Driving Patient Outcomes through Clinical Decision Support Systems and Nurse-Directed Protocols

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Virtua
High-Level Purpose

Evidence

CDSS

Practice
CDSSs

- **CDSSs & Physicians**
  - can improve physician performance; however, their effects on patient outcomes and cost-effectiveness are inconsistent and understudied (Garg et al., 2005).
  - Review of 17 high-quality systematic reviews (Jaspers et al., 2011).
    - 57% report significant impact on provider performance
    - 30% report positive impact on patient outcomes
    - Most common positive outcomes related to medication ordering and provision of preventive care

- **Features of CDSSs yielding greatest impact** (Kawamoto et al., 2005)
  - electronic provision of automatic support
  - automatic integration into charting or order entry
  - requirement of a physician response
  - provision of support at the point of care

- **Reports from the IT Industry** (Glaser & Hess, 2011; Hess, 2009).
  - benefits to patient of CDSSs are promising
  - based on quality improvement studies
  - No defined controls
  - Limited generalizability
CDSSs & Nursing

• CDSSs have the potential to impact nurse behaviors, patient outcomes and the cost of care.

• Nurses are more likely to adhere to guidelines and assessment recommendations when prompted by a CDSS (Beeckman et al., 2013; Ficke et al., 2011; Hagiwara et al., 2013; Lyerla, 2008; Lyerla et al. 2010)

• Outcomes such as frequency of urinary incontinence (Petrucci et al., 1991), immunization compliance (Swenson et al., 2012), attainment of target INR (Fitzmaurice et al., 2000), glycemic control (Boord et al., 2000; Eslami et al., 2012; Fogel & Baker, 2013; Harrison et al., 2013; Lipton et al., 2011; Morris et al., 2008; Plank et al, 2006; Rood et al., 2005; Vogelzang, Zijlstra & Nijsten, 2005), appropriate triage assignment (Dong et al., 2005), prevention of malnourishment (Fossum et al., 2011) and correct staging of pressure ulcers (Alvey, Hennen & Heard, 2012) are improved with the support of CDSSs.
CDSS & Nursing: Literature Gaps

• Research on CDSSs in nursing is not robust in quantity or quality
• Literature highlights the importance of nursing culture, experience, local practices, and beliefs in the adoption of CDSS recommendations, and nurses’ desires for flexibility from the CDSS (Campion et al., 2011; Dowding et al., 2009).
• Need for more research with larger and more adequately controlled samples on the use of CDSS by nurses
• The question of why nurses override CDSS recommendations and how this can be addressed to improve patient outcomes related to CDSSs must be investigated.
High-Level Purpose

Protocol for Nurse-Directed Urinary Catheter Removal

CDSS

CAUTI Prevention
CAUTI

• CAUTI is a significant and preventable healthcare complication.

• The single most effective intervention in CAUTI prevention is early removal of urinary catheters (Chenoweth & Saint, 2011; Gould et al., 2009; Hooton et al., 2010; Maki & Tambiyah, 2001), yet catheters remain in place after medically necessary (Harstein et al., 1981; Jain et al., 1995; Jamulitrat & Panmanee, 2007; Raffaele, et al., 2008; Tiwari et al., 2012).

• Evidence-based guidelines recommend reminder systems and nurse-directed protocols as strategies to eliminate unnecessary catheters (Gould, 2009; Hooton, 2010).
Prevention of Unnecessary Urinary Catheters

• Evidence-based strategies promoting prompt removal of unnecessary urinary catheters
  – Physician reminder systems
  – Nurse-directed catheter removal protocols (Gould et al., 2009; Hooton et al., 2008)

• Despite national guidelines:
  – CAUTI prevention practice utilization remains low (Krein, Kowalski, Hofer & Saint, 2012)
    • Physician Reminder Systems: 52% implementation, 27% adherence (Stone et al., 2014)
    • Nurse-Directed Protocols: 27% implementation, 22% adherence (Stone et al., 2014).
  – CAUTI rate is on the rise
    • Low of 4.0/100 catheterizations in 2006 to 5.3/100 catheterizations in 2010 (Daniels, Lee, & Frei, 2014).
CAUTI: Literature Gaps

- The evidence to support the use of nurse-directed protocols is limited and requires further, more rigorous study (Gould, 2009).
- Nurses have questioned their authority to remove catheters without a physician order (Arentzen, 2011; Newman et al., 2011; Wenger, 2010). Research will need to explore the impact of the nurses and their culture on the successful adoption of nurse-directed catheter removal protocols.
- Research should focus on the combined effect of utilizing a reminder system with a nurse-directed catheter removal protocol.
- Current evidence suggests a connection between risk for incontinence and inappropriate catheterization (Apisaranthanarak et al., 2007; Fakih et al., 2010; Holryod-Leduc et al., 2005; Jansen et al., 2012; Rafaelle et al., 2008; Tiwari et al., 2012). Research will need to explore the effect of patient factors on nurse-directed catheter removal.
Mixed-Method Design (Rogers, 2003)

BPM Enabled Workflow

Introduction of Innovation
Protocol for Nurse Directed Urinary Catheter Removal

Knowledge
- Standard Communication + BPM Enabled CDSS

Persuasion

Decision

Implementation
- Nurse-Directed Urinary Catheter Removal (Study Sample)
- Urinary catheterization rate (Institutional)
- CAUTI rate (Institutional)

Confirmation

Nursing Social System
- Open Ended Questionnaire

Patient Factors - Correlation with nurse-directed catheter removal (Study Sample)
FOLEY REMOVAL PROTOCOL

Nurse to assess daily with the following exceptions:
- Foley removal date already ordered
- Order to reinsert or maintain Foley for medical necessity present within the last two days
- Foley is a chronic Foley
- Patient has CBI ordered

Does the Patient Have Any of the Following:
- Physician order to re-insert or maintain catheter for medical necessity that was ordered > 2 days ago
- S/P GU/OYN Surgery
- Urology consulted Patients
- Urinary Tract Obstruction
- Urinary Catheter placed by urologist
- Gross Hematuria in pts with clots/irrigation
- Neurogenic Bladder Dysfunction
- Urinary retention not manageable by other means (intermittent catheterization)
- Stage 3 or 4 Pressure Ulcer in an incontinent patient
- Need for Strict I&O measurement
- Ventilator/ sedation < 2 days post-op
- ARF: ↑ creatinine and/or ↓ urine output

Order to "maintain catheter for medical necessity" must be written or entered into CPOE

Notify physician to determine if catheter remains medically necessary

Order received to discontinue catheter

Discontinue Catheter

Spontaneously voids in 6-8 hours > 250cc, continue to monitor as clinically appropriate
Spontaneously voids in 6-8 hours < 250cc, perform bladder scan, if PVR is > 250cc, initiate Straight Cath (SC)
Spontaneously voids in 6-8 hours but INCONTINENT Perform bladder scan, if PVR is > 250cc, initiate Straight cath. If PVR is < 250cc, promote personal care
No void 6-8hrs or uncomfortable at ANY TIME, perform bladder scan. If total bladder volume < 400 monitor as appropriate for spontaneous void. If total bladder volume is > 400cc initiate Straight Cath

Reassess patient and notify Licensed Independent Practitioner as clinically appropriate
Nurse-Directed Order for Removal

Remove Urinary Catheter (Indwelling) _PCare_

Details: 

Instructions: 

Reason For Request: 

Start | Repeat | Stop

Priority: Routine

On: 08/08/2014 06:00

Once | After: 1 Times

Every

One Time | Until D/C

Order ID: 39801031

Status: Active

Ordered By

Entered By: Amy Elizabeth Glafofer, RN

Target Cosigner 1

Order Source: Per Protocol

Service Provider: MARLTON

Height: 5 ft 6 in

Weight: 78.02 lbs

Allergies: NKA NKDA NKFA

Target Cosigner 1
Verbal Order to Maintain Catheter

Indwelling Urinary Catheter Management

Details

Instructions

Reason For Request: Maintain Indwelling Catheter for Medical Necessity

Start: 06/08/2014 06:00

Repeat: Every

Stop: One Time

Priority: Routine

Once: After 1 Times

Until: D/C

Source: Verbal Order

Ordered By

Entered By: Amy Elizabeth Glasofer, RN

Target Cosigner 1

Order ID: 39801076

Status: Active
Specific Aim: To examine the impact of a BPM enabled workflow on nurse-directed urinary catheter removal, urinary catheterization and CAUTI rates.
Specific Aim: *To examine the impact of a BPM enabled workflow on nurse-directed urinary catheter removal*

### Analysis of Nurse-Directed Catheter Removal

<table>
<thead>
<tr>
<th>Phase</th>
<th>Removal Per Protocol (n) %</th>
<th>Non-Removal Per Protocol (n) %</th>
<th>Chi Square Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(43) 42%</td>
<td>(60) 58%</td>
<td>χ²=19.6, df=1, p&lt;.001</td>
</tr>
<tr>
<td>2</td>
<td>(76) 76%</td>
<td>(24) 24%</td>
<td></td>
</tr>
</tbody>
</table>

All cells > minimal expected count of 5

### Table 4: Odds of Nurse Directed Catheter Removal

<table>
<thead>
<tr>
<th>Phase</th>
<th>Odds</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(43/60) .72</td>
<td>(3.17/.72) 4.4</td>
</tr>
<tr>
<td>2</td>
<td>(76/24) 3.17</td>
<td></td>
</tr>
</tbody>
</table>
Specific Aim: *To examine the impact of a BPM enabled workflow on urinary catheter utilization and CAUTI rates.*

Table 5: Analysis of Urinary Catheter Utilization and CAUTI Rates

<table>
<thead>
<tr>
<th>Phase</th>
<th>Patient Days</th>
<th>Catheter Days</th>
<th>CAUTIs</th>
<th>Urinary Catheter Utilization Rate</th>
<th>CAUTI Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16,722</td>
<td>4,362</td>
<td>3</td>
<td>0.26</td>
<td>0.69</td>
</tr>
<tr>
<td>2</td>
<td>15,312</td>
<td>3,989</td>
<td>1</td>
<td>0.26</td>
<td>0.25</td>
</tr>
</tbody>
</table>
## Summary of Qualitative Analysis

<table>
<thead>
<tr>
<th>Theme</th>
<th>Subtheme</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Values</td>
<td>Autonomy</td>
<td>Protocol promoted autonomy. 59% comfortable to remove catheter based on protocol</td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td>Protocol accountability for patient outcomes. Lack of peer-to-peer or leadership accountability</td>
</tr>
<tr>
<td>High Quality Care</td>
<td>Protocol and CDSS result in decreased urinary catheter utilization and prevent CAUTI Nurses prioritize pressure ulcer and fall prevention of CAUTI prevention</td>
<td></td>
</tr>
<tr>
<td>Avoidance of Conflict</td>
<td>Barriers</td>
<td>Discomfort with holding peers accountable Fear that following protocol may anger physician</td>
</tr>
<tr>
<td>Ease of Workflow</td>
<td>Barriers</td>
<td>Protocol: time consuming, error prone Alert: triggered and timed inappropriately</td>
</tr>
<tr>
<td></td>
<td>Enhancements</td>
<td>Protocol &amp; CDSS simplify work CDSS a good reminder in chaotic environment</td>
</tr>
</tbody>
</table>
“Makes me uncomfortable!! We have been taught to never do anything without a physician order.”

2. Staff feel free to question the decisions or actions of those with more authority. (C4)

Nonpunititive Response to Error

1. Staff feel like their mistakes are held against them. (A8R) 50%

2. When an event is reported, it feels like the person is being written up, not the problem. (A12R) 48%

3. Staff worry that mistakes they make are kept in their personnel file. (A16R) 35%
Accountability

“Overall a good alert, but is not addressed consistently by nurses.”

2. Mistakes have led to positive changes here. (A9) 64%

1. We are given feedback about changes put into place based on event reports. (C1) 59%

- 84% of clinical care providers work with someone who takes shortcuts that could be dangerous to patients
- 31% have spoken to the person and shared their full concern
High Quality Care

“What is worse? Potential for skin breakdown or possible infection?”

1. We have enough staff to handle the workload. (A2) 54%

4. We work in "crisis mode," trying to do too much, too quickly. (A14R) 50%

3. Whenever pressure builds up, my supervisory manager wants us to work faster, even if it means taking shortcuts. (B3R) 75%
Avoidance of Conflict

“I’m worried that if it has to go back in, a physician is going to be angry.”

Night shift often ignores the alert and it is left up to day shift to address and use the protocol. It’s just easier to take care of it myself.

1. Staff will freely speak up if they see something that may negatively affect patient care. (C2)

- 77% are concerned about disrespect they experience
- 7% have spoken with this peer and shared their full concerns
- 52% work with some number of people who abuse their authority- pull rank, bully, threaten, or force their point of view on them.

“Night shift often ignores the alert and it is left up to day shift to address and use the protocol. It’s just easier to take care of it myself”
Acknowledgements

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References


References


