Adventures in Practice Transformation

Perry Dickinson, MD
Miriam Dickinson, PhD,
Practice Transformation and Quality Improvement

• Changing healthcare environment in US and elsewhere
• Practice redesign and large-scale quality improvement efforts
• Ongoing need for quality improvement and innovation in all primary care practices
• Critical to capture data to understand what works and what doesn’t and learn from our efforts
• Need to show improvements in quality of care and patient experience and overall health while decreasing cost
Need New Approaches to Rapid Cycle Learning

• Rapid change – policy decisions, implementation aren’t waiting on traditional randomized clinical trials
• Many demonstration projects, natural experiments
• Support for rapid cycle evaluation & learning
• Need to develop new methods
• Combine research, evaluation, & QI approaches
• Mixed qualitative & quantitative approaches
Contextual Factors

• Practice characteristics and settings can affect the ability of the practice to make and sustain changes
• Critical to understand the context – what is working (or not) in what context
  – Organization/system level factors
  – Structural features of the practice
  – Setting
  – Practice culture
  – Characteristics of the patient panel
Conceptual Frameworks for Practice Change

• Organizational Theory
  – Steve Shortell
  – Leif Solberg
  – Deborah Cohen

• RE-AIM framework (Russ Glasgow) – Reach, Effectiveness, Adoption, Implementation, Maintenance
Practice Transformation Conceptual Framework

Practice Transformation Support Intervention

- Change Capacity
- Adaptive Reserve
- Alignment & Motivation
- Change Management & QI Process

Improved Practice Quality Improvement & Change Management

Change Content (Implementation of Comprehensive Primary Care & Behavioral Integration)

Improved Care & Population Health, Reduced Cost
Transformation Support

- Education, leadership engagement
- Development of a shared vision
- Readiness assessment with feedback
- Data resources and technical support
- Practice facilitation
- Practice quality improvement teams
- Learning collaboratives, learning community
- Training resources for staff and clinicians
- Patient advisory groups and other patient engagement efforts
Practice Facilitators

- Implement an ongoing change and quality improvement process – improvement teams
- Specifically, implement the targeted change content
- Implement sound quality improvement techniques
- Keep the team on task – ongoing “nudge”
- Identify and assist in solving problems
- Link to transformation resources
- Cross-pollinate best practices
Common Designs

- Pre/post or longitudinal, no comparison group
- Quasi-experimental designs with comparison group
- Cluster randomized trials (CRT)
- Parallel group design
- Stepped wedge - practices randomized to an intervention implementation time rather than a group so that ultimately, all practices get the intervention
Quantitative Methods – Pre/post or longitudinal with no comparison group

• Multi-practice quality improvement or clinical demonstration projects
• Data: practice level and/or patient level outcomes
• Methods
  – Comparisons of pre-post conditions
  – Growth curve models
  – Statistical process control (e.g. “run charts”)
• What can we learn?
  – Quantitative methods can be used to answer the question, did it improve (or get worse) – but can’t determine whether change was due to the intervention or something else
Quantitative Methods – Quasi-experimental and experimental with comparison group

• Methods involve comparison of change in one group vs change in another group, with or without randomization

• What can we learn?
  – Quantitative methods can address the question, did the intervention work?
  – Is there greater improvement in the intervention group than in the comparison group?
Quasi-Experimental and Experimental Designs with Comparison Group

- Parallel group design
  - General or generalized linear mixed effects modeling used to accommodate clustering of patients within practices and multiple observations of patients over time
  - Propensity score approaches can be used for quasi-experimental designs to assure comparable patient groups

- Cross-over or stepped wedge designs involve both within and between practice comparisons
Quantitative Methods - Other

• Contextual effects
  – Moderators of change (effect modification)
    • What can we learn?
      – For whom did it work?
      – i.e. Did the intervention work better for practices with certain characteristics?
  – Mediators of change (in the causal pathway)
    • What can we learn?
      – How did it work?
      – Did change in some expected intermediate step result in change in the outcome?
• Cost analysis - Addresses the question, is it worth it?
What Do You Learn from Qualitative Methods

• Qualitative methods help to describe…
  – Details about the practice context
  – Details about the implementation of the change process
• Qualitative methods help to answer questions about…
  – Why (or why not)?
  – Who? (Patients, clinicians, staff)
  – How? (Details about who does what, in what sequence)
Qualitative Methods

• Practice observation
  – Process or workflow mapping
  – Time-motion studies

• Key informant interviews
  – Clinicians, staff - all roles

• Group discussions – “lessons learned”

• Document reviews

• Content analysis

• Comparative case studies
Mixed Methods

• Quantitative data help answer “did the intervention or change work” (and sometimes “for whom”)
• Qualitative data help answer why and how questions. Describe implementation. Describe roles. Provide insight into office processes. Add context to numeric data.
• Reach: an essential skill for understanding practice change efforts for practices and evaluators. Tracks who receives the intervention.
• Process or workflow maps: help identify key operational obstacles or questions; (answers “who” and “what” questions).
Example, QI Project, No Comparison - Colorado Beacon Consortium Evaluation

• Three year project - practice transformation initiative in 51 practices, with HIT support and “quality improvement advisors” working onsite with the practices
  – Goal - to “optimize the efficiency, quality, and performance of our health care system, and integrate the delivery of care and use of clinical information to improve community health.”
  – Sought to assist practices in accomplishing extraction, reporting, and meaningful use of clinical data to improve care
  – Particular focus on asthma, diabetes, heart disease, obesity, and depression
Goals for Beacon Evaluation

• Describe the Quality Improvement Advisors’ work and how it contributed to practice IT implementation and practice quality improvement, including lessons learned

• Determine if there were improvements in quality measures

• Limitations
  – Not all practices were able to provide consistent data
  – Practices could choose which measures to report
  – Monthly reporting of outcomes aggregated at practice level, with no individual patient data
  – No comparison group
Beacon Mixed Method Evaluation

• Quantitative approaches
  – Descriptive statistics
  – Growth curve modeling with individual trajectories for practices (random intercept and random slope) and estimates of overall trend

• Qualitative approaches
  – Content analysis of monthly practice notes, other data sources
  – Interviews of Beacon team members and practice clinicians and staff members
  – Comparative case studies
  – Meta-matrices
<table>
<thead>
<tr>
<th>Beacon Measure</th>
<th># of practices reporting data</th>
<th>Estimate of 12 month change</th>
<th>p-value for change</th>
<th># of practices that improved significantly</th>
<th># of practices that met target or improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult BMI 18 to 64 Years Old Rate</td>
<td>17</td>
<td>8.39</td>
<td>0.005</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Adult BMI 65 Years and Older Rate</td>
<td>17</td>
<td>10.67</td>
<td>0.002</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>Breast Cancer Screening</td>
<td>9</td>
<td>9.67</td>
<td>0.193</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Diabetes A1c &gt; 9.0%</td>
<td>12</td>
<td>-3.87</td>
<td>0.231</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Diabetes Depression Screening</td>
<td>5</td>
<td>18.05</td>
<td>0.022</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>IVD Depression Screening</td>
<td>4</td>
<td>24.26</td>
<td>0.009</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>IVD LDL Screening</td>
<td>10</td>
<td>4.21</td>
<td>0.419</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>IVD LDL &lt; 100</td>
<td>10</td>
<td>8.56</td>
<td>0.062</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Tobacco Ask Measure (a)</td>
<td>15</td>
<td>13.59</td>
<td>0.005</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Tobacco Counsel Measure (b)</td>
<td>16</td>
<td>16.56</td>
<td>0.0002</td>
<td>7</td>
<td>13</td>
</tr>
</tbody>
</table>
Content Analysis Results

• Meaningful use of EHR data
  – Aligned with overall practice aims for improving care…but required substantial workflow reengineering and new training and skills for staff and clinicians
  – Practice facilitators provided essential support, translating MU objectives into practice-specific objectives
  – Collaborative, peer-to-peer learning helped build local/regional expertise for sharing
  – Local technical EHR expertise was vital ingredient
Quasi-Experimental and Experimental Designs with Comparison Group

• Example: the Colorado EPIC study
  – Cluster randomized trial of 3 approaches to using the chronic care model to improve diabetes care in 40 practices
CQI Facilitation Arm

- Onsite practice facilitation to assist with practice changes to improve diabetes care
- Facilitator helped form practice improvement teams and provided structure and process for quality improvement and use of the chronic care model for diabetes
- Underlying theory – Continuous Quality Improvement Model – using plan-do-study-act (PDSA) cycles guided by quality measurement data in a focused effort to improve diabetes care
- Duration was up to 18 months,
RAP Facilitation Arm

- Reflective Adaptive Process (RAP) change model
- Based on complexity theory, focusing on practice capacity to make and sustain change
- Assumed that improving practice change capacity is primary in implementing improvements
- Facilitator formed improvement teams, but allowed each practice to set its targets for change in diabetes care
- Not driven by quality measures
- Duration: 6 months
Self-directed Arm

- Given website with information about Chronic Care Model for diabetes
- Did not receive practice facilitation
Methods

- Study Design: Cluster randomized trial
- Primary subjects: 40 primary care practices in Colorado
  - 822 chart audits of random sample of patients with type 2 diabetes covering period from 12 months prior to baseline through 18 months post intervention
  - 502 clinician and staff Practice Culture Assessment surveys at baseline, 9, and 18 months
Outcome Variables

• Chart audits - diabetes process of care measures from the ADA Physician Recognition Program

• Number of up to date guideline concordant elements:
  – HgA1c, eye exam, foot exam, blood pressure, lipids, nephropathy screening, flu shot, self-management activities, nutrition counseling
Analytic Methods

- Multilevel models
  - Patient included as a random effect: repeated measures within individuals over time
  - Practice also included as a random effect: subjects nested within practices
- Patient age, gender, race/ethnicity, comorbidities included as fixed effects
## Colorado EPIC Study

### Total Process of Care

<table>
<thead>
<tr>
<th></th>
<th>RAP Mean Up-to-date out of 9</th>
<th>CQI Mean Up-to-date out of 9</th>
<th>SD Mean Up-to-date out of 9</th>
<th>Differential change over time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td>4.54</td>
<td>3.58</td>
<td>3.63</td>
<td>Overall: $F(4,2386)=10.70$, $P&lt;.0001$</td>
</tr>
<tr>
<td><strong>9 months</strong></td>
<td>4.69</td>
<td>4.91</td>
<td>4.04</td>
<td>$R \times S: F(2,1838)=3.65$, $p=.0263$</td>
</tr>
<tr>
<td><strong>18 months</strong></td>
<td>4.85</td>
<td>4.91</td>
<td>4.39</td>
<td>$C \times S: F(2,1475)=9.99$, $p&lt;.0001$</td>
</tr>
<tr>
<td><strong>Differential change</strong></td>
<td><strong>C x R: F(2,1455)=19.27, p&lt;.0001</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Moderators

• Moderators – baseline characteristics that are associated with differential improvement in outcomes across intervention groups

• Potential Moderators
  – Practice Characteristics
    • Rural or urban location
    • Others also looked at, no time to present!
  – Practice Culture Assessment
    • Change Culture and Work Culture
      – Mean scores and variability (SD)
Analytic Methods

• Moderator analyses
  – Main effects and all two way interactions for time, arm, and practice characteristic
  – Three way interaction (time x arm x practice characteristic) used to determine whether intervention effects differed by arm
Moderating Effect of Practice Location

- Intervention effects differed by rural location: $p < .0001$
- Greater improvement in rural CQI and RAP practices compared to their urban counterparts (both $p < .05$)
- Less improvement in rural SD practices compared to their urban counterparts ($p < .05$).
Moderating Effect of Change Culture

- Intervention effects differed by change culture: \( p < 0.001 \)
- Greater improvement in CQI in practices with higher CC scores \( (p < 0.01) \)
- Less improvement in RAP practices with higher CC scores \( (p < 0.05) \)
- No difference in improvement in SD practices by CC \( (p = 0.2236) \)

Low = -1SD, Medium = mean, High = +1sd
Moderating Effect of Work Culture

Intervention effects differed by Work Culture: p<.0001
Greater improvement in CQI and RAP practices with higher WC scores (both p<.01)
No difference in POC change by WC in RAP practices (p=.1838).

Low=-1SD, Medium=mean, High=+1sd
Effects of *Variability* in Practice Change Culture and Work Culture on Diabetes POC

Greater variability in CC associated with less improvement in RAP and SD (p<.05)
Greater variability in WC associated with less improvement in CQI and SD (p<.05)
**Multilevel Model for Assessing Moderation**

**Level 1 model.** Outcomes within patients over time (random intercept for patients)

**Level 2 model.** Patients within practices (random intercept for practices)

**Level 3 model.** Between practices

The two intervention arms are indicator variables with SD as the reference group (only model for slopes shown). $\beta_{10j}$ is the slope for patients in practice $j$

$$\beta_{10j} = \gamma_{100} + \gamma_{110} (\text{RAP}) + \gamma_{120} (\text{CQI}) + \gamma_{130} (\text{rural}) + \gamma_{140} (\text{RAP x rural}) + \gamma_{150} (\text{CQI x rural})$$

where $\gamma_{100}$ is the slope in urban SD practices, $\gamma_{110}$ and $\gamma_{120}$ are the differences in slope in urban RAP and urban CQI practices, $\gamma_{130}$ is the difference in slope for rural SD practices (compared to urban SD practices), and $\gamma_{140}$ and $\gamma_{150}$ are the differential effects of RAP and CQI in rural practices (e.g. differences in slope for rural practices in these arms compared to their urban counterparts)
Summary and Conclusions

• Practice characteristics can have a differential impact across various practice redesign interventions

• Important to assess practice context and culture as part of practice transformation efforts

• May be important in tailoring interventions

• Need to improve our understanding of practice context and culture
Lessons Learned

• Keep the research burden as low as possible
• Primarily or only collect survey data that is useful to the practice or the intervention team
• Don’t rely on registry data unless necessary – although that may be better in some places
• For some projects – primary learning may be qualitative, but think mixed methods
• You can learn a tremendous amount from multiple QI projects involving multiple practices – a different type of evidence, but very important
References


- Fernald DH, Dickinson WP, Wearner R. Supporting Primary Care Practices in Building Capacity to Use Health Information Data. eGEMS (Generating Evidence and Methods to Improve Patient Outcomes. 2;3:1-7 (2014).