Development and Implementation of Clinical Pathways in the CTICU

AATS/STS Cardiothoracic Critical Care Symposium
Sunday, May 5th, 2013

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Disclosures

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The delivery of high-quality critical care medicine is vital to the success of cardiac surgery.

ICU 2020: Five Interventions to Revolutionize Quality of Care in the ICU

Kristy A. Bauman, MD¹ and Robert C. Hyzy, MD¹

- Evidence-based best practice
- Participation in multicenter ICU collaborations
- Employing state-of-the-art information technology, (including point-of-care)
- Diagnostic testing
- Efficient organization of ICU care delivery

Outline

- What are clinical pathways
  - The Good, Bad and Indifferent

- A “practical” example of implementing a new clinical pathway
  - What Happen? Case example
  - What we chose to do – Lean Transformation
  - How we did – The work plan and method of implementation

- Does it work?

- Lessons learned
What is a Clinical Pathway?

- a.k.a. Integrated Care Pathways, Interdisciplinary Pathways of Care, Pathways of Care, Care Maps, Collaborative Care Pathways
- Essentially a patient care algorithm that provides:
  - flow chart format of the decisions to be made
  - a step-wise sequence

http://www.openclinical.org/clinicalpathways.html#benefits
What is a clinical pathway?

- Clinical Pathways differ from practice guidelines, protocols and algorithms as they are typically:
  - utilized by an interdisciplinary team
  - focus on the quality and co-ordination of care.
What is unique about the CTICU?

1. Who Benefits?

Low - Risk
- Healthy
- 80% of patients

High-Risk
- Complex procedures
- Multi-system issues
- 20% of patients

• High volume and high cost associated with cardiovascular diseases and cardiac surgery

• Both “low-intensity” and “high-intensity” patients in the same environment

• Can be used a method
  - to reduce variation in care
  - decrease resource utilization
  - potentially improve healthcare quality
Why Clinical Pathways are Necessary?

Dissemination of information of accepted protocols/guidelines makes little difference in clinical practice.

A CP provides the methodology to implement guidelines.
**Pros**

- Introduction of **evidence-based** medicine and clinical guidelines
- Support clinical effectiveness, risk management and clinical **audits**
- Improve interdisciplinary **communication** and teamwork
- **Continuity/co-ordination** across disciplines
- Provide well-defined **standards** for care
- Help reduce **variations**

**Cons**

- Unlike manufacturing – patients are not “widgets”
- Dislike of “**cookbook** medicine”
- Risk increasing litigation
- “**Tunnel Vision**”: Response to unexpected change
- **Increased workload** for new documentation, audits and action plans
- Problems of introduction of **new technology**
- May take time to be accepted
- Requires **“buy-in”**
What are the typical clinical pathways that are used in the CTICU?

- Monitoring
- Blood & Fluids
- Neuro/cognitive
- Sedation and Analgesia
- Extubation
- Glycemic Control
- VTE Prophylaxis
- Handover (a.k.a. communication)
- LCOS/Hemodynamics
- CTICU
"New Developments"

2: Delirium Assessment

- Feature 1: Acute onset of mental status changes or a fluctuating course
- Feature 2: Inattention
- Feature 3: Disorganized Thinking
- Feature 4: Altered Level of Consciousness

And

= DELIRIUM
Quality Improvement
Need for Quality Control in the CT Patient

How do we deliver consistent care to all patients?
"_ _IT HAPPENS"
Error is an inevitable

- Result of
  - natural limitations of human performance
  - function of complex systems.
AND

Newer technology

Does not eliminate error
How do we compare?
Most airline pilots believe they make mistakes.

In healthcare, only 30% of providers believe they make mistakes.

(Laura Adams, Faculty, Institute for Healthcare Improvement, 2005 and IHI Online Learning Program Module, Q101, 2010)
Facts about Patient Safety

- Estimates that 1 in 10 patients are “harmed” while receiving hospital care

- Problems associated with surgical safety account for 50% of avoidable adverse events that result in death in disability

http://www.who.int/features/factfiles/patient_safety/en/
Figure 1. Summary of results from the implicit surgeon review of isolated CABG deaths (n=347). ICU indicates intensive care unit.
*Based on 694 primary reviews of 347 deaths (221 preventable judgments of 694 primary reviews, 52 inappropriate decisions to operate of 694 primary reviews). The denominator at the top of each bar represents the number of patients in that particular risk category as rated by reviewers and the numerator represents the number of patients that were classified by reviewers as an inappropriate decision to operate (grey bar) or a preventable death (black bar).

Figure 3. Percentage of deaths judged preventable and/or inappropriate for surgery on primary surgeon review vs patient’s estimated risk of in-hospital death.
Medical Errors in the CVICU

- Identified Areas of Improvement Needed
  - Communication (23%)
  - Education (29%)
  - System (15%)

GURU V ET AL. *Circulation* 2008;117;2969-2976

*Table 3. Preoperative Patient Predictors of Preventable Death*

<table>
<thead>
<tr>
<th>Patient Factor</th>
<th>Coefficient (P)</th>
<th>Odds Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>1.63 (0.10)</td>
<td>...</td>
</tr>
<tr>
<td>Age (continuous variable)</td>
<td>-0.027 (0.05)</td>
<td>0.97 (0.95–1.00)</td>
</tr>
<tr>
<td>Female Sex</td>
<td>0.38 (0.12)</td>
<td>1.47 (0.90–2.39)</td>
</tr>
<tr>
<td>Left main coronary disease</td>
<td>-0.39 (0.12)</td>
<td>0.67 (0.41–1.11)</td>
</tr>
<tr>
<td>3-Vessel coronary disease</td>
<td>-0.31 (0.27)</td>
<td>0.73 (0.42–1.27)</td>
</tr>
<tr>
<td>Emergent status (OR &lt;24 h)</td>
<td>-0.95 (0.06)</td>
<td>0.38 (0.13–1.04)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>-0.96 (0.0003)</td>
<td>0.38 (0.22–0.65)</td>
</tr>
</tbody>
</table>
CABG vs. PCI Trials

- ARTS, Tactics
- SYNTAX

Case Example

What happened?

- A patient with end stage cardiac disease
  - 16 hour procedure: two re-do valve replacements, a third valve replacement, an ascending aortic aneurysm repair and insertion of an extracorporeal membrane oxygenation (ECMO) for perfusion support.
  - Massive Transfusion
What happened?

After the first 10 hours in the intensive care it was discovered that the intravenous infusion of norepinephrine was **infusing at 4 times the prescribed dose** to maintain the blood pressure.

The drug error had masked the graveness of the patient’s condition.

Twelve hours after the first surgery the patient was taken back to surgery for mediastinal exploration for **hemorrhaging** from the aorta. The patient **died** 25 days later.
Case Example

What were the review findings?

- During induction a bag of Norepinephrine (NOREP) 4 was administered and the IV pump programmed accordingly.

- At some time the concentration of **NOREP 4 was changed to NOREP 16**, the standard hospital dose, however the pump programming was not changed to reflect the medication concentration.
Blame someone

however ...

most errors occur after a convergence of a number of factors

blaming an individual does not change these factors and the same ones are likely to recur
How systems fail

Some holes due to known risks

Each slice of cheese represents protection against hazards

Other holes due to hidden risks
(excessive cost cutting, inadequate promotion policies, deficient training programs, improper crew pairing, etc.)

Harm

Hazards
The first bag of NOREP 16 started in the OR, lasted the entire case.

The programming error was **not caught over two shifts**.

**Human error** created gaps in the administration of the medication infusion in question.

The erroneous “overdose” of NOREP was maintaining the patient’s blood pressure at the desired level.
What are the typical clinical pathways that are used in the CTICU?

- Monitoring
- Blood & Fluids
- Glycemic Control
- VTE Prophylaxis
- Neuro/cognitive
- Sedation and Analgesia
- Extubation
- LCOS/Hemodynamics
- Handover (a.k.a. communication)

CTICU
Key elements for the development of a clinical pathway in the CTICU

- Ask the **right question**
  - High-volume, high-cost diagnoses and/or procedures

- Pick the **right people**
  - Interdisciplinary

- Evaluate what is **not working** now
  - Focus on critical outcomes, rate-limiting steps, and high-cost areas

- Identify current **best-practices**

- **Document and analyze** variance

What is Lean Transformation?
Why are we Transforming?

- To provide patients with world-class healthcare
- Our patients **do not receive consistent** care
Rapid Improvement Events (RIEs)

- *Staff from all levels* are included to pool their knowledge and expertise to create an ideal “future state” map.

- Solution is developed by the *people who do the work*.

- What the process should and could look like if it were working perfectly.

- Build the target state *piece by piece*.

- Goal is not to plan, *but to DO*.

- *Aim to deliver rapid change in a week*.
The RIE Team

- CRN
- Bedside RN, Operating Room RN
- MD - Cardiac Anesthesia, Cardiac Surgeon, Critical Care
- Pharmacy
- RT
- HCA
- Outside “Observer”
- Facilitator
A3 Example

1. **Reason for Action**
   - We are a center for excellence but recognize that we harm people through our processes.
   - To choose a process that can have a high probability of success as a demonstrator for Lean.
   - Need to increase capacity in ER; demand is going up.
   - We want to continue to be a center for excellence.

2. **Initial State**
   - Create a common map for ACS.
   - Tighten connections with all related services.
   - Select RIE, Projects & Do it.
   - Establish sequence of events.
   - Write charters for Events which address gaps.

3. **Target State**
   - Combine Triage & Registration Process (Flow improvement for patient, standard work, 6S).
   - Stretch bay pull (eliminate wait time, improve visual cues, support bed TAT).
   - Cardiology Consult services (improve response via tight connections and communications).
   - 6S Supply room system, hallways & treatment areas.
   - Patient transport & porters (improvement to patient flow).
   - Faster admission to Cardiology (inpatient bed turn-over).
   - Visual cues for in-patient bed management.

4. **Gap Analysis**
   - Triage & registration are separated.
   - Long wait to get to treatment area.
   - Delay in attaining consultation.
   - Delay of moving admitted patients to the ward.
   - Disorganized storage & supply system.
   - Multiple unnecessary patient moves and handoff.
   - Excessive travel distance by patient.
   - Flow time to touch time ratio disproportionate.
   - Duplicate paperwork and visual cues.
   - Inefficient usage of IT resources (IE: Edis board).

5. **Solution Approach**
   - Completed all action plans: RIE, Projects & Do it’s.
   - Reduced number of hand-off of patients with new process.
   - Coordinated / integrated interdepartmental functions to improve patient flow.
   - Transparent bed availability and expedited change over.
   - Patient centered admission & discharge process has been implemented.

6. **Rapid Experiments**
   - Sept: Stretch bay pull (Eliminate wait time, improve visual cues, improve bed TAT).
   - Oct: Cardiology Consult services (improve response via tight connections and communications).
   - Nov: 6S Supply room system, hallways & treatment areas.
   - Dec: Patient transport & porters (improvement to patient flow).
   - Jan: Faster admission to Cardiology (inpatient bed turn-over).

7. **Implementation Plan**
   - Between September, 2008 and March, 2009, the tasks to be completed are broken down as:
     - 7 projects
     - 7 Just Do It (JDI)
     - 8 Rapid Improvement Events

8. **Insights**
   - What Went Well:
     - Open, honest, enthusiastic team.
     - Not afraid to communicate.
     - GREAT future state diagrams, clear goals.
     - Patient still central to our processes.
     - Wonderful group energy.
     - Allowed to dream and plan.
     - Watching future leaders emerge.
     - Able to converge/synthesize huge amounts of information.
     - Met our expectations.
     - Group posed and ready for improvements.

   - What Could Improve:
     - Stuck in current state at times.
     - Occasional personal, defensive statements.
     - More representation from other stakeholders: Cardiology.
     - Uncertainties: What is possible (resources, funding, etc.)
     - Leads to guessing about future directions.
     - Multiple opinions make consensus difficult.
Box 1 – Reason for Action

- Chief complaint or problem statement:

- “At periods of transitions, patient vulnerability increases.
  - This is true with the transition of cardiac patients from the OR to ICCS.
- Our current processes are inconsistent, unclear and have resulted in harming patients in the ICCS.”
Handover (or ‘handoff’) is the exchange of information between health professionals that accompanies the transfer of patient care.

This process can result in adverse events.
Handover in the CTICU

- Transitioning patients from the operating room to the CTICU is:
  - a complex process
  - high incidence of latent and realized medical errors.

Handover Failure

- Leads to:
  - the institution of incorrect treatment plans
  - diagnostic delays
  - adverse events
  - patient complaints
  - increased length of stay, and potentially mortality
“It can’t be common!?”

- In a study of adverse events in patients undergoing surgery
  - 67% of anesthetists failed to transfer all the essential information
- Handovers from operating theatre to the Intensive Care Unit (ICU)
  - Communication errors were present in 100% of handovers.


Challenges in Our ICU

- Handover occurs several times in a 24 hour period

“Methodology” of Clinical Pathways

Four main components

1. A timeline (i.e. a step-by-step process)
2. Categorization of activities/interventions
3. Evaluation
4. Analysis of variance
   - in clinical practice/behavior away from created clinical pathway
Box 4 – Gap Analysis

- Identify all possible causes for situation
- Cause and effect diagrams may help
- Find “root cause”
Our Target State

- Structured, consistent process for patient transitions from the OR
- Receiving RN is able to be directly involved in the postoperative treatment plan
- Families are able to visit with patients in a more timely fashion

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Actual</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total time to settle patient</td>
<td>1.5 hours(min)-4 hours(max)</td>
<td>85% of the time less than 2 hours</td>
</tr>
<tr>
<td>Critical points of increased risk to patient safety</td>
<td>23</td>
<td>8</td>
</tr>
</tbody>
</table>
Roles of the F1 Pit Stop crew

• The "Lollipop Man" holds the team's pit sign
• The 4 tire changers
• Eight tire carriers are used
  • The front 2 tire carriers also have the responsibility of adjusting the car's front wing during the stop.
• The front and rear jack men use simple lever type jacks to lift the car and permit the changing of tires.
• Jack man is the only team member not in his working position before the car enters its pit stall.
• The fire extinguisher man
• The starter man
Here is what it looks like
- **1 lap** Race strategy is discussed in detail before the race, so the driver knows when to enter the pit. This is confirmed via radio one lap before the stop is scheduled to take place.

- **10 secs** The car enters the pit lane.

- **3 secs** The car approaches the garage.

- **0 secs** The car is stationary, and driver sets it in neutral and keeps his foot on the brake.

- **1 sec** The “wheel gun” crew use air guns to undo the wheel nuts and lean back; at the same time, the front and rear jack men raise the car off the ground with their jacks. The refueller should be connected by 1.5 secs.

- **2 secs** As the fuel is going in, the “wheel off” crew have started their work. All four wheels will be off by 2.5 secs, and the four “wheel on” crew start placing new wheels. Another crew member cleans the driver’s helmet visor.

- **3 secs** The new wheels are on by 3.5 secs, and the “wheel gun” crew lean forward to tighten the nuts. When they’ve finished, they raise a hand to signify that everything is okay.

- **4 secs** All four wheels have been changed, so the car is dropped from its jacks. Now everyone waits for the refuelling to be completed.

- **5.5 sec** The lollipop man signals to the driver to select first gear, while the refuelling continues.

- **6.5 secs** The fuel hose comes off, and the refueller wipes any spillage from the car. The lollipop man signals for the driver to leave, and the driver should be able to shoot off within 0.3 secs of the fuel hose coming off.

- **7 secs** The car is on its way. The fuel flap automatically closes, and the car’s tyres have been preheated to allow the driver to speed up without danger.
Here is what it looks like
Here is how it can go wrong.
“Time Out” in the CTICU
What the handover should include?

- **Information**: essential information that should be transferred from OR team to ICU team.

- **Tasks**: Identify tasks that need to be performed before information handover such as setting up monitors and alarms, placing the drains and urinary bag, etc.

- **Teamwork**: Involving all the team members who will be impacted by the proposed work plan

Our Process Map
Utility of Checklists

- Checklists are **action items** listed in order of priority
- The goal is to provoke **memory recall** and **reduce human error**.

IDAHOEA, O., & KAHN, J. M. (2012). BEYOND CHECKLISTS: USING CLINICIAN PROMPTS TO ACHIEVE MEANINGFUL ICU QUALITY IMPROVEMENT. CRITICAL CARE (LONDON, ENGLAND), 16(1), 305


Utility of Checklists

Draft - Cardiac Surgeons Checklist - April 25, 2012

- Indication of surgery
- Pertinent past medical history
- Surgical Plan/Surgery Completed
- Deviations for surgical plan/intraoperative complication
- Issues with separation from bypass
- Bleeding/coagulation Issues
- Completeness of operation (i.e. fully revascularized, adequacy of repair)
- Technical Considerations (intraoperative issues/complications)
- Need for protamine
- Systolic/MAP blood pressure limit
- Chest tube placement
- Plavix y/n
- Family Discussion
- Other issues relevant to ICU care

Draft - Cardiac Anesthesia Time-out Checklist - April 25, 2012

- Pertinent past medical history, physical exam and co-morbidities, medications
- Baseline HB, Cr, BP and HR
- Airway Issues
- Issues with induction
- Oxygenation/ventilation issues
- IV and arterial-line placement
- Pre-CPB TEE findings
- Technical Considerations/issues with separation from bypass
- CPB and X-clamp times
- Post-CPB TEE findings
- Drugs: allergies, intropes/vasopressors, last antibiotic, analgesics, last paralytic
- Fluids/blood products administered
- Desired hemodynamic goals/filling pressures
- Desired period of sedation (if required)
- Other issues relevant to ICU care
Unitary, multidisciplinary plan for and record of care
- Details tasks, sequence, timescale, and discipline and contains a checklist of all necessary actions
- Incorporates the patient’s expected condition over time
- Is paper (or electronic) based
  - requires minimal free text to complete
- Efficient, structured format for recording key clinical data in case notes
- Variances from planned care noted and analyzed
- Plan and practice adjusted following audit

# Summary Data - Efficiency

<table>
<thead>
<tr>
<th>Time</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>25th Percentile</th>
<th>Median</th>
<th>75th Percentile</th>
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</thead>
<tbody>
<tr>
<td>Total Time (Patient Arrives – T.O. Complete)</td>
<td>16.64</td>
<td>13.56</td>
<td>12</td>
<td>15</td>
<td>19</td>
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<tr>
<td>Delay (Time Out Start – RD to Time Out)</td>
<td>1.72</td>
<td>3.34</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Time Out (Time Out Completed – Time Out Start)</td>
<td>9.91</td>
<td>13.10</td>
<td>6</td>
<td>8</td>
<td>10</td>
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<table>
<thead>
<tr>
<th>Surgeon</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
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</thead>
<tbody>
<tr>
<td>Number of Timeouts</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Percentage Timeouts</td>
<td>42.9%</td>
<td>37.5%</td>
<td>25.0%</td>
<td>6.7%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>25.0%</td>
<td>0.0%</td>
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<tr>
<td>Mean Timeout (Minutes)</td>
<td>2.7</td>
<td>5.5</td>
<td>7.0</td>
<td>5.0</td>
<td>-</td>
<td>-</td>
<td>3.0</td>
<td>-</td>
</tr>
<tr>
<td>Median Timeout (Minutes)</td>
<td>2.0</td>
<td>5.0</td>
<td>7.0</td>
<td>5.0</td>
<td>-</td>
<td>-</td>
<td>3.0</td>
<td>-</td>
</tr>
<tr>
<td>Checklist Usage</td>
<td>No Checklists</td>
<td>One or More Checklists</td>
<td>All Checklists Used</td>
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<td></td>
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</tr>
<tr>
<td>Physician Checklist</td>
<td>8 (6 – 9)</td>
<td>8 (6 – 12)</td>
<td>8 (6 – 10)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Trainee Checklist</td>
<td>8 (6 – 10)</td>
<td>9 (6 – 13)</td>
<td>7 (6 – 10)</td>
<td></td>
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<tr>
<td>Physician or Trainee</td>
<td>8 (6 – 9)</td>
<td>8 (6 – 11)</td>
<td>8 (6 – 11)</td>
<td></td>
<td></td>
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</table>
What does this mean to me?

What data is there that this works?
Standardized multidisciplinary protocol improves handover of cardiac surgery patients to the intensive care unit.

- Pediatric cardiac intensive care unit.
- Pre and post implementation design

Conclusions: A formal, structured handover process for pediatric patients transitioning to the intensive care unit after cardiac surgery can reduce medical errors that occur during the admission process and improve teamwork among caregivers.

Interns spent 12% of their time in direct patient care.

64% in indirect patient care, 15% in educational activities, and 9% in miscellaneous activities. Computer use occupied 40% of interns' time.

2011 duty hour regulation-compliant models were associated with:

- increased sleep duration during the on-call period
- deteriorations in educational opportunities, continuity of patient care, and perceived quality of care.
How does this work for trainees?

Measuring Communication in the Surgical ICU: Better Communication Equals Better Care

Mallory Williams, MD, MPH, Nathanael Hevelone, MPH, Rodrigo F Alban, MD, James P Hardy, MBBS, MD, David A Oxman, MD, Ed Garcia, MD, Cristina Thorsen, MD, MPH, Gyorgy Frendl, MD, PhD, Selwyn O Rogers Jr, MD, MPH, FACS

- Resident–fellow communication of four cardiorespiratory events
  - hypotension, new arrhythmias, tachypnea, and desaturation
Measuring Communication in the Surgical ICU: Better Communication Equals Better Care

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Table 2. Communication Errors for Each Surgical ICU and PGY Resident Level Coverage

<table>
<thead>
<tr>
<th>SICU and resident coverage</th>
<th>Communication errors</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>Observational</td>
<td>Intervential</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%*</td>
<td>n</td>
</tr>
<tr>
<td>General surgery/vascular</td>
<td>23</td>
<td>39</td>
<td>11</td>
</tr>
<tr>
<td>PGY1</td>
<td>11</td>
<td>19</td>
<td>17</td>
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<tr>
<td>PGY2</td>
<td>3</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>PGY3</td>
<td>8</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>Trauma/burn</td>
<td>25</td>
<td>42</td>
<td>16</td>
</tr>
<tr>
<td>PGY3</td>
<td>13</td>
<td>22</td>
<td>9</td>
</tr>
<tr>
<td>Totals</td>
<td>59</td>
<td>44</td>
<td></td>
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</tbody>
</table>

*pPercent of total communication errors committed for each phase of the study.

Table 3. Communication of Cardiorespiratory Events in Early and Late Shifts

<table>
<thead>
<tr>
<th>Shift</th>
<th>Communicated n</th>
<th>%</th>
<th>Communication errors n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early (7 AM–9 PM)</td>
<td>117</td>
<td>83</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>Late (9 PM–7 AM)</td>
<td>92</td>
<td>54</td>
<td>79</td>
<td>46</td>
</tr>
</tbody>
</table>

p < 0.0001.

Table 4. Short-Term Outcomes by Type of Communication

<table>
<thead>
<tr>
<th>Type of communication</th>
<th>Improved n</th>
<th>%</th>
<th>Not improved or worse n</th>
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</thead>
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<tr>
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<td>90</td>
<td>20</td>
<td>10</td>
</tr>
<tr>
<td>Communication errors</td>
<td>77</td>
<td>75</td>
<td>26</td>
<td>25</td>
</tr>
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p < 0.0002.

Table 5. Resident–Fellow Communication Patterns During the Late Shift of Both Phases of the Study

<table>
<thead>
<tr>
<th>Phase</th>
<th>Communicated n</th>
<th>%</th>
<th>Communication errors n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observational</td>
<td>42</td>
<td>49</td>
<td>44</td>
<td>51</td>
</tr>
<tr>
<td>Interventional</td>
<td>50</td>
<td>59</td>
<td>35</td>
<td>41</td>
</tr>
</tbody>
</table>

p < 0.0521.
The Perspective from Above
July 18, 2011

To: Dr. Allan Menkins and the team who participated in my mitral valve repair

Before May 19, 2011 I had never been admitted to a hospital for anything serious. I entered a foreign world. It was my turn to experience the mysteries of what happens behind the scenes of a major operation. Dr. Menkins has an interest in aviation, and I am a retired Air Canada Captain. It was my turn, just as many passengers on my flights, to be the apprehensive “customer”.

Although I had been well briefed by my doctors and Pre-Op on what was going to occur, it was nevertheless perceived to be an unsettling event. Sure, “You will be fine,” or, “These operations have almost become routine,” sound reassuring. So does, “Maintenance advises that our mechanical issues are minor and the part will be changed at the next station,” or, “Don’t worry, these aircraft are built to withstand many more times the turbulence we are experiencing.”

The highlight of my experience was shortly after revived in ICU. I woke up, not groggy and no one was slapping me on the cheek like they did years ago when my parents had operations! I was momentarily clear. Dr. Menkins, the Captain of your team, was standing on my right. I believe the anesthesiologist stood to the right of my feet and 5-6 more assistants behind them. Dr. Menkins gave me the good news that the operation was a success and the repair had been achieved and all was well! I wasn’t quite fast enough to thank all of you for your work. I did, however, notice that smiles of satisfaction on your faces. Although you do it often, there was satisfaction that your training and experience had repaired another heart.

Some are going home. Some are leaving home. Some for family reasons, some for business. A wedding, an anniversary, a funeral...and my crew and I have just landed in a blinding snowstorm on a runway with minimum bendy action. We see their expressions as they walk up the bridge to the terminal. They don’t see us, but we felt that deep smile of satisfaction that all of us working together in a professional manner has resulted in bringing all those unknown people to their destination.

From the moment I entered “Pre-Op, to Patient Registration, OR, ICU, and the 4th floor of the Apotex Centre there was professionalism. As I was moved from one area to the next, everyone knew what I was, what my needs were, and what the goal was. Questions were answered or obtained. Everyone was part of the team. You, often overlooked, even the “baggage thrower” can make or break a trip.

I sincerely thank each of you for the help you offered. It was “almost an enjoyable experience” and if ever need to “fly” through your hospital again, my confidence will be much higher.

You know, I have seen a lot of hospitals. Somehow it occurs to me that there is more and more to learn and appreciate beyond all of them.

In appreciation,

Ralph Dyck

30 Tanglewood

July 18, 2011
The number of critically ill individuals complexity of illness, and cost of care continue to increase with time.

Intensivists will need to look beyond traditional medical practice, seeking lessons on quality assurance from industry and aviation.
How do we know we are improving?

- Currently, there is no universal standard means by which ICU performance is measured and reported.
- Participation in multicenter ICU collaborations
The CANCARE Society Investigator Group

Inaugural Meeting - Ottawa, May 12, 2012
10 Keys Points for CTICU Managers

1. Focus on what’s important (Keep it **simple**)
2. Show them the **evidence**.
3. Consider what type of **behavior** you are trying to change.
4. Be willing to **change** the system.
5. Try **different approaches**.
6. Prevent mistakes.
7. Support decisions at the **point of care**.
8. Choose strategies carefully.
10. Keep your guidelines **up to date**.

Clinical pathways serve to improve patient outcomes and satisfaction
- Improve interdisciplinary interaction
- *Reduce variability* practice
- Improve efficiency

Needs to be **iterative**
- Need a mechanism for re-evaluation and “re-tooling”

*Needs “buy-in”* from members of the team
The Surgeons

Cardiac Science program - St. Boniface Hospital
The Cardiac Science program - St. Boniface Hospital
The delivery of high-quality critical care medicine is vital to the success of cardiac surgery
Cardiac surgeons keep a breast of developments in critical care medicine in order to understand what constitutes optimal supportive care before and after surgery.
Cardiologists need to understand why and how their patients are treated with particular techniques or approaches after cardiac surgery.

Cardiac anaesthetists so that they can draw from such advances to improve overall patient care and understand how interactions between their craft and that of intensive care physicians can serve to deliver best care to complicated patients.
Why are clinical pathways relevant in the CTICU?

- High volume and high cost associated with cardiovascular diseases and cardiac surgery
- Both “low-intensity” and “high-intensity” patients in the same environment
- Can be used a method
  - to reduce variation in care
  - decrease resource utilization
  - potentially improve healthcare quality
Facts about Patient Safety

- Estimates that 1 in 10 patients are “harmed” while receiving hospital care
  - 20x higher in developing countries
- 1.4 million people are affected by nosocomial infections
- Problems associated with surgical safety account for 50% of avoidable adverse events that result in death in disability

http://www.who.int/features/factfiles/patient_safety/en/
Clinical Pathways (CP) seek to:

- maintain and improve the safety, effectiveness, patient centeredness, and timeliness of care
- Prevent increasing costs of healthcare delivery

Dissemination of information of accepted protocols/guidelines makes little difference in clinical practice

- A CP provides the methodology to implement guidelines
Campaign to prevent 5 million incidents of medical harm over two years
“Cycle of Change”

1. Measuring Harm
2. Understanding Causes
3. Identifying Solutions
4. Evaluating Impact
5. Translating Evidence into Safer Care
What is Lean Thinking?

- To **challenge** the tradition and status quo
- To **bring out the best** in people and allow teams to develop ideas and implement changes
- To focus on **long-term**, sustainable changes as opposed to short-term gains
- A **way of life**, never ending journey toward world-class status
Pitfalls of the “Handover”

- Should not a unilateral transfer of information
- Even experienced full-time faculty physicians
- did not conform to widely promoted communication schemes

Interdisciplinary Issues

- Fragmented handovers often occur due to competing demands on nurse
  - setting up equipment
  - coping with other patients.

Quality is THE Strategy

- 4 objectives
  - Patient satisfaction
  - Staff engagement
  - Clinical effectiveness and safety
  - Efficiency and financial performance
Verbal (and non-verbal) communication and information has been found to be crucial for task coordination and work performance in ICUs.

This doesn’t happen overnight
Everyone Have Their Say
Select References


Cardiac Surgery Clinical Pathway Guidelines

<table>
<thead>
<tr>
<th>Cardiac Surgery Inpatient Unit - Discharge and Teaching Checklist</th>
<th>Date (dd/mm/yyyy)</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STEP 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nursing:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ensure patient has their Patient Guide to Heart Surgery Booklet (PGHS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(if non-elective case – give patient a copy of PGHS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o Ask patient/family to read page 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Confirm family physician &amp; ensure s/he is added as Primary Care Provider</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Receiving homecare pre-op □ Yes □ No if yes, send consult</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Identify concerns/needs post discharge: Consult</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Home Care □ Occupational Therapy □ Social Work</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>STEP 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nursing:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Discuss target discharge date with patient/family</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Reinforce what to expect after surgery (PGHS pages 13-15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Physiotherapy</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Review care of breast bone (PGHS page 19)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Review transfers using sternal precautions (PGHS page 14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Complete Cardiac Rehabilitation referral form and choose site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Wellness Institute □ Reh-Fit □ Thunder Bay □ Brandon □ The Pas</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o If not referred, why?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clinical Nutrition</strong> (choose one of the following)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Review nutritional guidelines (PGHS pages 32-38) OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>□ Referred to out-patient cardiac nutrition class</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Patients were divided into two groups:

- After establishment of the multidisciplinary quality improvement program (January 2005–December 2006, n = 922) 
  - systems-based approach, standardization, team building, consistent and accurate communication and active management of change and quality.

Logistic regression and propensity score analysis were used to adjust for imbalances in patients’ preoperative characteristics.
Quality improvement program decreases mortality after cardiac surgery

- 48% decline in operative mortality after implementation of a QIP
Defined three short-term outcomes: improved, not improved, and worse.

- Non-communicated and miscommunicated events were considered communication errors.

An intervention was attempted to improve communication.

- Residents were given a special communication seminar with their usual orientation at the beginning of the rotation.
Measuring Communication in the Surgical ICU: Better Communication Equals Better Care

Mallory Williams, MD, MPH, Nathanael Hevelone, MPH, Rodrigo F Alban, MD, James P Hardy, MBBS, MD, David A Oxman, MD, Ed Garcia, MD, Cristina Thorsen, MD, MPH, Gyorgy Frendl, MD, PhD, Selwyn O Rogers Jr, MD, MPH, PACS

Table 2. Communication Errors for Each Surgical ICU and PGY Resident Level Coverage

<table>
<thead>
<tr>
<th>Communication errors</th>
<th>Observational</th>
<th>Interventional</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%*</td>
</tr>
<tr>
<td>General surgery/vascular</td>
<td>23</td>
<td>39</td>
</tr>
<tr>
<td>PGY3</td>
<td>23</td>
<td>39</td>
</tr>
<tr>
<td>General thoracic</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>PGY1</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>PGY3</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Trauma/burn</td>
<td>25</td>
<td>42</td>
</tr>
<tr>
<td>PGY2</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>PGY3</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Totals</td>
<td>59</td>
<td>44</td>
</tr>
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*Percent of total communication errors committed for each phase of the study.

Table 3. Communication of Cardiorespiratory Events in Early and Late Shifts

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<tbody>
<tr>
<td>Early (7 AM–9 PM)</td>
<td>117</td>
<td>83</td>
<td>24</td>
<td>17</td>
</tr>
<tr>
<td>Late (9 PM–7 AM)</td>
<td>92</td>
<td>54</td>
<td>79</td>
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p < 0.0001.

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