Rethinking Critical Care: Building a Foundation with Reliability

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Quality From the View Point of the Patient

Don’t Kill Me
Don’t Hurt Me
Don’t Let Me Suffer

Don Berwick 2003 IHI National Forum
Defining Healthcare Reliability

The Measurable Capability of a Health-related Process, Procedure, or Service

To Perform Its Intended Function Correctly,

In The Required Time

Under Commonly Occurring Conditions

Measuring Reliability

From The Patient’s Perspective, This Is An All or None Measure

Either They Receive “All” of The Elements of Care Associated With A Process or The Process Is Considered To Be Unreliable
What Are Our Expectations of Reliability?

- How many of you would put up with your car not starting two out of ten attempts?
- How many of you would fly commercially if the airplane crashed or aborted the flight two out of ten trips?
- How many of you would frequent a restaurant that served contaminated food two times out of ten meals?

This is What 80% Reliability Looks Like

<table>
<thead>
<tr>
<th></th>
<th>Average Percent</th>
<th>High Income Zip Codes</th>
<th>Low Income Zip Codes</th>
<th>Expected in One Year</th>
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<tbody>
<tr>
<td>Diabetic Eye Exams</td>
<td>47.9</td>
<td>53.2</td>
<td>44.9</td>
<td>100.0</td>
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<tr>
<td>Hgb A1c Monitoring</td>
<td>55.9</td>
<td>59.5</td>
<td>50.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Mammography Screening</td>
<td>46.7</td>
<td>50.8</td>
<td>39.8</td>
<td>100.0</td>
</tr>
<tr>
<td>Colon Cancer Screening</td>
<td>9.0</td>
<td>10.3</td>
<td>8.0</td>
<td>20.0</td>
</tr>
<tr>
<td>Influenza Vaccine</td>
<td>46.5</td>
<td>50.8</td>
<td>41.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Pneunococcal Vaccine</td>
<td>8.0</td>
<td>8.7</td>
<td>7.3</td>
<td>10.0</td>
</tr>
</tbody>
</table>

Two Years After Publishing the Evidence, 69% of Pts Are Not Receiving Best Care. Results 9,000 Deaths


Adhere to Best Practice?

Do you use lung protective strategy (low Vt) in ventilating acute lung injury patients?

Results of a Level 1 Reliability Processes.

Supportive and Adjunctive Therapies
Results of the German “Prevalence” Study


Why?
The Number 1 Barrier To High Reliability

“… the inherent limitations of human memory, effects of stress and fatigue, the risks associated with distraction and interruptions and limited ability to multi-task ENSURE that even skilled, experienced providers will make mistakes.”


All Humans Err Frequently
Keys to Higher Reliability

- Get Buy-in From Everyone
- Keep The Process Simple
- Bundle A Few Simple Things Together
- Execute Those Few Things Reliably
- Push to High Reliability By Reducing Human Error By Using Level 2 Reliability Methods

Change Culture & Attitudes

The Frontline Must Believe It’s Important

- Use the evidence in the literature
- Feedback your local data
- Review failures ASAP
- Use emotional breaches of our basic values
Get Everyone Engaged

- Assign Everyone a Role
  - Champion, Designer, Reviewer, Critiquer, Tester, Supporter, Participator, Data Collector, Database Manager

- Encourage Frontline to Team Lead

- Vertical Alignment Is Powerful

- Work Flow Structure Reinforces Engagement

- Use Rapid Cycle Testing to Drive Agreement, Acceptance, and Engagement

IHI Model for Improvement

- **AIM:** What are we trying to accomplish.

- **MEASURE:** How will we know the change is an improvement?

- **CHANGE CONCEPT:** What change can we make that will result in an improvement?

- **TEST:**
  - Rapid Cycle Testing

  Langley, Nolan, Nolan, Norman & Provost
  "The Improvement Guide"
Example:

**AIM:**
Get Ventilated Patients Out of Bed and Walking 200 Feet

**Plan**

- Under close supervision sit one awake intubated ventilator dependent patient with an FiO$_2$ < 0.7 on the side of the bed in the “dangle” position for as long as they can tolerate it with RN, RT, and PT present.

- Record:
  - Amount of assistance required (Max, Moderate, Minimal or None)
  - Any physiologic changes
  - Ability of patient to balance and sustain position
  - Duration of dangle experience
  - Any difficulties with tubes or lines
Do

- With RN, RT, and PT assisting patient is placed in dangle position with RN monitoring physiologic response, RT monitoring the ET tube and other lines, and PT assisting patient movement and documenting patient strength, balance, coordination, and duration of activity tolerance.

- Above problems with physiologic response, issues with tubes and lines and patients strength, balance, coordination are recorded.

Study

- Patient required minimal assistance (primarily controlling of tubes and lines) to move to the “dangle” position.

- Minimal change in V.S. were noted.

- Tension was noted on the IV lines that could have been avoided if more attention was paid to where the IVs were located.

- RT felt the Ventilator tubing should be secured in a better way to assure no tension would be place on the ET tube.

- Patient tolerated dangling well with minimum assistance for 30 minutes.
Act

- It was decided since the patient was strong enough that they could progress to standing and even transfer to a chair perhaps if standing goes well.
- A better way to secure the ventilator tubing will be tested.
- Positioning of the IV pumps and tubing length will be specified prior to mobility activity.
- Monitoring will be as before.

Plan – Second Cycle

- Under close supervision stand this awake intubated ventilator dependent patient with an $\text{FiO}_2 < 0.7$ at the side of the bed and if tolerated pivot them to sit in a chair for as long as they can tolerate it with RN, RT, and PT present during the move.
- Record:
  - Amount of assistance required (Max, Moderate, Minimal or None)
  - Any physiologic changes
  - Ability of patient to balance and sustain position
  - Duration of chair experience
  - Any difficulties with tubes or lines
Do – Second Cycle

- With RN, RT, and PT assisting patient stood at bedside with RN monitoring physiologic response, RT monitoring the ET tube and other lines, and PT assisting patient movement and documenting patient strength, balance, coordination, and duration of activity tolerance.

- Because activity tolerated well, patient was pivoted & sat in chair.

- Above problems with physiologic response, issues with tubes and lines and patients strength, balance, coordination were recorded.

Study – Second Cycle

- Patient required minimal assistance (1° controlling of tubes and lines) to move to pivot to the chair.

- Mild desaturation was noted to 88% on current FiO₂.

- Tension was again noted on the IV lines that could have been avoided if more attention was paid to where the IVs should be located when moving to the chair.

- RT felt the Ventilator tubing was secured in a better way and no tension was place on the ET tube.

- Patient tolerated sitting in chair well for 60 minutes.
Act – Second Cycle

- It was decided since the patient was strong enough that they could progress to walking short distances.
- FiO₂ will be increase during activity.
- The IV pumps and tubing will be specified prior to mobility activity for walking distances.
- Monitoring will be as before.

Plan – Third Cycle

- Under close supervision walk this awake intubated ventilator dependent patient with an FiO₂ < 0.7 to the hallway and back and if tolerated allow them to sit in a chair for as long as they can tolerate it with RN, RT, and PT present during the move.
- Record:
  - Amount of assistance required (Max, Moderate, Minimal or None)
  - Any physiologic changes
  - Ability of patient to balance and sustain position
  - Distance walked
  - Any difficulties with tubes or lines
The Power of Rapid Cycle Testing

1. It Makes Development of Protocols **Safe**
2. It Results in **Effective** Change
3. It Demonstrates the Change is **Doable** in the current environment
4. It Drives **Agreement** and **Acceptance** Among Provider
5. It Engages the Frontline & Stimulates **Change in the Local Culture**

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**RELIABILITY**
Adverse Events Are Usually A Result of Multiple Systems Factors

Swiss Cheese Model

When many things line up just right a failure occurs
Solution

Build Into the System Mechanisms to Prevent Human Tendencies to Create Errors When Implementing The Plan of Care

Anatomy of an Adverse Events

- Most IV solution bags look similar.
  (difference in heparin bag is it has Heparin written on the bag in RED letters)
- Central distribution stocks the IV solutions for ICUs.
- The bins for NS and Heparin are near each other.
- A heparin solution was put in the wrong bin.
- Patient was hypotensive from massive hemorrhage.
- Nurse grabbed a bag out of the NS bin and infused it rapidly - it was a heparin bag!
“Every System is Perfectly Designed to Produce the Results It Gets.”

Paul B. Batalden, MD – Dartmouth University

Lung Protective Strategy

Intermountain Healthcare
Design for Reliability

**LEVEL 1:** Intent, Vigilance and Hard Work

- Guidelines
  - An Inexplicit Outline How We Want It To Be Done
- Training
  - Give An In-service or CME About The Guideline
- Personal Checklists
  - Create A Mechanism To Help Me Personally To Do It
- Feedback
  - Let them See How They Are Doing Compared to Others

**LEVEL 2:** Human Factors Prevention – Decision Aids

- Reminders Built Into The System – Alerts, Bar Code Scan
- Evidence Base Defaults – Must Document Why Patient Did Not Walk, Tidal Volume Defaulted, Glucose level to start insulin drip default
- Redundancy – Medication Double Checks, Unit Wide Vent & Pump Alarm
- Scheduling – Med. Schedule, Coordination of Activity Time,
- Real Time Data Collection & Feedback – Sepsis Communication Tool
- Explicit Protocols & Standardize Processes
- Forced Functions By Design – O₂ and Air Outlets, Order Sets
Characteristics of a Highly Reliable Process

- It Is **Simple** When Segmented
- It Is **Explicit** and Specific
- It is **Measurable**
- It Is **Doable** In The Intended Environment and Time Frame Allowed
- It Is **Acceptable** To The Workers
- It Is **Communicated** Easily To Everyone

S-E-M-D-A-C
The Power of Doing

- The Right Thing
- At The Right Time
- Every Time

My Granddaughter’s High School Graduation – June 9th 2010

Terry P. Clemmer, M.D.
The Miracle & Power of Reliability

- T.T. was selected by his classmates to be the student speaker at East High School Graduation Program in Salt Lake City.
- First year in high school T.T. had a 0.7 GPA. He had flunked almost every class.
- His English language skills were deficient, his native language being Tongan.
- Knowing he was not stupid, he was embarrassed regarding his performance when facing his family and teachers.

Therefore, prompted by his Grandfather he made a commitment that he would reliably do a few simple things - things he knew were in his capacity to do:

1. Go to all of his classes
2. Listen to all the teacher's instructions
3. Do all the assignments
4. Turn in all his homework

- With in 6 months he was getting almost straight “A”s.
- He became a leader among his peers.
- He received an academic scholarship to college.
The Miracle & Power of Reliability

T.T. had tears in his eyes as he thanked his teachers, counselors, family & Grandfather for their help.

I am sure that there were many reminders, redundancies, encouragements, defaults, backups and other level 2 reliability helps built into that system.

T.T. was the only speaker to get a standing ovation from his classmates and the rest of the graduation guests.

The power of doing the right thing at the right time, every time even though it may seem simple, cannot be over emphasized.

Questions?