Effectiveness of quality improvement strategies on the management of diabetes: Systematic review

Noah Ivers MD, CCFP
PhD Candidate, University of Toronto

on behalf of the diabetes QI review team

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Diabetes: Growing burden, sub-optimal care

Figure 1: Diabetes in Canada: 2000 to 2020

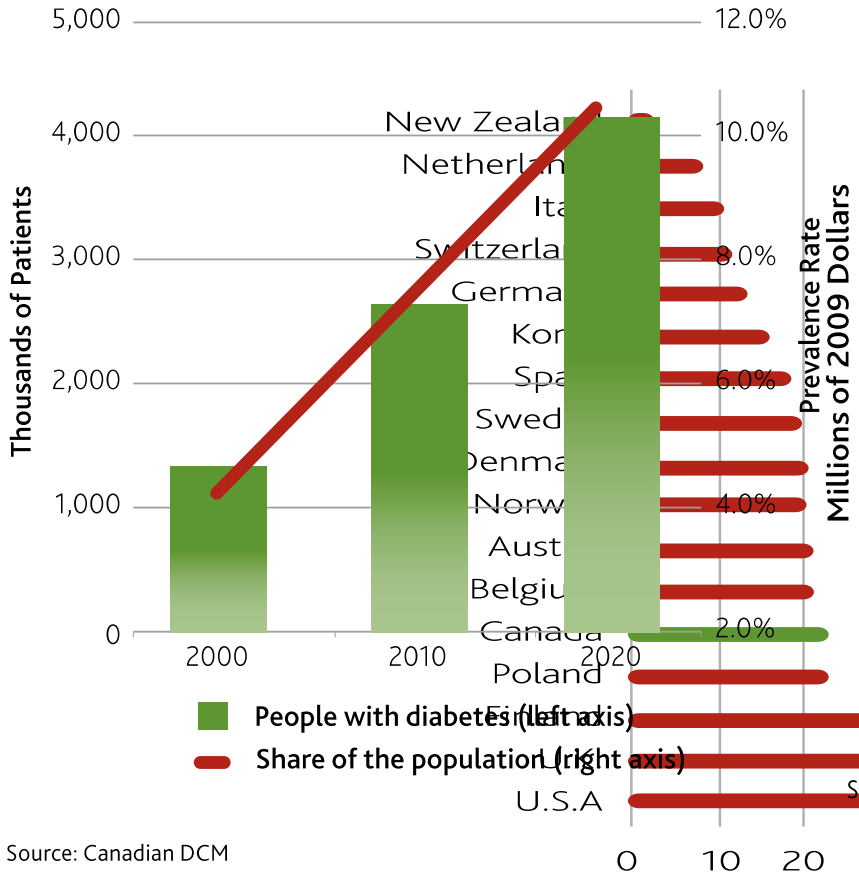
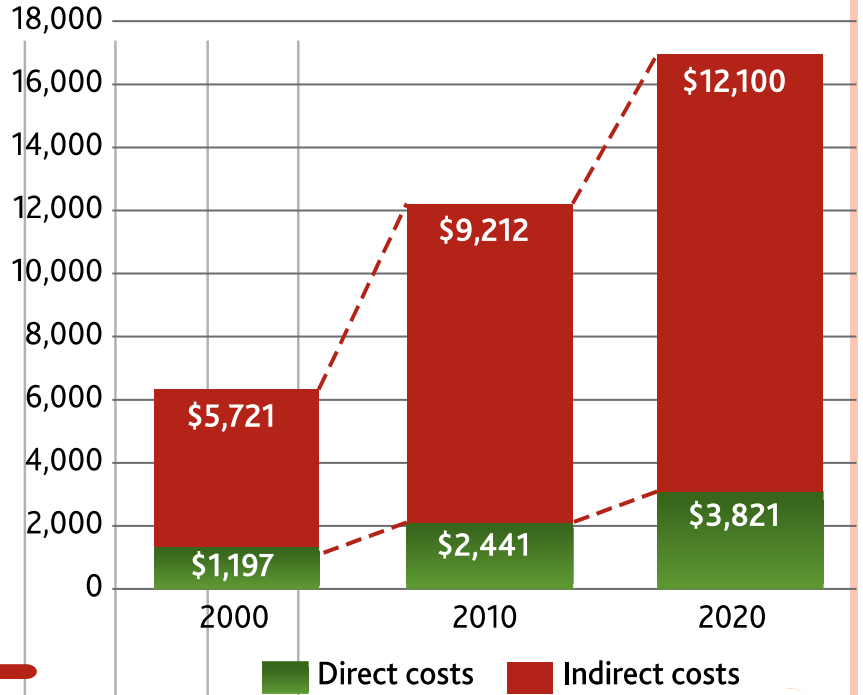


Figure 7:
Avoidable Hospitalizations for Acute Diabetes Complications per 100,000 Population

Source: OECD, 2009

Figure 5: Cost of Diabetes in Canada: 2000 to 2020



QI strategies targeting….

Health systems:
Case management
Team changes
Electronic patient registry
Facilitated relay of clinical info.
Continuous QI

Healthcare providers:
Audit and feedback
Clinician education
Clinician reminders
Financial incentives

Patients:
Patient education
Promotion of self-management
Patient reminders

Objective

- To examine the influence of QI strategies on the following:
  - glycemic control
  - vascular risk factor management
  - microvascular complication monitoring
  - smoking cessation
  - harms

Methods – Eligibility criteria

- Study design - RCTs
- Patients: adult outpatients with type 1 or type 2 diabetes
- Interventions – QI strategies had to have a health systems/provider component
- Comparators – usual care, other QI strategies, patient-mediated QI strategies
- Outcomes – glycemic (HbA1c), vascular (LDL-c, SBP, DBP, ASA, anti-hypertensive, statins, hypertension control), microvascular (retinopathy, foot, renal), smoking cessation, harms

Methods – Literature search

- Experienced librarian conducted searches in:
  - MEDLINE (July 2003 [last date of the original search for the AHRQ report] to July 2010)
  - Cochrane Effective Practice and Organisation of Care (EPOC) database (July 2003 to July 2010)

  → Peer reviewed using the PRESS checklist
- Scanned reference lists of included RCTs

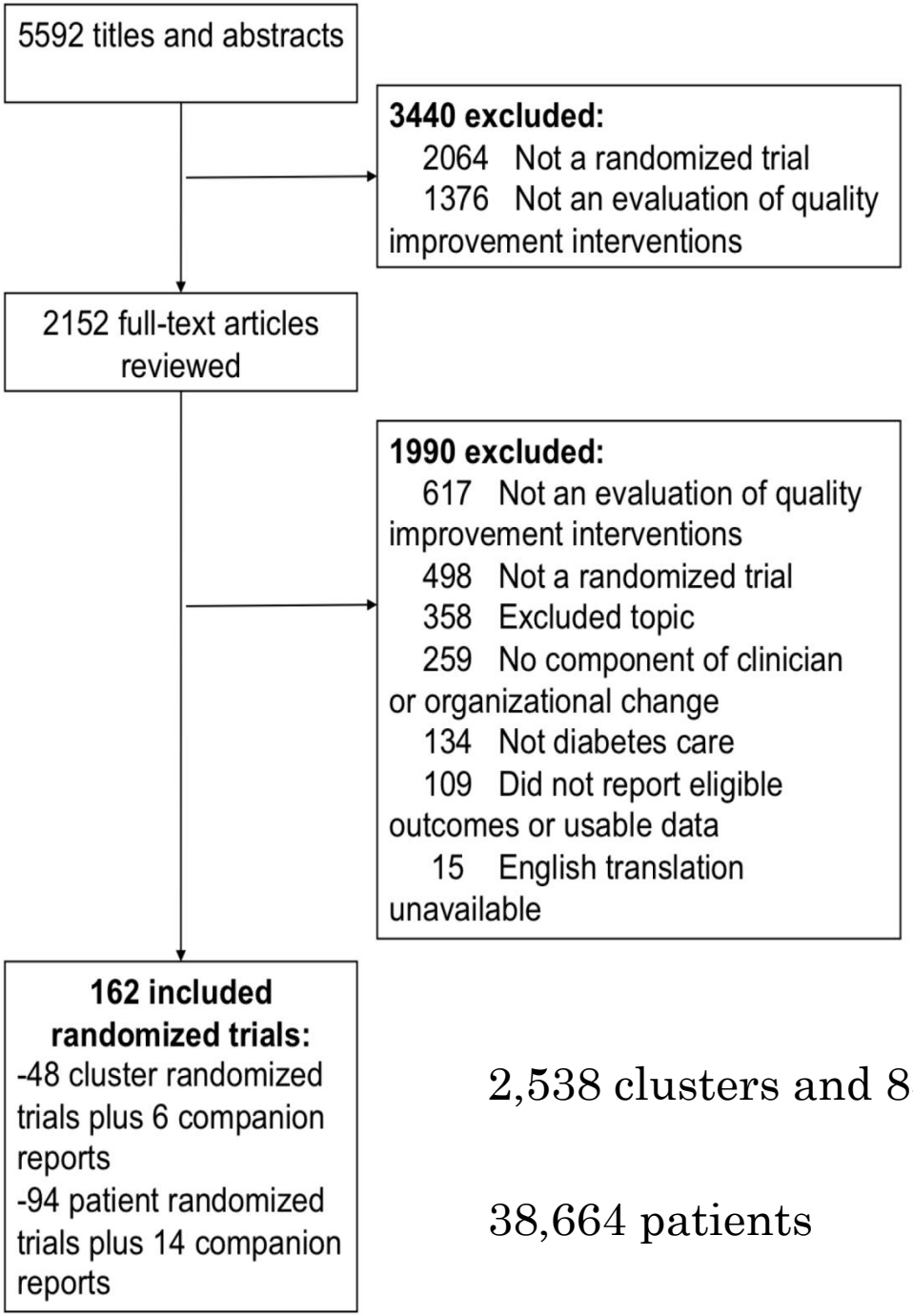
Synthesis

- Random effects meta-analysis (relative risk for dichotomous outcomes, mean difference for continuous outcomes)
  - Leveraged established methods to
    - combine cluster-RCTs with patient-RCTs
    - impute unreported standard deviations

- Meta-regression analysis on HbA1c
  - Linear effects model
  - Adjusted for median baseline HbA1c and median effective sample size

Results:

Study Flow

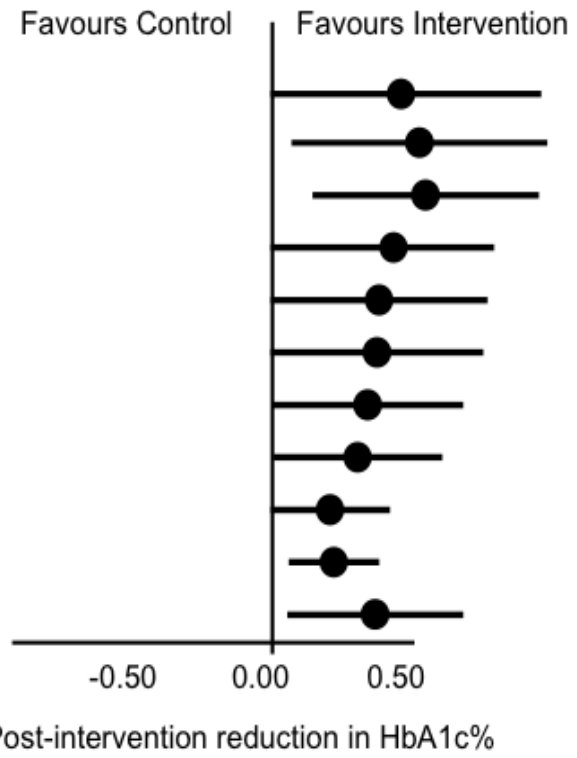


2,538 clusters and 84,865 patients

38,664 patients

HbA1c meta-regression analysis

Quality Improvement Strategy	# RCTs	MD	95% CI
Team Changes	47	0.52	0.00, 1.04
Facilitated Relay	31	0.49	0.02, 0.96
Promotion of Self-management	57	0.45	0.04, 0.87
Case Management	52	0.41	0.00, 0.82
Patient Education	52	0.40	0.00, 0.80
Electronic Patient Register	28	0.39	0.00, 0.78
Clinician Reminders	16	0.35	0.00, 0.70
Patient Reminders	20	0.31	0.00, 0.62
Audit and Feedback	9	0.22	0.00, 0.44
Clinician Education	12	0.16	0.01, 0.33
All Interventions	**117**	**0.33**	**0.01, 0.65**



HbA1c meta-analysis: reduction of 0.37% (0.28-0.45%)

Baseline levels	# RCTs	MD (95% CI)
HbA1c		
< 8	46	-0.233 (0.34, -0.127)
≥ 8	70	-0.461 (-0.577, -0.346)

HbA1c meta-analysis by baseline levels

	All studies			HbA1c >8%			HbA1c ≤8%		
QI strategy	Rank	#RCTs	MD (95% CI)	Rank	#RCTs	MD (95% CI)	Rank	#RCTs	MD (95% CI)
Promotion of self management	1	60	-0.57 (-0.83, -0.31)	4	37	-0.56 (-0.70, -0.42)	6	23	-0.29 (-0.47, -0.12)
Team changes	2	47	-0.57 (-0.71, -0.42)	1	31	-0.62 (-0.79, -0.46)	2	17	-0.46 (-0.71, -0.21)
Case management	3	57	-0.50 (-0.65, -0.36)	2	37	-0.61 (-0.80, -0.42)	7	17	-0.25 (-0.44, -0.07)
Patient education	4	52	-0.48 (-0.61, -0.34)	3	39	-0.59 (-0.74, -0.43)	5	13	-0.39 (-0.71, -0.06)
Facilitated relay	5	32	-0.46 (-0.60, -0.33)	6	19	-0.42 (-0.56, -0.29)	1	13	-0.54 (-0.79, -0.30)
Electronic patient register	6	27	-0.42 (-0.61, -0.24)	5	9	-0.47 (-0.79, -0.14)	4	18	-0.41 (-0.60, -0.22)
Patient reminders	7	21	-0.39 (-0.65, -0.12)	8	10	-0.39 (-0.77, -0.00)	3	11	-0.42 (-0.70, -0.15)
Audit and feedback	8	8	-0.26 (-0.44, -0.08)	7	5	-0.40 (-0.77, -0.03)	9	3	-0.06 (-0.16, 0.06)
Clinician education	9	15	-0.19 (-0.35, 0.03)	10	10	-0.33 (-0.57, -0.10)	10	5	0.03 (-0.18, 0.25)
Clinician reminders	10	18	-0.16 (-0.31, -0.02)	9	9	-0.35 (-0.56, -0.13)	8	9	-0.06 (-0.15, 0.04)
All interventions		120	-0.37 (-0.45, -0.28)		70	-0.46 (-0.58, -0.35)		46	-0.23 (-0.34, -0.13)

Interpretation

- Rapidly expanding field (from 53 RCTs in 2005 to 120 RCTs in 2010 for HbA1c)
- QI strategies significantly improved intermediate disease outcomes: **HbA1c**, **LDL-c**, **SBP**, **DBP**
  - Effects are ***important on a population level***
  - Larger effects with ***poor baseline control***
- QI strategies significantly improved some process indicators: aspirin use, anti-hypertensive use, retinopathy screening, renal screening, foot screening but not hypertension control, statin use, smoking cessation

  → few RCTs and infrequently the focus of the intervention

Interpretation

- All categories of QI interventions appeared effective but larger effects observed for:
  - ✓ **Team changes**
  - ✓ **Case management**
  - ✓ **Facilitated relay**
  - ✓ **Electronic register**
  - ✓ **Self management**
  - ✓ **Patient education**
  - ✓ **Patient reminders**

- BUT:
  - Most RCTs poorly described interventions

→ Optimal components of interventions unclear

→ Optimal combination of interventions unclear

Interpretation

- Larger effect sizes where baseline values poorer
  - **Graded interventions should be tailored for patients at higher risk**
    - Complex, expensive interventions (e.g. team changes, case management) most effective for high risk patients
    - Adding patient-mediated interventions (e.g. self management) likely useful for all patients
  - **BUT:**
    - Cost-effectiveness unclear
    - Targeting the 'right' patients and providing them with the 'right' intervention is complex…

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Co-authors: Andrea Tricco, Jeremy Grimshaw, David Moher, Lucy Turner, James Galipeau, Ilana Halperin, Brigitte Vachon, Tim Ramsay, Braden Manns, Marcello Tonelli, and Kaveh Shojania.

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