Incorporating Systems Thinking into Clinical Care

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Disclosures

• Grant recipient for work on patient safety and quality improvement from Agency for Healthcare Research and Quality and World Health Organization

• No current financial disclosures
## Existing Quality Gap

<table>
<thead>
<tr>
<th>Condition</th>
<th>% of Recommended Care Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low back pain</td>
<td>68.5</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>68.0</td>
</tr>
<tr>
<td>Hypertension</td>
<td>64.7</td>
</tr>
<tr>
<td>Depression</td>
<td>57.7</td>
</tr>
<tr>
<td>Orthopedic conditions</td>
<td>57.2</td>
</tr>
<tr>
<td>Colorectal cancer</td>
<td>53.9</td>
</tr>
<tr>
<td>Asthma</td>
<td>53.5</td>
</tr>
<tr>
<td>Benign prostatic hyperplasia</td>
<td>53.0</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>48.6</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>45.4</td>
</tr>
<tr>
<td>Headaches</td>
<td>45.2</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>40.7</td>
</tr>
<tr>
<td>Hip fracture</td>
<td>22.8</td>
</tr>
<tr>
<td>Alcohol dependence</td>
<td>10.5</td>
</tr>
</tbody>
</table>

“To the individual who devotes his/her life to science, nothing can give more happiness than when the results immediately find practical application. There are not two sciences. There is science and the application of science, and these two are linked as the fruit is to the tree”

Louis Pasteur, 1871
How Can These Gaps Happen?

• Reasons for variability in practice
  • Lack of multidisciplinary engagement
  • Confusion regarding practice
  • Workflow issues
  • Lack of required resources
  • Provider beliefs and practices

Need to view the delivery of healthcare as a science!

System Failure Leading to An Error

- Inadequate training and supervision
- Lack of protocol for catheter removal
- Communication between resident and nurse
- Patient sitting
- Venous air embolism
- Catheter pulled with

Pronovost PJ, Wu Aw, Sexton, JB et al., Ann Int Med, 2004
Reason J, Hobbs A, 2000
System Factors Impact Safety

- Institutional
- Hospital
- Departmental Factors
- Work Environment
- Team Factors
- Individual Provider
- Task Factors
- Patient Characteristics

Adopted from Vincent
“Rather than being the main instigators of an accident, operators tend to be the inheritors of system defects…Their part is that of adding the final garnish to a *lethal brew* that has been long in the cooking”

System-Level Factors Can Predict Performance

<table>
<thead>
<tr>
<th>System Factor</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily rounds with an intensivist</td>
<td>When ICUs are staffed with a multidisciplinary team, including daily rounds with an intensivist, mortality is reduced</td>
</tr>
<tr>
<td>Nurses responsible for more than two patients</td>
<td>When nurses are responsible for more than two patients, there is an increased risk of pulmonary complications in the ICU patient population</td>
</tr>
<tr>
<td>Point-of-care pharmacist or pharmacist who participates in rounds</td>
<td>A point-of-care pharmacist or one who participates in rounds reduces prescribing errors</td>
</tr>
</tbody>
</table>
Systems Approach vs Systems Thinking

Traditional thinking vs Systems thinking

Quality

Structure → Process → Outcome

Feedback

Systems Approach
How can we improve?

Understand that safety is a science

1. Accept we are fallible - assume things will go wrong rather than right
2. Every system is perfectly designed to achieve the results it gets
3. Understand principles of safe design - standardize, create checklists, learn when things go wrong
4. Recognize these principles apply to technical and team work
5. Teams make wise decision when there is diverse and independent input

Caregivers are largely not to blame!
Principles of Safe Design

- Standardize care
- Create independent checks
- Learn when things go wrong

Principles apply to both technical tasks and adaptive teamwork issues.
Applying System Thinking to Practice
Principles of Safe Design apply to technical and teamwork as well
Teamwork Disconnect

Perceptions of Teamwork

% Reporting Adequate Teamwork

<table>
<thead>
<tr>
<th>Field</th>
<th>RN</th>
<th>Physician</th>
</tr>
</thead>
<tbody>
<tr>
<td>L&amp;D / MD</td>
<td>48%</td>
<td>83%</td>
</tr>
<tr>
<td>ICU / MD</td>
<td>48%</td>
<td>88%</td>
</tr>
<tr>
<td>OR / Surg</td>
<td>54%</td>
<td>90%</td>
</tr>
<tr>
<td>CRNA / Anest</td>
<td>59%</td>
<td>93%</td>
</tr>
</tbody>
</table>

ARMSTRONG INSTITUTE FOR PATIENT SAFETY AND QUALITY

aku.edu
Basic Components and Process of Communication
Introduction to Quality and Patient Safety Module in Medicine and Nursing Curriculum

Course Description
The Patient Safety Course is a five-day program created by the Centre for Patient Safety, Aga Khan University.

Goals
• To understand how medical errors may occur, how we can learn from them, and how to prevent their recurrence
• To obtain knowledge and skills necessary to practice medicine safely both individually as well as within teams
• To improve system-based thinking to improve patient safety and quality of care.
• Improved the knowledge of healthcare providers in Patient Safety and Quality Improvement

<table>
<thead>
<tr>
<th>M.B, B.S Students</th>
<th>Knowledge Assessment (Pre and Post)</th>
<th>Systems Thinking Scale (Pre and Post)</th>
<th>Knowledge Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class of 2023 (Year 3)</td>
<td>+22.12%, p&lt;0.001</td>
<td>+4.16%, p=0.018</td>
<td>Uniform increase, p&lt;0.001</td>
</tr>
<tr>
<td>Class of 2024 (Year 3)</td>
<td>+ 37.71%, p=0.000</td>
<td>+5.49%, p=0.010</td>
<td>Uniform increase, p&lt;0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BScN Students</th>
<th>Knowledge Assessment (Pre and Post)</th>
<th>Systems Thinking Scale (Pre and Post)</th>
<th>Knowledge Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class of 2021 (Year 4)</td>
<td>+26.53%, p=0.000</td>
<td>+8.54%, p=0.000</td>
<td>Uniform increase, p=0.000</td>
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<tr>
<td>Class of 2023 (Year 2)</td>
<td>+35.79%, p=0.000</td>
<td>+11.14%, p=0.000</td>
<td>Uniform increase, p=0.012</td>
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<tr>
<td>Class of 2024 (Year 2)</td>
<td>+22.96%, p=0.000</td>
<td>+8.94%, p=0.000</td>
<td>Uniform increase, p=0.000</td>
</tr>
</tbody>
</table>
Recap

• Every system is designed to achieve its anticipated results
  • Develop lenses to see systems

• The principles of safe design are:
  • standardize when you can,  
  • create independent checks, and
  • learn from defects

• Infuse principles of standardization and independent checks in your processes

• The principles of safe design apply to technical work and teamwork
Thank you