Using data to improve quality of care and patient outcomes

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Data in quality improvement

“Without data you’re just another person with an opinion.”

“In God we trust. All others must bring data.”

W. Edward Deming (1900 -1993)
What is Quality Improvement?

Using understanding of our complex healthcare environment

Applying a systematic approach

Designing, testing, and implementing changes using real time measurement for improvement

To make a difference to patients by improving safety, effectiveness, and experience of care

Academy of Medical Royal Colleges. Quality improvement: training for better outcomes. March 2016
What data do we need?

Data can be used for each of these, answering different questions:

➢ Do we have a problem, for which patients and in what circumstances?

➢ Is the intervention working as intended or do we need to make changes?

➢ Are there any unintended consequences of the intervention?

➢ Is the intervention effective to improve patient outcomes?
Do we have a quality or safety problem?

Multiple data sources:
- Quality indicators: e.g. worrying trend over time
- Registry or audit data: e.g. worse performance relative to others
- Patient experience data or complaints
- .....etc.

Understand your data!
Choosing a set of quality measures

No one-size-fits-all

In practice: often single indicators but why are these monitored?

Periodic review: indicator still needed?
Quality improvement in registries

Failure to administer recommended chemotherapy: acceptable variation or cancer care quality blind spot?

Ryan J Ellis, Cary Jo R Schlick, Joe Feinglass, Mary F Mulcahy, Al B Benson, Sheetal M Kircher, Tony D Yang, David D Odell, Karl Bilimoria, Ryan P Merkow

Variation in the use of infection control measures and infection-related revision incidence after breast implant surgery in the Netherlands


Continuous Quality Improvement Program for Hip and Knee Replacement

Deborah A. Marshall, PhD, Tanya Christiansen, Christopher Smith, BCom, MBA, Jane Squire Howden, RN, BScN, Jason Werle, MD, FRCSC, Peter Faris, PhD, and Cy Frank, MD, FRCSC

Effectiveness of a multifaceted quality improvement intervention to improve patient outcomes after total hip and knee arthroplasty: a registry nested cluster randomised controlled trial

Peter van Schie, Leti van Bodegom-Vos, Tristan M Zijdeman, Rob G H Nelissen, Perla J Marang-van de Mheen, IQ Joint study group
Designing QI initiatives: key elements

- Understand the problem
- Replicable intervention – development and refinement
- Theory why the intervention will address the problem
- Measurements showing that intervention worked as intended
Why can the intervention work – articulate the programme theory


Develop and refine the intervention - PDSA

Box 1 Benefits from the authentic application of plan–do–study–act cycles

- Efficient use of data—collecting just enough to inform the best action forward
- Refine measures and data collection method (to ensure that baseline and intervention data are collected in similar fashion)
- High ‘return on failure ratio’ (valuable lessons learned with relatively little resources invested to learn)
- Recognise necessary refinements to the intervention
- Identify missing ingredients for the intervention
- Anticipate what might go wrong during implementation
- Increases confidence that the change under consideration will produce improvement
- Engages stakeholders in development of the intervention
- Minimises resistance when change is implemented

Each implementation phase has potential challenges:

- **Plan**
  - Failure to understand the problem fully
- **Do**
  - Failure to implement the intended intervention
  - Failure to collect the intended data
  - Failure to capture unanticipated learning
  - Failure to abandon the intervention despite negative results or side effects
- **Study**
  - Failure to appropriately analyze or interpret the data collected
  - Failure to communicate what has been learned with the team
- **Act**
  - Moving too quickly from small to large scale change


Measurements: 3 types of outcomes

- **Primary outcome**: key quality / safety issue targeted
- **Intervention fidelity** (or process) measures: key things you work on to achieve outcomes
- **Balancing measures**: possible unintended effects or harm
Improving care using registries

Most registries provide feedback to hospitals, intended to improve care

But is it tailored to the needs and skills of clinicians?
Understanding the problem with feedback

- About two-third of surgeons logged in – received feedback information
- 55% was aware of deviating performance – awareness
- About 60% interpreted the funnel plot correctly – interpretation of feedback

## Theory why feedback was ineffective

<table>
<thead>
<tr>
<th>Causes</th>
<th>Interventions</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Need to log in</td>
<td>Align with workflow</td>
<td>Feedback by email</td>
</tr>
<tr>
<td>Incorrect interpretation</td>
<td>Increase knowledge</td>
<td>Staff education</td>
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<tr>
<td></td>
<td>Feedback aligned with mental model</td>
<td>Add different types of charts</td>
</tr>
<tr>
<td>Cannot link actions to feedback</td>
<td>Increase skills</td>
<td>Add toolbox to facilitate action planning</td>
</tr>
<tr>
<td>Engagement of surgeons</td>
<td>Credibility of data</td>
<td>Use monthly registry data</td>
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<td></td>
<td>Timely feedback</td>
<td>Choose their own QI targets, setting goals</td>
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</tbody>
</table>
Refinement of feedback

- Annual feedback vs. continuous improvement
- Funnel plots – average performance in a period
- Aggregate level data, not aligned with mental model of clinicians

CUSUM chart with 5 control limit: earlier signal
- Best accuracy (97%)
- First signal for worsening
  - THA: 18 months IQR [7-22]
  - TKA: 21 months IQR [9-25]

Link feedback to actions to improve

- Reasons for revision give more direction

- Facilitate actions by providing a toolbox with evidence-based measures for each outcome
Engagement of surgeons

• Use registry data they have submitted themselves
• More frequent feedback
• Setting goals, choose own targets to improve
• Survey to:
  • Encourage reviewing feedback
  • Which improvement initiatives conducted

Four stages of facing reality

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>The data are wrong</td>
</tr>
<tr>
<td>Stage 2</td>
<td>The data are right, but it’s not a problem</td>
</tr>
<tr>
<td>Stage 3</td>
<td>The data are right, it’s a problem, but not my problem</td>
</tr>
<tr>
<td>Stage 4</td>
<td>The data are right, it’s a problem, it’s my problem</td>
</tr>
</tbody>
</table>

https://www.ihi.org/resources/Pages/ImprovementStories/ImprovementTipTakeTheJourneyToJiseki.aspx
Testing effectiveness to improve patient outcomes

More improvement in patient outcomes intervention group

Effect size dependent on introducing quality initiatives

Van Schie et al. BMJ Qual Saf 2023;32:34-46
Lessons learned – what worked well

“We were doing pretty well on hospital stay, but other hospitals were faster without compromising other outcomes. That makes you wonder, what can we do to get to that point?”

“Particularly the education session where it was explained how we should interpret the data, was very helpful.”

“The rapid cycle feedback with information on your patient characteristics. It shows where you deviate from other hospitals and you also quickly gain insight whether adjustments in care are having effect.”

“We analysed why we had more revisions of the hip and started improvement initiatives. The intervention may have been too short but you could already see it in our numbers.”

“We joined together with X. Because we were evaluated separately we could distil best practices. If one did worse on one part than the other, we could immediately investigate why that occurred. Very helpful.”
Lessons learned – what could be improved

• No feedback on implants relative to others -> improving choice of implants
• Stratification by type of patients – logistics vs patient complexity
• No involvement of patients – different outcomes targeted by improvement initiatives

Sustainability of improvement initiatives

• What changes when a QI initiative ends – are resources still available?
• Planning for sustainment
  • Make it easier to do the right thing – facilitate action in workflow
  • What intervention elements are crucial?
• Avoid availability bias
• Leverage the role of caregivers to design and sustain initiatives
Using data to drive quality improvement

• More is needed than data alone: engagement, time and resources
• Frequent feedback needed for continuous improvement
• Tailored to the needs and skills of clinicians, aligned with workflow

“You can’t do quality between surgical cases and tea time”


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