Living systematic review of diabetes quality improvement interventions
Diabetes QI: a rapidly evolving field

1982-2006
JAMA 2006
Effects of Quality Improvement Strategies for Type 2 Diabetes on Glycemic Control. A Meta-Regression Analysis
66 included studies

2003-2010
Lancet 2010
Effectiveness of quality improvement strategies on the management of diabetes: a systematic review and meta-analysis
162 included studies

2010-2014
Forest and Trees 2017
Seeing the forests and the trees—innovative approaches to exploring heterogeneity in systematic reviews of complex interventions to enhance health system decision-making: a protocol
278 included studies
Diabetes QI review inclusion criteria

- **P:** Type 1 or 2 diabetes, outpatient

- **I:** Cochrane’s EPOC taxonomy (adapted)

- **C:** ‘Usual care’ or active intervention

- **O:** Range of process and patient indicators of quality of care

## EPOC Taxonomy

- Audit and Feedback
- Case management
- Team changes
- Electronic patient registry
- Facilitated relay of information
- Clinician education
- Clinician reminders
- Continuous QI
- Financial Incentives
- Promotion of self-management
- Patient education
- Patient reminder systems

### Domain

<table>
<thead>
<tr>
<th>Domain</th>
<th>Process measure</th>
<th>Intermediate outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glycemic control</td>
<td>Mean HbA1c</td>
<td></td>
</tr>
<tr>
<td>Vascular risk factor</td>
<td>Mean LDL</td>
<td></td>
</tr>
<tr>
<td>management</td>
<td>Mean SBP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mean DBP</td>
<td></td>
</tr>
<tr>
<td>Retinopathy screening</td>
<td># pts screened</td>
<td></td>
</tr>
<tr>
<td>Foot screening</td>
<td># pts monitored</td>
<td></td>
</tr>
<tr>
<td>Renal function</td>
<td># pts monitored</td>
<td></td>
</tr>
<tr>
<td>Smoking cessation</td>
<td># pts quit</td>
<td></td>
</tr>
</tbody>
</table>
What is the best approach to synthesize the evidence?

We know that the QI interventions are effective in improving diabetes QI.

For diabetes QI review: $2^{12}$ intervention combinations = 4,096.

Options:

• Single trial, 4,096 arms
• 4,096 independent trials
• Network meta-analysis with 4,096 nodes

Alternative (feasible) approach to capture complexity and inform future directions?
Bayesian multivariate hierarchal meta-regression

Using this statistical approach allows us to:

1) Do multi-arm comparisons rather than pairwise

2) Look at the individual components of these multifaceted, complex interventions in an additive way
## Comparison of approaches

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Traditional meta-analyses</th>
<th>Hierarchical meta-regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promotion of self management</td>
<td>-0.57 (-0.71, -0.31) [1]</td>
<td>-0.07 (-0.25, 0.10)</td>
</tr>
<tr>
<td>Team changes</td>
<td>-0.57 (-0.71, -0.42) [2]</td>
<td>-0.33 (-0.48, -0.18)</td>
</tr>
<tr>
<td>Case management</td>
<td>-0.50 (-0.65, -0.36) [3]</td>
<td>-0.09 (-0.27, 0.07)</td>
</tr>
<tr>
<td>Patient education</td>
<td>-0.48 (-0.61, -0.34) [4]</td>
<td>-0.16 (-0.31, 0.00)</td>
</tr>
<tr>
<td>Facilitated relay</td>
<td>-0.46 (-0.60, -0.33) [5]</td>
<td>-0.17 (-0.33, -0.00)</td>
</tr>
<tr>
<td>Electronic patient registry</td>
<td>-0.42 (-0.61, -0.24) [6]</td>
<td>-0.19 (-0.38, 0.00)</td>
</tr>
<tr>
<td>Patient reminders</td>
<td>-0.39 (-0.65, -0.12) [7]</td>
<td>0.01 (-0.17, 0.18)</td>
</tr>
<tr>
<td>Audit and feedback</td>
<td>-0.26 (-0.44, -0.08) [8]</td>
<td>-0.21 (-0.58, 0.09)</td>
</tr>
<tr>
<td>Clinician education</td>
<td>-0.19 (-0.35, 0.03) [9]</td>
<td>0.03 (-0.24, 0.29)</td>
</tr>
<tr>
<td>Clinician reminders</td>
<td>-0.16 (-0.31, -0.02) [10]</td>
<td>0.07 (-0.15, 0.29)</td>
</tr>
</tbody>
</table>

- Effects are smaller due to isolation of individual components
- Rankings are altered
- Fewer effective components
Considerations for transitioning to a LSR

Bayesian multivariate hierarchical meta-regression:
- Primary concern = ensure data analysis are correct, while minimizing statistician time

Questions concerning:
- Can we standardize data extraction forms?
- How can we ensure data is clean as possible before exporting to statistician?
Considerations for transitioning to a LSR

The large scale of our LSR potentially allows for unique considerations/methods:

Screening:
- Search and screen every 3 months

Data Analysis:
- Updated every 6 months, with new evidence flagged until incorporation
Questions?