td>Hersh (Med students)</td>
<td>20%</td>
<td>31%</td>
<td>12%</td>
<td>36%</td>
</tr>
<tr>
<td>Hersh (Nursing)</td>
<td>18%</td>
<td>17%</td>
<td>14%</td>
<td>52%</td>
</tr>
</tbody>
</table>

Evidence-Based Order Sets

- Codify specific care initiatives
- Expedite the translation of knowledge and evidence into everyday practice to assure QI
- Minimize variation in practice
  - Iterative processes
  - Outcomes essential

IP ACUTE CYSTIC FIBROSIS [134]

**Insulin**
- Cystic fibrosis-related diabetes. Order insulin via order set #134

**Isolation Precautions**

<table>
<thead>
<tr>
<th>Isolation Precautions</th>
<th>Isolation Contact</th>
<th>Isolation Dropwet</th>
<th>Isolation Airborne</th>
<th>Isolation Special Contact</th>
<th>Neutropenic Isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolation - Contact</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Reason for Isolation: Cystic Fibrosis</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today</td>
</tr>
<tr>
<td>Isolation - Dropwet</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Reason for Isolation: Cystic Fibrosis</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today</td>
</tr>
<tr>
<td>Isolation - Airborne</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Reason for Isolation: Cystic Fibrosis</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today</td>
</tr>
<tr>
<td>Isolation - Special Contact</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Reason for Isolation: Cystic Fibrosis</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today, Hospital Performant</td>
</tr>
<tr>
<td>Neutropenic Isolation</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Hospital Performant</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today</td>
<td>Routine, CONTINUOUS, Starting today, Hospital Performant</td>
</tr>
</tbody>
</table>

**Activity**

<table>
<thead>
<tr>
<th>Activity [CF Admit]</th>
<th>Activity As Tolerated</th>
<th>Routine, UNTIL SPECIFIED, Starting today</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedrest</td>
<td>Routine, UNTIL SPECIFIED, Starting today</td>
<td></td>
</tr>
<tr>
<td>Bedrest</td>
<td>Routine, UNTIL SPECIFIED, Starting today</td>
<td></td>
</tr>
<tr>
<td>Out of Bed, Progress to Ambulation</td>
<td>Routine, UNTIL SPECIFIED, Starting today</td>
<td></td>
</tr>
<tr>
<td>Out of Bed, Progress to Ambulation</td>
<td>Routine, UNTIL SPECIFIED, Starting today</td>
<td></td>
</tr>
</tbody>
</table>

**Diet/Nutrition**

<table>
<thead>
<tr>
<th>Diet/Nutrition [CF Admit]</th>
<th>Diet High Calorie High Protein</th>
<th>Routine, Starting today</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diet High Calorie High Protein</td>
<td>Routine, Starting today, Specify Calories, Age Level: Inf Jr &lt; 1 Year</td>
<td></td>
</tr>
<tr>
<td>Diet High Calorie High Protein</td>
<td>Routine, Starting today, Age Level: Toddler &lt; 4 Years</td>
<td></td>
</tr>
<tr>
<td>Diet High Calorie High Protein</td>
<td>Routine, Starting today, Age Level: Regular &gt; 4 Years</td>
<td></td>
</tr>
<tr>
<td>Diet High Calorie High Protein</td>
<td>Cultural Preference</td>
<td></td>
</tr>
<tr>
<td>Diet High Calorie High Protein</td>
<td>Fluid: No Restriction</td>
<td></td>
</tr>
<tr>
<td>Diet High Calorie High Protein</td>
<td>Fluid Consistency:</td>
<td></td>
</tr>
</tbody>
</table>

For more details on diet, please refer to the specific guidelines and protocols for Cystic Fibrosis patients.
Quality assesses whether order set reflects strategic organizational priority (e.g. disease process that is: high volume, high cost, high morbidity/mortality)*

* Some of these order sets will be selected to undergo an evidence review
Defining the Need: *Identifying Disease Processes for Order Set Development*

**Clinical Needs:**
- Frustration in perceived lack of quality

**Process Needs:**
- Unwanted Variation
- Most common DRGs
- High cost
MUSC’s Evidence Review Process

- Search for existing EB guidelines/order sets/clinical pathways relevant to MUSC order set under review
- Appraise guideline(s) using AGREE II criteria
- Create guideline comparison table
- Determine whether guideline(s) is/are of high enough quality to use as framework for MUSC order set build/revision
- Compare MUSC order set to existing EB guidelines/clinical pathways/order sets
- Present findings to team of clinicians
- Create links to resources
Step 1: Asking Focused Questions

**Prevention bundle: Catheter-Associated UTI**

In all medical and surgical patients, what urinary catheter insertion technique is associated with the fewest number of urinary tract infections (UTIs)?

In all medical and surgical patients, what are the criteria for placing a urinary catheter?

In patients with urinary catheters, what are the risk factors for developing a UTI?

In patients with urinary catheters, what interventions (e.g., hand hygiene, maintaining bag below the bladder, closed system, using a dedicated container for measuring/emptying urine, use of securement device) are associated with the prevention of UTIs?

In patients with urinary catheters, how frequently and for what indications should perineal care be performed to prevent the occurrence of a UTI?

In patients with urinary catheters, what are the criteria for discontinuing a foley?

In patients with urinary catheters, from what source should urine cultures be obtained to prevent the occurrence of a UTI?

In patients with urinary catheters, how frequently should the need for the catheter be assessed by a physician to prevent the occurrence of a UTI?

In patients with urinary catheters, what products/alternatives are there to care for incontinent patients after a foley?
Step 2: Finding the Evidence

- M University of Michigan Medical Info System
- Texas Children’s Hospital
- MUSC Medical University of South Carolina
- National Guideline Clearinghouse
- PubMed
- CINAHL
- PsycINFO
- DynaMed
- UpToDate
Managing the Evidence

Impact of Routine Intensive Care Unit Surveillance Cultures and Resultant Barrier Precautions on Hospital-Wide Methicillin-Resistant Staphylococcus aureus Bacteremia

Susan S. Huang,1,4 Deborah S. Yokoe,3 Virginia L. Hinrichsen,2 Laura S. Spurcisle,2 Rupak Dutta,1 Irina Miresniki,2 and Richard Platt1
1Channing Laboratory, Department of Medicine and Infection Control Department, Brigham and Women’s Hospital, and Department of Ambulatory Care and Prevention, Harvard Medical School, and Harvard Pilgrim Health Care, Boston, Massachusetts

Background. Serial interventions are often used to reduce the risk of health care–associated methicillin-resistant Staphylococcus aureus (MRSA) infections. To our knowledge, the relative impact of these interventions has not previously been ascertained.

Methods. We conducted a retrospective study of 4 major infection control interventions using an interrupted time series design to evaluate their impact on MRSA bacteremia in an 800-bed hospital with 8 intensive care units (ICUs). Interventions were introduced 1 at a time during a 9-year period and involved the promotion of compliance with maximal sterile barrier precautions during central venous catheter placement, the institution of alcohol-based hand rubs for hand disinfection, the introduction of a hand hygiene campaign, and the institution of routine surveillance cultures for MRSA in all ICUs for patients on ICU admission and weekly thereafter while in the ICU. Positive cultures resulted in the initiation of contact isolation precautions.

Results. Routine surveillance cultures and subsequent contact isolation precautions resulted in substantial reductions in MRSA bacteremia in both ICUs and non-ICUs. In 16 months, the incidence density of MRSA bacteremia decreased by 75% in ICUs (P = .007) and by 46% in non-ICUs (P = .008), leading to a 67% hospital-wide reduction in the incidence density of MRSA bacteremia (P = .002). Methicillin-resistant S. aureus bacteremia rates remained stable during this time. The other interventions were not associated with a statistically significant change in MRSA bacteremia.

Conclusions. Routine surveillance for MRSA in ICUs allowed earlier initiation of contact isolation precautions and was associated with large and statistically significant reductions in the incidence of MRSA bacteremia in the ICUs and hospital-wide. In contrast, no similar decrease was attributable to the other infection control interventions.

Methicillin-resistant Staphylococcus aureus (MRSA) is the leading cause of health care–associated infections among clinically relevant, antibiotic-resistant pathogens [1]. By 2003, methicillin resistance among health care–associated infections due to S. aureus reached 60% among intensive care unit (ICU) patients and 59% among patients hospitalized in units other than the ICU (hereafter, referred to as non-ICU) [1–3]. MRSA acquisition is highly associated with subsequent infection. We previously found that 29% of newly detected MRSA carriers developed invasive disease within 18 months [4]. Nearly one-third of these infections involved bacteremia.

Several infection control practices have emerged ever...
Step 3: Appraising the Evidence
Evidence-Based Practice Summary

1. Evidence sent back to Director of EBP for review
2. Director of EBP appraises evidence and develops evidence-based summary
3. Director of EBP presents evidence summary to clinical team
Step 3: Appraising the Evidence

Existing guidelines are appraised using the AGREE II criteria.

AGREE II includes evaluation of: Guideline Scope and Purpose, Stakeholder Involvement, Rigor of Development, Clarity and Presentation, Applicability, and Editorial Independence.

<table>
<thead>
<tr>
<th>External Guideline/Pathway/Order Set</th>
<th>Organization and Author</th>
<th>Last Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catheterisation - Indwelling Catheters in Adults: urethral and suprapubic</td>
<td>European Association of Urology Nurses</td>
<td>2012</td>
</tr>
<tr>
<td>Strategies to Prevent Catheter-Associated Urinary Tract Infections in Acute Care Hospitals</td>
<td>Infectious Disease Society of America</td>
<td>2008</td>
</tr>
</tbody>
</table>
Step 3: Appraising the Evidence

Original research studies are appraised using the GRADE criteria.

GRADE is a common, sensible approach to grading the quality of evidence, and the strength of clinical practice recommendations.

<table>
<thead>
<tr>
<th>Design Limitations</th>
<th>Summary of Consistency</th>
<th>Indirectness of Comparison</th>
<th>Imprecision of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient sample (Jaggi 2012)</td>
<td>Wide variation of treatment effect across studies</td>
<td>Indirect comparisons (e.g., Interventions to placebo but not each other)</td>
<td>Sample size lower than calculated optimal information size (Jaggi 2012)</td>
</tr>
<tr>
<td>Large losses to F/U</td>
<td>Outcomes varied (e.g., diminishing effect over time)</td>
<td>Different outcomes measured</td>
<td>95% CI includes no effect and the upper or lower limits cross the minimal important difference (MID), either for benefit or harm</td>
</tr>
<tr>
<td>Incorrect analysis of ITT</td>
<td>Selective reporting of measured outcomes (e.g., no effect outcome)</td>
<td>Comparisons not applicable to question</td>
<td>Upper or lower limit crosses an effect size of 0.5 in either direction (if MID is not known or differences in outcomes require the calculation of an effect size)</td>
</tr>
</tbody>
</table>

**Burke (1981):** Study reported results of two RCTs, one study of 384 patients compared acquired bacteriuria between patients given twice daily applications of providone-iodine solution and ointment and those patients not receiving special medical care. The second RCT of 452 patients compared acquired bacteriuria between patients given once daily medical cleansing with a nonantiseptic solution of soap and water, to patients not receiving special medical care.

**Burke (1983):** RCT of 428 patients with temporary indwelling urethral catheters, compared acquired bacteriuria between patients receiving medical care with poly-antibiotic treatment twice daily to those patients not receiving medical treatment.

**Classen (1991):** RCT of 747 adult patients who underwent closed urinary catheter drainage. Patients were randomized to either treatment at urethral-meatus catheter interface with poly-antibiotic cream three times daily, or control group.

**Huth (1992):** RCT of 696 patients to determine effectiveness of 1% silver sulfadiazine cream applied twice daily to the urethral meatus in preventing catheter-associated bacteriuria.

**Burke 1981:**
- 32 (16%) of 200 patients given twice daily applications of providone-iodine solution acquired bacteriuria, compared with 24 (12.4%) of 194 patients not given the treatment
- 28 (12.2%) of 225 patients given once daily cleansing with soap and water acquired bacteriuria, compared with 18 (8.1%) of 223 patients not given the treatment (p=0.08)

**Burke 1983:**
- Bacteriuria was acquired in 14 of 214 (6.5%) patients receiving treatment, compared to 16 of 214 (7.5%) patients not receiving treatment, p=0.05

**Classen 1991:**
- 25 (6.8%) of patients given poly-antibiotic treatment acquired bacteriuria, compared to 37 (10.1%) not receiving treatment (p=0.167)

**Huth 1992:**
- 38 of 332 patients (11.4%) in the treated group, and 48 of 364 patients (13.2%) in the control group acquired bacteriuria (p=0.56, odds ratio: 0.85, 95% CI: 0.53–1.33).
Question 2: In patients with urinary catheters, how frequently and for what indications should perineal care be performed to prevent the occurrence of a UTI?

Recommendation:

Grade Criteria: Low Quality Evidence

The Centers for Disease Control (2009), Infectious Disease Society of America (2008), and the European Association of Urology Nurses’ (2012) guidelines for the prevention of CAUTIs, all recommend against the routine use of antiseptics to clean the periurethral area, and state that routine hygiene is appropriate. There has not been any recent literature on the topic published in the last 20 years. Four RCTs from the 80’s and 90’s found no significant difference in acquired bacteriuria between patients receiving daily special meatus care (e.g., providone-iodine solution, poly-antibiotic treatment, 1% silver sulfadiazine cream) and those in control groups (Burke 1981, Burke 1983, Classen 1991, Huth 1992). The Burke trial found that patients not receiving daily special meatus care were actually less likely to acquire bacteriuria (Burke 1991). A systematic review on the topic published in 2009 concludes that the literature suggests that using antiseptic cleansers, creams or ointments is no better than providing regular meatal care as a part of routine perineal and genital hygiene (Willson 2009).

The data from observational studies is mixed. One study conducted in 5 hospitals in Japan found that daily cleansing of the perineal area with tap water and regular soap reduced the likelihood of developing CAUTI, this risk reduction was even greater for patients with fecal incontinence (Tsuchida 2008). An observational study conducted in India, however, noted that practicing perineal cleansing was found to show no effect on the CAUTI rate. However, the study failed to provide statistics for this assertion.
Step 4: Applying the Evidence

It is no easy task... 17 years!
Step 5: Evaluate the Results
Opportunities for Collaboration

Comparative Effectiveness Research

Exchange of evidence-based guidelines and decision support tools

Elizabeth A. Crabtree, MPH, PhD (c)
crabtr@musc.edu

Emily A. Brennan, MLIS
brennane@musc.edu