A Mixed Methods Approach to Studying Organizational Learning

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What is organizational learning?

- **Organizational learning**: the process of improving organizational actions by integrating new insights and knowledge
  - from own experiences = *intraorganizational learning*
  - from others’ experiences = *interorganizational learning*
    (Levitt & March, 1988)

- The benefits of organizational learning:
  - high-level performance
  - performance improvement
  - sustained competitive advantage
  - staff learning and satisfaction
Why study organizational learning in the health care industry?

- Quality of care in America – Need for improvement
  - Numerous reports document quality problems (IOM, 1999; 2001)
  - Problems - overuse, underuse, misuse and geographic variation in care – are rooted in system and organizational routines
  - Improvement requires change; organizational learning produces change

- Health care industry trends
  - Medical knowledge growing at unprecedented levels (Chassin, 1998)
  - Increasing specialization and interdependence of professionals
  - External pressure to improve care delivery quickly
  - Integrating knowledge quickly requires organizational learning

- An empirical opportunity
  - Efforts to become learning organizations/improve care are rampant
  - Efforts have met with varied success
  - Varied simultaneous experiences are a rarity and an opportunity
Barriers to organizational learning

- High stakes
  - Human life is at risk when processes fail
  - Experimenting with changes is difficult when outcomes are uncertain
    
    . . . it’s difficult to attempt change if change may cause harm

- Complexity
  - Dynamic nature of knowledge
  - Variability of inputs (patients)
  - Variability of processes (treatments)
    
    . . . it’s often difficult to describe the process... let alone improve it!

- Resource constraints
  - Staff shortages
  - Financial demands and limitations
    
    . . . it’s difficult to dedicate one’s self to learning new things when already feeling pressed to accomplish the old things

- Entrenched status hierarchy - - the focus of this study
  - Across professions
  - Across subspecialties
    
    . . . it’s difficult to create collaboration and teamwork for learning efforts when a history of division exists
An approach to studying organizational learning

- **Mixed methods research**: combines qualitative and quantitative research
  - **Qualitative research**: use of text-based data (from interviews, observation notes, etc.) to describe a phenomenon and generate hypotheses
  - **Quantitative research**: use of numeric data to count occurrences and to statistically test hypotheses

- **Why use mixed methods research**:
  - More comprehensive understanding of phenomena
  - Development of sounder measurement processes

Source: Curry, Nembhard & Bradley, 2009
Mixed methods-in-use:
Organizational learning for quality improvement in hospital units

Research Questions:

1. What factors promote team engagement in quality improvement (QI) work, despite the salience of a well-documented status hierarchy in medicine?

2. How do QI teams help their organizations learn and improve performance quickly and effectively?

- Collaborators: Amy Edmondson, Anita Tucker, Richard Bohmer
Status and the Medical Hierarchy

Status: prominence, respect and influence (Anderson et al., 2001)

Specialty physicians
Primary care physicians
Nurses (MS, BA, RN, LP)
Allied health workers (RTs, PTs, SWs)

The Medical Hierarchy*

“You’ll find in our nursery that there are nurses that have been here 25 years, and they have a hard time calling me by my first name.”
- Neonatologist, NICU 2

* Sources: e.g. Friedson, 1970a, 1970b; Hafferty & Wolinsky, 1991
The Effects of Status

- Status influences interpersonal interactions (e.g. Alderfer, 1987). Low status individuals are more likely to . . .
  - withhold valid information (Argyris, 1985)
  - limit their organizational citizenship (Stamper & Van Dyne, 2001)
  - defer decision rights to higher status others (Driskell et all, 1991)
  - speak less (Weisband et al., 1995) . . . than high status individuals.

- Research on organizational silence indicates that sense of threat and/or risk is a key determinant of employees’ willingness to speak up freely (Ashford et al., 1998; Edmondson, 1999; 2003; Milliken et al., 2003).

- Leader behavior affects the internal dynamics of the team, including team psychological safety and learning orientation.
Proposed Model and Hypotheses

Leader inclusiveness - leader actions that indicate an *invitation* and *appreciation* for others’ contributions

Psychological safety - feeling safe to speak up with questions, concerns, suggestions

Team engagement in quality improvement work

H1

H2

H3

H4

H5

H6

Professional status

Unit membership
Research Setting

- Neonatal Intensive Care Units (NICUs) in a quality improvement collaborative

- NICUs provide care to premature infants, extremely low birth weight babies and newborns with complications
  (Pictured: An baby boy, 24 Weeks GA, 1lb)

- Quality improvement collaborative: a short-term (6- to 24-months) learning system that brings together cross-disciplinary teams from multiple hospitals or clinics to seek improvement in a focused topic area (e.g. decreasing infection rates, decreasing wait times, etc.)
Research Methods

- **Phase 1:** Site visits to 4 NICUs and literature review (Qualitative)
  - Interview and observations
  - Case studies of NICUs and their QI projects
    - > Informed development of survey instrument

- **Phase 2:** Pilot test of survey at 4 NICUs (Quantitative)
  - Paper-and-pencil format, N=30 per NICU
    - > Assessed survey psychometric properties, validity of results

- **Phase 3:** Survey NICU 1440 staff at 23 non-pilot NICUs (Quantitative)
  - Paper & Web formats offered to meet participant preference
    - > Data for hypothesis-testing

- **Phase 4:** Follow-up interviews and questionnaires (Qualitative)
  - Report findings to NICUs and collaborative
    - > Validate results, Understand findings in context

- **Phase 5:** Obtain clinical outcomes data on 1061 infants (Quantitative)
  - > Data for additional hypothesis-testing
Sample items from survey scales

- **Psychological safety (Chronbach alpha = .73)**
  - Members of this NICU are able to bring up problems and tough issues.
  - People in this unit are comfortable checking with each other if they have questions about the right way to do something.

- **Leader inclusiveness (Chronbach alpha = .75)**
  - Physicians ask for the input of team members that belong to other professional groups.
  - Physicians do not value the opinion of others equally.
  ** Only non-physician responses used for conceptual and methodological reasons (Baggs et al, 1999; Leonard et al, 2004; Shortell et al, 1991)

- **Engagement in QI work (Chronbach alpha = .79)**
  - A growing number of staff in this NICU are participating in improvement efforts.
  - In the coming year, I would like to be very involved in our NICU’s quality improvement efforts.

*Response scale: 1 (strongly disagree) to 7 (strongly agree)*
Result 1: Status -> Psychological safety

GLM Contrast Comparing Psychological Safety of

- Physicians to Nurses: $p < .001$
- Nurses to Therapists: $p = .016$
- Overall planned contrast: $p = < .001$

![Bar chart showing mean psychological safety for physicians, nurses, and respiratory therapists.](chart.png)
## General Linear Model Results

**Dependent variable** = Ln(Psychological safety)

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>F-ratio</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>$F(1, 1111) = .01$</td>
<td>.93</td>
</tr>
<tr>
<td>Years in any NICU</td>
<td>$F(4, 1111) = 3.54$</td>
<td>.01</td>
</tr>
<tr>
<td>Years as a hospital employee</td>
<td>$F(4, 1111) = 2.09$</td>
<td>.08</td>
</tr>
<tr>
<td>Years in current NICU</td>
<td>$F(4, 1111) = 3.09$</td>
<td>.02</td>
</tr>
<tr>
<td>Hours per week in NICU</td>
<td>$F(1, 1111) = .24$</td>
<td>.62</td>
</tr>
<tr>
<td>Professional status – 3 groups</td>
<td>$F(2, 67) = 8.46$</td>
<td><strong>.001</strong></td>
</tr>
<tr>
<td>Unit membership</td>
<td>$F(22, 41) = 2.08$</td>
<td><strong>.02</strong></td>
</tr>
<tr>
<td>Professional status (3 groups) x Unit membership</td>
<td>$F(31, 1111) = 2.22$</td>
<td><strong>&lt;.001</strong></td>
</tr>
</tbody>
</table>
Result 2: Effect of status differences varies by unit
## Results 3 & 4: Leader inclusiveness matters

### Dependent variable: Ln(Psychological safety)

<table>
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<tr>
<th>Independent variables</th>
<th>F-ratio</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>Gender</td>
<td>F(1, 1126) = .10</td>
<td>.76</td>
</tr>
<tr>
<td>Years in any NICU</td>
<td>F(4, 1126) = 3.98</td>
<td>.003</td>
</tr>
<tr>
<td>Years as a hospital employee</td>
<td>F(4, 1126) = 1.66</td>
<td>.16</td>
</tr>
<tr>
<td>Years in current NICU</td>
<td>F(4, 1126) = 2.43</td>
<td>.05</td>
</tr>
<tr>
<td>Hours per week in NICU</td>
<td>F(1, 1126) = .001</td>
<td>.97</td>
</tr>
<tr>
<td>Professional status – low v. high status</td>
<td>F(1, 1126) = 11.58</td>
<td>.001</td>
</tr>
<tr>
<td>Leader inclusiveness</td>
<td>F(21, 1126) = 4.27</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Professional status x Leader inclusiveness</td>
<td>F(18, 1126) = 1.78</td>
<td>.02</td>
</tr>
</tbody>
</table>

[Graph showing the relationship between leadership inclusiveness and psychological safety.]

High inclusiveness

Low inclusiveness
Result 5: Psychological safety mediates conditions to demonstrate mediation

<table>
<thead>
<tr>
<th>Conditions to demonstrate mediation*</th>
<th>Independent variable</th>
<th>B</th>
<th>t</th>
<th>p</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does leader inclusiveness predict <strong>psychological safety</strong>?</td>
<td>Leader inclusiveness</td>
<td>.53</td>
<td>5.02</td>
<td>&lt;.001</td>
<td>.55</td>
</tr>
<tr>
<td>2. Does leader inclusiveness predict <strong>engagement in quality improvement work</strong>?</td>
<td>Leader inclusiveness</td>
<td>.41</td>
<td>3.19</td>
<td>.004</td>
<td>.46</td>
</tr>
<tr>
<td>3. Does the effect of leader inclusiveness drop substantially or become insignificant when psychological safety (the mediator) is included in the model for <strong>engagement in quality improvement work</strong>?</td>
<td>Psychological safety Leader inclusiveness</td>
<td>.57</td>
<td>2.32</td>
<td>.03</td>
<td>.47</td>
</tr>
</tbody>
</table>

* Dependent variables are in italics.

Intraclass correlation coefficients for psychological safety, leader inclusiveness and engagement in QI work are .21, .35 and .18, respectively, supporting group level analysis.
Summary of results: A model of team engagement in QI
Two unanswered questions

1. What kinds of QI activities are teams in “safe” units more likely to use?

2. Are these activities associated with desired organizational outcomes?
### Question 1: Kinds of QI activities?

Insight from site visits (interviews and observations):

**12 learning activities used by QI teams**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff feedback before implementation</td>
<td>Dry runs i.e. offline trials</td>
</tr>
<tr>
<td>Solicitation of staff ideas from staff</td>
<td>Project team meetings</td>
</tr>
<tr>
<td>Education session with staff</td>
<td>Problem solving cycles (PDSA)</td>
</tr>
<tr>
<td>Limited time pilot runs</td>
<td>Conference calls</td>
</tr>
<tr>
<td>Distribution of articles to staff</td>
<td>Literature reviews</td>
</tr>
<tr>
<td>Site visits to other hospitals</td>
<td>Workbooks of potentially better practices</td>
</tr>
</tbody>
</table>
### Factor analysis of survey data on QI activities

<table>
<thead>
<tr>
<th>Learning Activity</th>
<th>Learn-how</th>
<th>Learn-what</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff feedback before implementation</td>
<td>1.03</td>
<td>-0.23</td>
</tr>
<tr>
<td>Solicitation of staff ideas from staff</td>
<td>0.78</td>
<td>0.03</td>
</tr>
<tr>
<td>Education session with staff</td>
<td>0.70</td>
<td>0.04</td>
</tr>
<tr>
<td>Limited time pilot runs</td>
<td>0.65</td>
<td>0.10</td>
</tr>
<tr>
<td>Dry runs</td>
<td>0.55</td>
<td>0.08</td>
</tr>
<tr>
<td>Project team meetings</td>
<td>0.50</td>
<td>0.26</td>
</tr>
<tr>
<td>Problem solving cycles (PDSA)</td>
<td>0.45</td>
<td>0.37</td>
</tr>
<tr>
<td>Distribution of articles to staff</td>
<td>-0.01</td>
<td>0.74</td>
</tr>
<tr>
<td>Conference calls</td>
<td>0.11</td>
<td>0.68</td>
</tr>
<tr>
<td>Literature Reviews</td>
<td>0.08</td>
<td>0.67</td>
</tr>
<tr>
<td>Site visits to other hospitals</td>
<td>-0.13</td>
<td>0.59</td>
</tr>
<tr>
<td>Workbooks of potentially better practices</td>
<td>0.15</td>
<td>0.53</td>
</tr>
<tr>
<td>Variance explained</td>
<td>6</td>
<td>1.2</td>
</tr>
<tr>
<td>Variance explained (%)</td>
<td>49.90</td>
<td>9.70</td>
</tr>
<tr>
<td>Reliability (Cronbach’s Alpha)</td>
<td>88</td>
<td>80</td>
</tr>
</tbody>
</table>

*Used in “safe” places*
Q2: Learn-how and outcomes

Question: Is learn-how associated with desired outcomes?
- Successful implementation of new work practices
- Overall performance quality (patient mortality)

Answer: Yes!

Learn-how
(Engagement in)

- Implementation success of new practices: 1.27** (.39)
- Overall performance quality (Patient Mortality): -.68* (.31)

* p < .05, ** p < .01; coefficients are from mediated regression models that include psychological safety and covariates
Learn-how activities create opportunities for all staff to engage in operational and conceptual learning -- while adapting work practices to fit the organizational context.

“We made our best guess using the [existing bits and pieces of] evidence to figure out how we could implement it in a way that was reasonable for our people. . . We used the isolation room and a rubber ball to simulate a neonate, and we tried everything. We conducted dry-runs to see what it would be like to try this and that...We tried lots and lots of ways, practicing.

“We use this procedure in the delivery room 100% of the time. Even now, every once in awhile, someone will say, ‘What if we did this?’ And they suggest a little bit of a modification.”

Neonatologist, NICU 3
Summary and implications

- Status does predict psychological safety, but it need not be deterministic.

- Traditional status differences in health care may be overcome - to the benefit of quality improvement efforts.

- Aspects of unit team membership, especially the degree of leader inclusiveness, influence individuals' perceptions of psychological safety and willingness to engage in quality improvement efforts.

This is noteworthy because we can alter teams to create safety, a precursor of staff engagement in QI work, learn-how and improved clinical outcomes.

We can train leaders to be inclusive to foster psychological safety and thus facilitate effective quality improvement.
Conclusions

- More comprehensive understanding of organizational learning is gained using mixed methods research

- Advisory: Mixed methods has benefits and challenges
  - Benefits: unique, rich data sets for theorizing and testing
  - Challenges: time-consuming, ensuring rigor in both methods of research

- The 1lb baby boy survived and is doing well.

At 24 weeks Gestational Age

At 24 months (2 years old)
Thank you!
References


# Qualitative Data Collection Methods

<table>
<thead>
<tr>
<th>Qualitative Methods</th>
<th>Description</th>
<th>Application/purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>In-depth interview</td>
<td>Discussion between researcher/s and participant, driven by participant</td>
<td>Explore individual experiences and perceptions in rich detail</td>
</tr>
<tr>
<td>Focus group</td>
<td>Guided discussions among a group of people who share a common characteristic of interest</td>
<td>Generate unique insights into shared experiences and social norms</td>
</tr>
<tr>
<td>Observation</td>
<td>Systematic, detailed observation of people and events to learn about behaviors and interactions in natural settings</td>
<td>Learn about behaviors and interactions in natural settings; examine situations or processes typically hidden from the public; study cultural aspects of a setting/phenomenon</td>
</tr>
<tr>
<td>Document review</td>
<td>Objective and systematic analysis of written communication to categorize and classify essential concepts</td>
<td>Identify patterns of communication; analyze traits of individuals; describe characteristics of organizations or processes; make inferences about antecedents and effects of communication</td>
</tr>
</tbody>
</table>

Source: Curry, Nembhard & Bradley, 2009
Why add qualitative methods?

<table>
<thead>
<tr>
<th>Uses of qualitative methods</th>
<th>Examples of contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop sound quantitative measurement processes or instruments (e.g. Learning Organization</td>
<td>Identify health-care centered measures of general management constructs; assess cross-</td>
</tr>
<tr>
<td>Survey adapted to health care)</td>
<td>industry equivalency of existing tools</td>
</tr>
<tr>
<td>Investigate complex phenomena that are difficult to measure quantitatively (e.g. organizational learning)</td>
<td>Characterize organizational processes, dynamics and change over time; describe social interactions; elicit individual attitudes and preferences</td>
</tr>
<tr>
<td>Ensure comprehensive understanding of a problem (e.g. why health care teams struggle to</td>
<td>Explain surprising or inconsistent quantitative results; provide detailed descriptions of experiences; enhance quantitative measures of phenomena</td>
</tr>
<tr>
<td>learn effectively and efficiently?)</td>
<td>Explore potential causal mechanisms (e.g. why some learning activities are more effective</td>
</tr>
<tr>
<td></td>
<td>than others?)</td>
</tr>
</tbody>
</table>