Evidence-based community interventions for diabetes prevention and control

GLOBAL HEALTH CONSORTIUM GHC
9th INTERNATIONAL GLOBAL HEALTH CONFERENCE

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Outline

- Diabetes as a public health problem
- The Central role of communities in prevention
- Evidence for action to prevent complications
- Evidence for action to prevent diabetes
- Needs and the way forward
Diabetes as a Public Health Problem

- High and growing prevalence
- Extensive and diverse social determinants
- Diverse comorbidity and complex care
- Difficult and varying barriers to both care and prevention
- Beyond what health care can provide alone
What *should* prevention look like?

- Have multiple avenues of public health action, including health systems, health promotion, and population-wide policies:

- Include both a high-risk and population approach.
Classic Public Health Avenues for Chronic Disease Prevention

- Clinical Health Services
- Behavioral Health Promotion
- System and Population-Wide Policies

Community
What should prevention look like?

- Have multiple avenues of public health action, including health systems, health promotion, and population-wide policies:
  - Include both a high-risk and population approach.
  - Be multi-tiered using risk stratification approaches to link interventions to risk level.
  - Consider short-term and long-term time horizons.
Diabetes Pyramid of Prevention

- **Moderate Risk**
  - Prevent morbidity through optimal risk factor management and screening for complications
  - Efficiently detect in clinical settings

- **High Risk**
  - Reduce risk with community programs in community settings.
  - Reduce risk with structured programs in community settings.

- **Very High Risk**
  - (IGT; A1c 5.7%; GDM)
  - Reduce risk with community programs, counseling and education

- **Undiagnosed**
  - Low Risk
  - Reduce risk by changing underlying risk factors (food, social, built environment) in communities
Range of Potential Public Health Priorities for Diabetes

- Glycemic control
- Blood pressure control
- Lipid control
- Tobacco counseling
- Self-mgt education
- Retinopathy screening
- Foot care / screening
- CKD screening
Effectiveness of quality improvement strategies on the management of diabetes: a systematic review and meta-analysis

Andrea C Tricco, Noah M Ivers, Jeremy M Grimshaw, David Moher, Lucy Turner, James Galipeau, Ilana Halperin, Brigitte Vachon, Tim Ramsay, Braden Manns, Marcello Tonelli, Kaveh Shojania
Tricco et al., Lancet, 2012
• Team-based care interventions to help patients manage type 2 diabetes and improve ABCs.

• Case management interventions to coordinate and provide care.

• Engage community health workers in care and prevention to improve glycemic control and weight-related outcomes.

• Intensive lifestyle interventions for patients with type 2 diabetes to improve glycemic control, dietary, PA, and weight management.

• Implement telehealth interventions to assist in efficient interaction between providers and patients to improve dietary practice.
Range of Potential Public Health Priorities for Diabetes

<table>
<thead>
<tr>
<th>Normal</th>
<th>IFG / IGT</th>
<th>Type 2 DM</th>
<th>Disability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Complications</td>
</tr>
</tbody>
</table>

- Obesity / fat distribution ↑
- Physical Activity / fitness ↓
- Smoking ↑
- Very low birth weight ↑
- Depression ↑
- Antipsychotic medications ↑
- Processed red meat ↑
- Red meat ↑
- White rice ↑
- Sweetened beverages ↑
- Whole grains ↓
- Alcohol ↓
- Coffee ↓
- Dairy products ↓
- Green leafy vegetables. ↓

- How to translate lifestyle prevention trials into scalable programs and translated policies?
- How to exploit the vast number of modifiable factors and lower population risk?

- Glycemic control
- Blood pressure control
- Lipid control
- Tobacco counseling
- DSME
- Retinopathy screening
- Foot care / screening
- CKD screening

Integrated Team-based Care
Translating the Diabetes Prevention Program into the Community: The DEPLOY Study

Prevention of type 2 diabetes by lifestyle intervention: A 20-year follow-up study in the Da Qing Diabetes Prevention Study

Behavioral strategies in diabetes prevention programs: A systematic review of randomized controlled trials

Effects of Diet and Exercise in Preventing NIDDM in People With Impaired Glucose Tolerance
Range of Options for Prevention

- **Individual-Focused:**
  - Structured, multi-disciplinary lifestyle
  - Metformin and other drugs
  - Nutrition and education referral
  - Low intensity, high reach counseling approaches
  - Worksite wellness
How effective were lifestyle interventions in real-world settings that were modeled on the Diabetes Prevention Program?

- 26 studies of 3797 high risk adults:
  - Diverse settings:
    - 12 community (recreation, faith)
    - 11 health care
  - Mean weight change: 4%
  - Every 4 sessions attended: 1% percentage point added weight loss

Ali et al., Health Affairs, 2012
### Systematic Review: Cost-effectiveness of individual-level T2DM Prevention

<table>
<thead>
<tr>
<th>Group</th>
<th>Study, n</th>
<th>Median (range), $/QALY, healthcare perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention strategy: Lifestyle</td>
<td>11</td>
<td>$12,557 (CS-$23,957)</td>
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<tr>
<td>Metformin</td>
<td>2</td>
<td>$17,153</td>
</tr>
<tr>
<td>Time horizon: &lt; 10 years</td>
<td>5</td>
<td>$19,686 ($6,235-$45,530)</td>
</tr>
<tr>
<td>&gt;=10 years</td>
<td>8</td>
<td>$13,127 (CS-$23,957)</td>
</tr>
<tr>
<td>Modality: In-person</td>
<td>6</td>
<td>$10,930 (CS-$22,516)</td>
</tr>
<tr>
<td>Virtual</td>
<td>3</td>
<td>$12,557 (CS-$13,155)</td>
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<tr>
<td>Combination</td>
<td>2</td>
<td>$10,768</td>
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<tr>
<td>Delivery setting: One-to-one</td>
<td>3</td>
<td>$19,686 (CS-$22,516)</td>
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<tr>
<td>Group</td>
<td>2</td>
<td>$7,126</td>
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<tr>
<td>Combination of both</td>
<td>1</td>
<td>$13,844</td>
</tr>
<tr>
<td>Provider type: Health</td>
<td>3</td>
<td>$19,686 (CS-$23,957)</td>
</tr>
<tr>
<td>professionals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCP + trained lay health</td>
<td>3</td>
<td>$8,016 ($6,235-$13,844)</td>
</tr>
<tr>
<td>workers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Siegel, Zhuo, Ng, Jawands, Zhang, Zhang, Under Review, 2018
Relación de la Hb-a1c (eje de las x) y la Incidencia de Diabetes a 10 años (eje de las y).

El tamaño del círculo representa la proporción de los casos de diabetes a lo largo de 10 años.

Adaptado de Zhang et al., 2010; Zhuo et al., 2012; Gregg et al., 2013
The National Diabetes Prevention Program: A Public-private partnership to scale the translated model of the DPP.

Congress authorized CDC to establish the NATIONAL DIABETES PREVENTION PROGRAM (National DPP)—a public-private initiative to offer evidence-based, cost effective interventions in communities across the United States to prevent type 2 diabetes.
The core of the National DPP is a CDC-recognized, year-long lifestyle change program that offers participants:

**Elements of the National DPP Lifestyle Change Program**

**Program Start**

- **1-6** Weekly Sessions (16 minimum)
- **7-12** Monthly Sessions (6 minimum)

**Program Goal:** Help participants make lasting behavior changes such as eating healthier, increasing physical activity, and improving problem-solving skills.

**Example modules covered in core curriculum:**
- Eat Well to Prevent T2
- Burn More Calories Than You Take In
- Manage Stress
- Keep Your Heart Healthy

**Sessions facilitated by a trained lifestyle coach**

**Participant Goal:** Lose 5 – 7% of body weight

National DPP Strategic Goals

- Increase *supply* of quality programs.
- Build *workforce* to deliver program
- Increase *coverage* among public and private payers
- Increase *referrals* from healthcare providers
- Increase *demand* for the National DPP among people at risk
- Maintain *quality standards* through a recognition program and registry.
• 1557 CDC-recognized programs across 50 states/territories.
• >10,300 coaches (lay people; health professionals) trained.
• Serving 156,935 eligible participants.
• 65 commercial health plans providing some coverage for 3M in 11 states
**Participants’ attendance and percent body weight lost (unadjusted) by number of sessions attended among eligible** participants enrolled in the lifestyle change program

Percent of body weight lost from first to last session attended among those reporting at least 2 weights (94.2% of 14,742)

<table>
<thead>
<tr>
<th></th>
<th><strong>All eligible participants, n = 13,893§</strong></th>
<th><strong>Percent achieving weight loss goal of ≥5%, n = 13,893§</strong></th>
<th><strong>Percent achieving physical activity goal of 150 min/week, n = 12,929‡</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Median (25th, 75th)</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>3.1 (0.8, 6.7)</td>
<td>35.5</td>
<td>41.8</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male**</td>
<td>3.8 (1.1, 7.4)</td>
<td>40.0</td>
<td>52.3</td>
</tr>
<tr>
<td>Female</td>
<td>3.0 (0.7, 6.5)</td>
<td>34.5</td>
<td>39.2</td>
</tr>
<tr>
<td><strong>Age group (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–44**</td>
<td>2.2 (0.3, 5.4)</td>
<td>27.5</td>
<td>34.3</td>
</tr>
<tr>
<td>45–64</td>
<td>3.1 (0.8, 6.7)</td>
<td>35.0</td>
<td>40.2</td>
</tr>
<tr>
<td>65+</td>
<td>4.1 (1.4, 7.6)</td>
<td>43.1</td>
<td>50.9</td>
</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>2.5 (0.5, 5.9)</td>
<td>30.8</td>
<td>47.3</td>
</tr>
<tr>
<td>Non-Hispanic/white only**</td>
<td>4.1 (1.4, 7.8)</td>
<td>43.2</td>
<td>48.6</td>
</tr>
<tr>
<td>Non-Hispanic/black only</td>
<td>2.2 (0.3, 5.3)</td>
<td>27.1</td>
<td>39.9</td>
</tr>
<tr>
<td>Other</td>
<td>2.6 (0.4, 5.7)</td>
<td>29.1</td>
<td>30.7</td>
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<tr>
<td><strong>Baseline BMI (kg/m^2)</strong></td>
<td></td>
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<td></td>
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<tr>
<td>&lt;25**</td>
<td>2.8 (0.8, 6.0)</td>
<td>30.8</td>
<td>54.8</td>
</tr>
<tr>
<td>25–29</td>
<td>3.4 (0.9, 6.8)</td>
<td>37.2</td>
<td>46.6</td>
</tr>
<tr>
<td>≥30</td>
<td>3.1 (0.8, 6.8)</td>
<td>35.9</td>
<td>39.8</td>
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<tr>
<td><strong>Eligibility category</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entered program with blood test/history of GDM**</td>
<td>3.2 (0.8, 6.8)</td>
<td>36.1</td>
<td>42.2</td>
</tr>
<tr>
<td>Entered program on risk test only</td>
<td>3.0 (0.7, 6.6)</td>
<td>34.6</td>
<td>41.0</td>
</tr>
</tbody>
</table>
Keys to *enrollment success* include:
- Offering multiple class locations.
- Using multiple recruitment strategies.
- Information sessions.

Keys to *retention success* include:
- Monitoring early logistical challenges related to space, timing.
- Non-financial incentives, such as gym memberships, cookbooks, athletic gear, transportation.
- Lifestyle coach training & background
- Cultural adaptation for curricula, including cultural themes, images, language, dietary restrictions.
Challenges / Barriers to Individual-Targeted Approaches

- Structure, reimbursement, scalability
- Engagement, Participation, Sustainability
- Too late in the pathogenesis of diabetes?
- Diabetes is a common-source epidemic rooted in culture and society?
- Risk factor levels of the general population remain high.
- Over long time horizon, the general population contributes most cases.
High risk, no diagnosed prediabetes

15.0M
11.0M 9.5M 8.9M
3.2M
0.7M
55.2M
46.5M
27.9M
23.3M
19.6M
5.9M
0.2M
### Proportion of Non-diabetic Adults Meeting Key Healthy Targets for Diabetes Risk Reduction, NHANES 2007-2012

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables</td>
<td>26</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>Dairy</td>
<td>18</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Whole Grains</td>
<td>29</td>
<td>23</td>
<td>26</td>
</tr>
<tr>
<td>Added Sugars</td>
<td>26</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>Saturated Fats</td>
<td>42</td>
<td>45</td>
<td>43</td>
</tr>
<tr>
<td>Leisure-Time Phys Activity</td>
<td>40</td>
<td>32</td>
<td>36</td>
</tr>
</tbody>
</table>

*Siegel et al., presented at ADA 2016 Scientific Sessions*
Range of Options for Prevention

- **Individual-Focused:**
  - Structured, multi-disciplinary lifestyle
  - Metformin and other drugs
  - Nutrition and education referral
  - Low intensity, high reach counseling approaches
  - Worksite wellness

- **Population-wide**
  - Fiscal Food and crop policies
  - Incentives for Healthy foods in food deserts
  - Community / urban re-design for physical activity
  - Food and menu labeling
  - School food and physical education policies
  - Broad awareness and social marketing
Promising Targets for Population-Wide Food Policies to Influence Cardiometabolic Risk

Cutting salt 'should be global priority'
By Matt McGrath
Science reporter, BBC World Service

Soft Drink and Juice Consumption and Risk of Physician-diagnosed Incident Type 2 Diabetes
The Singapore Chinese Health Study

Fruit and vegetable intake and incidence of type 2 diabetes mellitus: systematic review and meta-analysis
Patrice Carter, research nutritionist, Laura J Gray, research associate in medical statistics, Jacqui Troughton, senior research associate, Kamlesh Khunti, professor of primary care diabetes and vascular medicine, Melanie J Davies, professor of diabetes medicine

Whole Grain, Bran, and Germ Intake and Risk of Type 2 Diabetes: A Narrative Review and Systematic Review
Jeroen S. L. de Munter, Frank B. Hu, Donna R. Huijbregts, Valeria Amina Sant, Pola R. Brozek, Jennifer E. Gall, Anna N. Florentino, Miguel Angel Martínez-González, Jérôme Bock, Maria Isabel Covas, Dolores Corella, Fernando Arós

Reduction in the Incidence of Type 2 Diabetes With the Mediterranean Diet
Results of the PREDIMED-Reus nutrition intervention randomized trial
Jordi Salas-Salvado, Monica Bello, Nancy Bario, Miguel Angel Martínez-González, Maria Isabel Covas, Dolores Corella, Fernando Arós, Valentín Ruiz-Gutiérrez, Emilio Ros
<table>
<thead>
<tr>
<th>Category</th>
<th>Intervention</th>
<th>Study, n</th>
<th>CE outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fiscal policy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSB tax</td>
<td>20%, penny-per-ounce, 10%, or $0.5/L tax on SSB</td>
<td>9</td>
<td>CS</td>
</tr>
<tr>
<td>Sugar tax</td>
<td>$0.99/100mL ice cream; $0.9/100g other products</td>
<td>1</td>
<td>CS</td>
</tr>
<tr>
<td>Subsidy</td>
<td>30% or 0.15/100g subsidy for fruit/veg consumption</td>
<td>4</td>
<td>CS to worse health</td>
</tr>
<tr>
<td>Combination tax and subsidy</td>
<td>Tax SSB, sat fat., sodium, sugar; subsidy fruit/veg</td>
<td>1</td>
<td>CS</td>
</tr>
<tr>
<td><strong>Environmental change</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh food in low-income area</td>
<td>Open supermarket</td>
<td>1</td>
<td>CS</td>
</tr>
<tr>
<td>Workplace healthy food</td>
<td>Provide healthy food in cafeteria</td>
<td>1</td>
<td>CS</td>
</tr>
<tr>
<td>Enhanced phys act access</td>
<td>Increase facilities for physical activities</td>
<td>1</td>
<td>$36k/QALY</td>
</tr>
<tr>
<td><strong>Health promotion</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campaign</td>
<td>Community-wide, mass media, or internet campaign to promote physical activity</td>
<td>4</td>
<td>$87k/QALY to CS</td>
</tr>
<tr>
<td>Healthy eating education in low-income community</td>
<td>Diet education and cooking classes</td>
<td>1</td>
<td>More QALY but no change in cost</td>
</tr>
<tr>
<td>Social support PA promotion</td>
<td>Use organized groups to promote physical activity</td>
<td>3</td>
<td>$35 – 50k/QALY</td>
</tr>
<tr>
<td>Physical activity promotion for targeted population</td>
<td>Encourage walking and reduce car use using tailored educational information</td>
<td>2</td>
<td>$17,658/QALY – CS</td>
</tr>
</tbody>
</table>
Key Considerations in Design of Prevention Strategy

- Prevalence/Burden of Diabetes
- Prevalence/burden of undiagnosed diabetes.
- Current status/trajectory of environmental/cultural risk.
- Capacity of health system to manage diabetes.
- Potential of communities and insurers to support high risk individuals.
- Political context/will for population-wide intervention.
- Time horizon of public health goals
**Goal:** Act at all levels

**Pivotal Factors:**
- Prevention reimbursement
- Political will for population-wide interventions

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**High Prevalence / High Income Countries**

- **Diabetes** (12%)
- **Undiagnosed** (3%)
- **Very High Risk** (~15%)
  - IGT; A1c 5.7%; GDM
- **High Risk** (~20%)
  - FPG100; Obesity; HTN
- **Fiscal Food Policies** (50%)
  - Healthy foods in food deserts
  - Community / urban re-design
  - Health Education and Health Promotion

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- Prevent morbidity
- Efficiently detect
- Reduce progression
- Reduce risk
- Change Communities Environments.
Goal: Prioritize
1) Integrated team-based care and
2) Population-wide interventions

Pivotal Factors:
- Size of undiagnosed population
- Health system capacity
- Community structure
- Political will

High Prevalence / Low- and Mid-income

Fiscal Food Policies
- Healthy foods in food deserts
- Community / urban re-design

Health Education and Health Promotion
- Change Communities Environments
Diabetes demands a multi-tiered strategy to reduce complications, progression of high risk individuals, and population-wide risk.

Science base to prevention complications and individual-targeted prevention approaches is strong, from RCTs and CE modeling.

Science base for *population-wide policies* is encouraging and growing, with need for rigorous natural experiments of real-world policies.

High income, high prevalence countries should invest in all areas, depending on the political and health care insurance context.

Low and middle income countries should prioritize team-based integrated care and population-wide approaches, with individual-targeted approaches under optimal settings.
extras
Prioritizing our Core Science Base

- Systematic reviews of trials
- Randomized controlled clinical and community trials
- Well-designed natural experiments
- Rigorously designed modeling efforts
- Prospective cohorts
# Long-term Sustainability of Diabetes Prevention Approaches

A Systematic Review and Meta-analysis of Randomized Clinical Trials

<table>
<thead>
<tr>
<th>Source</th>
<th>Intervention</th>
<th>Active Intervention, y</th>
<th>End of Active Intervention, RR (95% CI)</th>
<th>Follow-up</th>
<th>End of Follow-up, RR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LSM Trials</strong></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Swinburn et al, 2001</td>
<td>Reduced-fat diet</td>
<td>1.0</td>
<td>0.76 (0.25-2.34)</td>
<td>5.0 y</td>
<td>0.70 (0.26-1.88)</td>
</tr>
<tr>
<td>DPP, 2009b</td>
<td>Diet and physical activity</td>
<td>2.8</td>
<td>0.48 (0.41-0.58)</td>
<td>5.7 y</td>
<td>0.68 (0.63-0.73)</td>
</tr>
<tr>
<td>DPS, 2001, 2013</td>
<td>Diet and physical activity</td>
<td>4.0</td>
<td>0.44 (0.29-0.68)</td>
<td>9.0 y</td>
<td>0.63 (0.54-0.73)</td>
</tr>
<tr>
<td>Da Qing, 1997, 2008</td>
<td>Diet and physical activity</td>
<td>6.0</td>
<td>0.68 (0.54-0.85)</td>
<td>9.4 y</td>
<td>0.86 (0.81-0.92)</td>
</tr>
<tr>
<td><strong>Pooled estimate</strong></td>
<td></td>
<td></td>
<td>0.55 (0.43-0.70)</td>
<td></td>
<td>0.72 (0.60-0.86)</td>
</tr>
<tr>
<td><strong>Medication Trials</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eriksson et al, 2006</td>
<td>Glipizide</td>
<td>0.5</td>
<td>0.41 (0.01-11.3)</td>
<td>52 wk</td>
<td>0.20 (0.03-1.53)</td>
</tr>
<tr>
<td>DREAM, 2006, 2011</td>
<td>Rosiglitazone</td>
<td>3.0</td>
<td>0.43 (0.37-0.48)</td>
<td>10 wk</td>
<td>1.07 (0.88-1.32)</td>
</tr>
<tr>
<td>DREAM, 2006, 2011b</td>
<td>Ramipril</td>
<td>3.0</td>
<td>0.93 (0.82-1.04)</td>
<td>10 wk</td>
<td>1.08 (0.89-1.33)</td>
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<tr>
<td>DPP, 2002, 2003</td>
<td>Metformin</td>
<td>2.8</td>
<td>0.76 (0.66-0.88)</td>
<td>2 wk</td>
<td>0.76 (0.68-0.85)</td>
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<tr>
<td>STOP-NIDDM, 2002</td>
<td>Acarbose</td>
<td>3.0</td>
<td>0.78 (0.68-0.90)</td>
<td>12 wk</td>
<td>1.46 (0.90-2.36)</td>
</tr>
<tr>
<td>ORIGIN, 2012</td>
<td>Insulin glargine</td>
<td>6.2</td>
<td>0.79 (0.67-0.94)</td>
<td>14 wk</td>
<td>0.86 (0.74-0.99)</td>
</tr>
<tr>
<td><strong>Pooled estimate</strong></td>
<td></td>
<td></td>
<td>0.71 (0.55-0.92)</td>
<td></td>
<td>0.95 (0.79-1.14)</td>
</tr>
</tbody>
</table>

Haw et al., JAMA Intern Med 2018
Screening and health education—CHWs deliver individual or group education on diabetes self-management, provide adherence support for medications, and monitor patients’ blood pressure as recommended by the American Diabetes Association.

Outreach, enrollment, and information—CHWs reach out to individuals and families who are eligible for medical services, help them apply for these services, and provide them with proactive follow-up and monitoring, such as appointment reminders and home visits.

Member of a care delivery team—CHWs partner with the patient, their primary care provider, and other health professionals to improve coordination of diabetes care, education, and support.

Patient navigation—CHWs help individuals and families navigate complex medical service systems and processes to improve their access to care.

Community organization—CHWs facilitate self-directed change and community development by serving as liaisons between the community and healthcare systems.
Figure 15. A schematic diagram showing how to use diabetes centres, diabetes teams and diabetes registers to integrate professional education, research and practice with linkage of register data to other databases to identify root causes, evaluate care standards, monitor clinical outcomes, perform surveillance of prevalence (burden) and incidence (intervention) of diabetes and its complications to inform practices and policies.

Community/hospital based Diabetes mini-teams

Multi-disciplinary Diabetes Centre of Excellence for complex case management (e.g. Type 1 diabetes, young-onset diabetes, multiple morbidities), research and professional training

Linkage to population, socio-demographic, environmental and other administrative databases (e.g. birth registers) to identify root causes

Structured assessment Diabetes Registers
 Risk stratification
 Care triage
 Feedback
 Empowerment
 Recall

Linkage to hospitalization data, EMR and other registers (e.g. death, dialysis, cancer, heart failure, stroke, myocardial infarction) to ascertain outcomes

Self care & social support

Continuing care, medications, education

Lifestyle changes, stress management, digital health
HEALTH CARE REFORM

Impact of Pharmacist Care in the Management of Cardiovascular Disease Risk Factors

A Systematic Review and Meta-analysis of Randomized Trials

Valérie Santschi, PharmD, PhD; Arnaud Chiolero, MD, MSc; Bernard Burnand, MD, MPH; April L. Colosimo, MSc, MLIS; Gilles Paradis, MD, MSc

[Diagram showing the impact of pharmacist care on systolic blood pressure with data points and statistical analysis results.]
Risk factors for type 2 diabetes mellitus: an exposure-wide umbrella review of meta-analyses
Goal: Prioritize
Prioritize 1) population-wide interventions to reduce complications and prevent rise in incidence; 2) Integrated team-based care.

Pivotal Factors:
- Health system capacity
- Community structure
- Recognizing opportunity.

Low Prevalence / Low- and Mid-income

- Diabetes
  - Prevent morbidity
  - Efficiently detect
  - Reduce progression
  - Reduce risk
  - Change Communities Environments

- Fiscal Food Policies
  - Healthy foods in food deserts
  - Community / urban re-design

- Health Education and Health Promotion
  - Undiagnosed
  - Very High Risk
    - IGT; A1c 5.7%; GDM
  - High Risk
    - FPG100; Obesity; HTN
Figure 13. A meta-analysis of 181 trials (N = 135,112) showing the effects of multi-component integrated care on mean difference (MD) in A1c, systolic blood pressure (SBP) and LDL-C in different regions and patient groups compared to usual care with team change, facilitated patient relay and patient education/self management having the largest effect size (Lim LL et al Diabetes Care 2018).