GLOBAL EPIDEMICS OF TYPE 2 DIABETES AND CVD: Nursing opportunities for prevention and management

STTI 25th International Nursing Research Congress
Hong Kong
July 26, 2104

Deborah Chyun, PhD, RN, FAHA, FAAN
Professor and Executive Associate Dean
New York University College of Nursing
Overview

- Importance of chronic disease - diabetes and cardiovascular disease
  - Risk factors
  - Evidence for prevention/treatment
  - Nursing considerations
- My interprofessional program of research and how students and junior faculty have participated
- Audience discussion
Resolution A/RES/65/238

High Level Meeting of General Assembly on the Prevention and Control of Non-communicable Disease (NCD)

September 19 & 20, 2011

Did you know??

35 000 000 people will die from chronic diseases in 2005

60% of all deaths are due to chronic diseases
Cardiovascular diseases (heart disease and stroke) are the leading cause of death.
Death rates from non-communicable diseases per 100,000 adults aged 15-69 years in 23 high-burden countries

47% of all NCD deaths
71% of deaths in people younger than 70 years globally

Projected global deaths (millions) for major chronic disease groups and other causes of death in 23 selected countries, 2005-2015

## Mortality and burden in LMICs

<table>
<thead>
<tr>
<th>Annual mortality</th>
<th>%LMIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVD</td>
<td>17.1</td>
</tr>
<tr>
<td>Cancer</td>
<td>7.1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>4</td>
</tr>
</tbody>
</table>

*WHO, 2004*
Cardiovascular Disease (CVD)

- Coronary heart disease (CHD) [coronary artery disease (CAD), ischemic heart disease (IHD)]
- Cerebrovascular disease (stroke)
- Peripheral vascular disease
- Heart failure (HF)
- Hypertension (HTN)
- Rheumatic heart disease
- Congenital heart disease
- Deep vein thrombosis and pulmonary embolism
Diabetes

- 230 million people
- 350 million by 2050
- Each year 6 million people develop
- 3 million deaths directly attributed
- Fourth leading cause of death globally

http://www.idf.org
Classification

- Type 1 - β-cell destruction, usually leading to absolute insulin deficiency
- Type 2 - insulin resistance with secretory defect
- Other types
- Gestational

_Diabetes Care 2014;37: S81-S90_
Characteristics of Type 2 Diabetes

- Obesity or overweight
- Family history of diabetes
- Sedentary lifestyle
- High blood pressure
- High lipid levels
- Frequently goes undiagnosed for years
- Higher rates in ethnic minorities and elderly
- Typically occurs in adulthood but increasing in youth
### Top 10: Countries/territories of number of people with diabetes (20-79 years), 2011 and 2030

<table>
<thead>
<tr>
<th>COUNTRY/TERRITORY</th>
<th>2011 MILLIONS</th>
<th>2030 MILLIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 China</td>
<td>90.0</td>
<td>129.7</td>
</tr>
<tr>
<td>2 India</td>
<td>61.3</td>
<td>101.2</td>
</tr>
<tr>
<td>3 United States of America</td>
<td>23.7</td>
<td>29.6</td>
</tr>
<tr>
<td>4 Russian Federation</td>
<td>12.6</td>
<td>19.6</td>
</tr>
<tr>
<td>5 Brazil</td>
<td>12.4</td>
<td>16.8</td>
</tr>
<tr>
<td>6 Japan</td>
<td>10.7</td>
<td>16.4</td>
</tr>
<tr>
<td>7 Mexico</td>
<td>10.3</td>
<td>14.1</td>
</tr>
<tr>
<td>8 Bangladesh</td>
<td>8.4</td>
<td>12.4</td>
</tr>
<tr>
<td>9 Egypt</td>
<td>7.3</td>
<td>11.8</td>
</tr>
<tr>
<td>10 Indonesia</td>
<td>7.3</td>
<td>11.4</td>
</tr>
</tbody>
</table>
CHD and Type 2 DM

- Complication of diabetes
- Common genetic and environmental influences

\[\Downarrow\]

Insulin Resistance Syndrome

\[\Downarrow\]

DM

\[\Downarrow\]

CHD

*Stern, Diabetes Care 1999;22:C2-C5*
CHD and Type 2 DM

- ↑ proinflammatory state of immune system
  ↓
  Inflammation and endothelial dysfunction
  ↓
  DM
  ↓
  CHD
Average Annual Incidence
CVD

Kannel and McGee, Circ
Risk Factors for Chronic Disease and Chronic Conditions
### Causes of chronic diseases

<table>
<thead>
<tr>
<th>UNDERLYING SOCIOECONOMIC, CULTURAL, POLITICAL AND ENVIRONMENTAL DETERMINANTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Globalization</td>
</tr>
<tr>
<td>Urbanization</td>
</tr>
<tr>
<td>Population ageing</td>
</tr>
</tbody>
</table>

| COMMON MODIFIABLE RISK FACTORS |
| Unhealthy diet                 |
| Physical inactivity            |
| Tobacco use                    |

| NON-MODIFIABLE RISK FACTORS    |
| Age                            |
| Heredity                       |

| INTERMEDIATE RISK FACTORS      |
| Raised blood pressure         |
| Raised blood glucose          |
| Abnormal blood lipids          |
| Overweight/obesity            |

| MAIN CHRONIC DISEASES          |
| Heart disease                  |
| Stroke                         |
| Cancer                         |
| Chronic respiratory diseases   |
| Diabetes                       |
## Ranking of 10 selected risk factor causes of death in world (WHO, 2009)

<table>
<thead>
<tr>
<th></th>
<th>Deaths (Millions)</th>
<th>% of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. High blood pressure</td>
<td>7.5</td>
<td>12.8</td>
</tr>
<tr>
<td>2. Tobacco use</td>
<td>5.1</td>
<td>8.7</td>
</tr>
<tr>
<td>3. High blood glucose</td>
<td>3.4</td>
<td>5.8</td>
</tr>
<tr>
<td>4. Physical inactivity</td>
<td>3.2</td>
<td>5.5</td>
</tr>
<tr>
<td>5. Overweight and obesity</td>
<td>2.8</td>
<td>4.8</td>
</tr>
<tr>
<td>6. High cholesterol</td>
<td>2.6</td>
<td>4.5</td>
</tr>
<tr>
<td>7. Unsafe sex</td>
<td>2.4</td>
<td>4.0</td>
</tr>
<tr>
<td>8. Alcohol use</td>
<td>2.3</td>
<td>3.8</td>
</tr>
<tr>
<td>9. Childhood underweight</td>
<td>2.2</td>
<td>3.8</td>
</tr>
<tr>
<td>10. Indoor smoke from solid fuels</td>
<td>2.0</td>
<td>3.3</td>
</tr>
</tbody>
</table>
Mortality due to leading global risk factors

NHANES III: Age-Specific Prevalence of the Metabolic Syndrome

Data are presented as percentage (SE).

Obesity risks are increasing

Projected prevalence of overweight (BMI $\geq 25$ kg/m$^2$), women aged 30 and above, 2005

Projected prevalence of overweight (BMI $\geq 25$ kg/m$^2$), women aged 30 and above, 2015

- World Health Organization

Preventing CHRONIC DISEASES
a vital investment
Association of risk factors with acute myocardial infarction in men and women after adjustment for age, sex, and geographical region: INERHEART

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Sex</th>
<th>Control (%)</th>
<th>Case (%)</th>
<th>Odds ratio (99% CI)</th>
<th>PAR (99% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current smoking</td>
<td>F</td>
<td>9.3</td>
<td>20.1</td>
<td>2.86 (2.36-3.48)</td>
<td>15.8% (12.9-19.3)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>33.0</td>
<td>53.1</td>
<td>3.05 (2.78-3.33)</td>
<td>44.0% (40.9-47.2)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>F</td>
<td>7.9</td>
<td>25.5</td>
<td>4.26 (3.51-5.18)</td>
<td>19.1% (16.8-21.7)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>7.4</td>
<td>16.2</td>
<td>2.67 (2.36-3.02)</td>
<td>10.1% (8.9-11.4)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>F</td>
<td>28.3</td>
<td>53.0</td>
<td>2.95 (2.57-3.39)</td>
<td>35.8% (32.1-39.6)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>19.7</td>
<td>34.6</td>
<td>2.32 (2.12-2.53)</td>
<td>19.5% (17.7-21.5)</td>
</tr>
<tr>
<td>Abdominal obesity</td>
<td>F</td>
<td>33.3</td>
<td>45.6</td>
<td>2.26 (1.90-2.68)</td>
<td>35.9% (28.9-43.6)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>33.3</td>
<td>46.5</td>
<td>2.24 (2.03-2.47)</td>
<td>32.1% (28.0-36.5)</td>
</tr>
<tr>
<td>Psychosocial index</td>
<td>F</td>
<td>-</td>
<td>-</td>
<td>3.49 (2.41-5.04)</td>
<td>40.0% (28.6-52.6)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>-</td>
<td>-</td>
<td>2.58 (2.11-3.14)</td>
<td>25.3% (18.2-34.0)</td>
</tr>
<tr>
<td>Fruits/veg</td>
<td>F</td>
<td>50.3</td>
<td>39.4</td>
<td>0.58 (0.48-0.71)</td>
<td>17.8% (12.9-24.1)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>39.6</td>
<td>34.7</td>
<td>0.74 (0.66-0.83)</td>
<td>10.3% (6.9-15.2)</td>
</tr>
<tr>
<td>Exercise</td>
<td>F</td>
<td>16.5</td>
<td>9.3</td>
<td>0.48 (0.39-0.59)</td>
<td>37.3% (26.1-50.0)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>20.3</td>
<td>15.8</td>
<td>0.77 (0.69-0.85)</td>
<td>22.9% (16.9-30.2)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>F</td>
<td>11.2</td>
<td>6.3</td>
<td>0.41 (0.32-0.53)</td>
<td>46.9% (34.3-60.0)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>29.1</td>
<td>29.6</td>
<td>0.88 (0.81-0.96)</td>
<td>10.5% (6.1-17.5)</td>
</tr>
<tr>
<td>ApoB/ApoA ratio</td>
<td>F</td>
<td>14.1</td>
<td>27.0</td>
<td>4.42 (3.43-5.70)</td>
<td>52.1% (44.0-60.2)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>21.9</td>
<td>35.5</td>
<td>3.76 (3.23-4.38)</td>
<td>53.8% (48.3-59.2)</td>
</tr>
</tbody>
</table>
Risk of acute myocardial infarction associated with exposure to multiple risk factors: INTERHEART

Comparison of the population-attributable risk (99% CI) for common risk factors in the INTERSTROKE and INTERHEART studies

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>INTERSTROKE (all stroke; 3000 cases, 3000 controls)**</th>
<th>INTERHEART (acute myocardial infarction; 15,152 cases, 14,820 controls)††</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>34.6% (30.4–39.1)</td>
<td>17.9% (15.7–20.4)</td>
</tr>
<tr>
<td>Smoking</td>
<td>18.9% (15.3–23.1)</td>
<td>35.7% (32.5–39.1)</td>
</tr>
<tr>
<td>Waist-to-hip ratio (abdominal obesity)</td>
<td>26.5% (18.8–36.0)</td>
<td>20.1% (15.3–26.0)</td>
</tr>
<tr>
<td><strong>Diet</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet risk score</td>
<td>18.8% (11.2–29.7)</td>
<td>..</td>
</tr>
<tr>
<td>Fruits and vegetables daily</td>
<td>..</td>
<td>13.7% (9.9–18.6)</td>
</tr>
<tr>
<td>Regular physical activity</td>
<td>28.5% (14.5–48.5)</td>
<td>12.2% (5.5–25.1)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>5.0% (2.6–9.5)</td>
<td>9.9% (8.5–11.5)</td>
</tr>
<tr>
<td>Alcohol intake</td>
<td>3.8% (0.9–14.4)</td>
<td>6.7% (2.0–20.2)</td>
</tr>
<tr>
<td><strong>Psychosocial factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All psychosocial factors</td>
<td>..</td>
<td>32.5% (25.1–40.8)</td>
</tr>
<tr>
<td>Psychosocial stress</td>
<td>4.6% (2.1–9.6)</td>
<td>..</td>
</tr>
<tr>
<td>Depression</td>
<td>5.2% (2.7–9.8)</td>
<td>..</td>
</tr>
<tr>
<td>Cardiac causes</td>
<td>6.7% (4.8–9.1)</td>
<td>..</td>
</tr>
<tr>
<td>Ratio of apolipoproteins B to A1</td>
<td>24.9% (15.7–37.1)</td>
<td>49.2% (43.8–54.5)</td>
</tr>
</tbody>
</table>


90% men

94% women
Importance of chronic conditions

- Encompasses but expands traditional “non-communicable diseases”
- Mental health problems
  - Depression second only to CVD in disability
  - 400 million have mental or behavioral disorder
  - Likely to increase with ageing and worsening social problems

Innovative Care for Chronic Conditions: Building Blocks for Action, WHO, 2002
7 million deaths from cancer worldwide in 2001: 2.43 million (35%) attributable to 9 potentially modifiable risk factors

- Low and middle income countries (1.67 million)
  - Smoking, alcohol use and low fruit and vegetable consumption
- High income countries (.76 million)
  - Smoking, alcohol use, overweight/obesity

Danaei et al., Causes of cancer in the world: comparative assessment of nine behavioural and environmental risk factors. Lancet 2005; 366:1784-93
Evidence
*≥BP 140/90 mm Hg or on antihypertensive medication; comparison with baseline hypertension status to assess persistent vs incident hypertension
DASH=Dietary Approaches to Stop Hypertension

Approximate Mortality Reduction: Pharmacotherapy* and Lifestyle/Diet†

*In coronary artery disease patients.
†After myocardial infarction.

Adapted from Iestra JA et al. Circulation. 2005;112:924-934.
4S: Lipid Lowering Reduces CHD Event Rates in $\geq65$-Year Old Subjects

- Placebo (n=503)
- Simvastatin (n=518)

- Total mortality: Placebo 19.1%, Simvastatin 12.9%, $P=0.009$
- Coronary mortality: Placebo 14.5%, Simvastatin 8.5%, $P=0.003$
- Revascularization: Placebo 15.9%, Simvastatin 9.9%, $P=0.003$

Diabetes Incidence Rates by Age

The DPP Research Group, *NEJM* 346:393-403, 2002
UK Prospective Diabetes Study Findings

Risk reduction with 1% decline in annual average A1C

- Microvascular Disease: 37% reduction, $P < .0001$
- PVD: 43% reduction, $P = .035$
- MI: 12% reduction, $P = .021$
- Stroke: 16% reduction, $P = .0001$

UKPDS: Intensive Blood-Glucose vs Conventional Treatment in Patients With Type 2 Diabetes

<table>
<thead>
<tr>
<th>Clinical End Point</th>
<th>RR (95% CI)</th>
<th>Favors Intensive</th>
<th>Favors Conventional</th>
<th>Log-rank P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any diabetes-related end point</td>
<td>0.88 (0.79–0.99)</td>
<td></td>
<td></td>
<td>0.029</td>
</tr>
<tr>
<td>Diabetes-related deaths</td>
<td>0.90 (0.73–1.11)</td>
<td></td>
<td></td>
<td>0.34</td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>0.94 (0.80–1.10)</td>
<td></td>
<td></td>
<td>0.44</td>
</tr>
<tr>
<td>MI</td>
<td>0.84 (0.71–1.00)</td>
<td></td>
<td></td>
<td>0.052</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.11 (0.81–1.51)</td>
<td></td>
<td></td>
<td>0.52</td>
</tr>
<tr>
<td>Amputation or death from PVD</td>
<td>0.65 (0.36–1.18)</td>
<td></td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>Microvascular disease</td>
<td>0.75 (0.60–0.93)</td>
<td></td>
<td></td>
<td>0.0099</td>
</tr>
</tbody>
</table>

RR=relative risk.
PVD=peripheral vascular disease.

UKPDS: Tight Blood Pressure Control vs Less Tight Control in Patients With Type 2 Diabetes

<table>
<thead>
<tr>
<th>Clinical End Point</th>
<th>RR for tight control (95% CI)</th>
<th>Favors tight control</th>
<th>Favors less tight control</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any diabetes-related end point</td>
<td>0.76 (0.62–0.92)</td>
<td></td>
<td></td>
<td>0.0046</td>
</tr>
<tr>
<td>Diabetes-related deaths</td>
<td>0.68 (0.49–0.94)</td>
<td></td>
<td></td>
<td>0.019</td>
</tr>
<tr>
<td>All-cause mortality</td>
<td>0.82 (0.63–1.08)</td>
<td></td>
<td></td>
<td>0.17</td>
</tr>
<tr>
<td>MI</td>
<td>0.79 (0.59–1.07)</td>
<td></td>
<td></td>
<td>0.13</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.56 (0.35–0.89)</td>
<td></td>
<td></td>
<td>0.013</td>
</tr>
<tr>
<td>Peripheral vascular disease</td>
<td>0.51 (0.19–1.37)</td>
<td></td>
<td></td>
<td>0.17</td>
</tr>
<tr>
<td>Microvascular disease</td>
<td>0.63 (0.44–0.89)</td>
<td></td>
<td></td>
<td>0.0092</td>
</tr>
</tbody>
</table>

RR=relative risk.

# Summary of Randomized Trials

<table>
<thead>
<tr>
<th></th>
<th>UKPDS</th>
<th>PROActive</th>
<th>ADVANCE</th>
<th>VADT</th>
<th>ACCORD</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>4620</td>
<td>5238</td>
<td>11140</td>
<td>1791</td>
<td>10251</td>
</tr>
<tr>
<td>Duration</td>
<td>&lt;1 YR</td>
<td>8</td>
<td>7.9</td>
<td>11.5</td>
<td>10.0</td>
</tr>
<tr>
<td>CVD</td>
<td>?</td>
<td>100%</td>
<td>32%</td>
<td>40%</td>
<td>35%</td>
</tr>
<tr>
<td>SBP</td>
<td>136</td>
<td>143</td>
<td>145</td>
<td>132</td>
<td>136</td>
</tr>
<tr>
<td>LDL</td>
<td>135</td>
<td>114</td>
<td>120</td>
<td>108</td>
<td>104</td>
</tr>
<tr>
<td>BMI</td>
<td>28</td>
<td>31</td>
<td>28</td>
<td>31</td>
<td>32</td>
</tr>
<tr>
<td>HbA1c</td>
<td>7.1%</td>
<td>7.9%</td>
<td>7.5%</td>
<td>9.4%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Non-fatal MI</td>
<td>.78*</td>
<td>.83</td>
<td>.98</td>
<td>.81</td>
<td>.78*</td>
</tr>
<tr>
<td>CHD</td>
<td>.75</td>
<td>.81</td>
<td>.92</td>
<td>.85</td>
<td>.82*</td>
</tr>
</tbody>
</table>

CHD- non-fatal MI and all cardiac mortality

Kishore, 2012; Ray, 2009
Figure 2  Probability of events of coronary heart disease with intensive glucose-lowering versus standard treatment  *Included non-fatal myocardial infarction and death from all-cardiac mortality.

Kausik K Ray, Sreenivasa Rao Kondapally, Seshasai, Shanelle Wijesuriya, Rupa Sivakumaran, Sarah Nethercott, Dav...

Effect of intensive control of glucose on cardiovascular outcomes and death in patients with diabetes mellitus: a meta-analysis of randomised controlled trials

The Lancet Volume 373, Issue 9677 2009 1765 - 1772

http://dx.doi.org/10.1016/S0140-6736(09)60697-8
Forest plot for all cause mortality and death from cardiovascular causes.

Boussageon R et al. BMJ 2011;343:bmj.d4169
Forest plot for severe hypoglycaemia.

<table>
<thead>
<tr>
<th>Study</th>
<th>Intensive treatment</th>
<th>Standard treatment</th>
<th>Risk ratio Mantel-Haenszel, random (99% CI)</th>
<th>Weight (%)</th>
<th>Risk ratio Mantel-Haenszel, random (99% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UKPDS&lt;sup&gt;27&lt;/sup&gt;</td>
<td>33/2487</td>
<td>8/1138</td>
<td>1.89 (0.69 to 5.19)</td>
<td>9.6</td>
<td></td>
</tr>
<tr>
<td>PROactive&lt;sup&gt;28&lt;/sup&gt;</td>
<td>19/2605</td>
<td>11/2633</td>
<td>1.75 (0.66 to 4.62)</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>ACCORD&lt;sup&gt;7&lt;/sup&gt;</td>
<td>538/5128</td>
<td>179/5123</td>
<td>3.00 (2.42 to 3.73)</td>
<td>32.7</td>
<td></td>
</tr>
<tr>
<td>ADVANCE&lt;sup&gt;6&lt;/sup&gt;</td>
<td>150/5571</td>
<td>81/5569</td>
<td>1.85 (1.30 to 2.63)</td>
<td>27.5</td>
<td></td>
</tr>
<tr>
<td>VADT&lt;sup&gt;8&lt;/sup&gt;</td>
<td>76/892</td>
<td>28/899</td>
<td>2.74 (1.57 to 4.77)</td>
<td>19.9</td>
<td></td>
</tr>
<tr>
<td>Total (99% CI)</td>
<td>816/16683</td>
<td>307/15362</td>
<td></td>
<td>100.0</td>
<td>2.33 (1.62 to 3.36)</td>
</tr>
</tbody>
</table>

Test for heterogeneity: $\tau^2=0.05, \chi^2=10.95, \text{df}=4, P=0.03, l^2=63\%$

Test for overall effect: $z=5.98, P<0.001$

Boussageon R et al. BMJ 2011;343:bmj.d4169
Changes in Selected Risk Factors during the Interventional Study and Follow-up Period

Kaplan-Meier Estimates of the Risk of Death from Any Cause and from Cardiovascular Causes and the Number of Cardiovascular Events, According to Treatment Group

Weight loss does not lower heart disease risk from type 2 diabetes

- Look AHEAD (Action for Health in Diabetes)
- Intervention stopped early in NIH-funded study of weight loss in overweight and obese adults with type 2 diabetes after finding no harm, but no cardiovascular benefits

https://www.lookaheadtrial.org/public/home.cfm
Figure 4

Source: The Lancet 2011; 378:156-167 (DOI:10.1016/S0140-6736(11)60698-3)

Terms and Conditions
Cumulative Incidence of the First of Any of the Predefined Cardiovascular Disease Outcomes (Panel A) and of the First Occurrence of Nonfatal Myocardial Infarction, Stroke, or Death from Cardiovascular Disease (Panel B)

The Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications (DCCT/EDIC) Study Research Group

Glucose – *Important*??

- May not be key factor
- Intensive control plays modest role
  - Opportunity for harm
- But affects other factors
- Role of glucose-lowering agents
  - No evidence exogenous insulin contributes to CHD
    - Oral agents
  - Hypoglycemia
Study Design Issues

• Inadequate power - Low event rates
  – Larger and longer duration studies needed

• Effects of hypoglycemia
  – Too rapid reduction

• Selecting wrong glucose target
  – Post-prandial or -challenge better predictor?
  – Glycemic variability

• Intervention too late!!
Clinical Implications

- Need for management approach targeting multiple risk factors
  - Caution with speed of glucose lowering especially in known CHD
  - Cost and compliance challenges
- Need to screen high-risk individuals
- Prevention of type 2 diabetes in the first place!
INTENSIVE????

- Good news/bad news
- Long term effects on CVD unclear
- Individualized
Goals in Diabetes

- **BP:** > 60 or CKD; + HTN - < 140/90 (JNC 8);
  - ADA: < 140/80; < 130 for some
- **No CVD,** LDL* < 100mg/dL (2.6 mmol/L); with CVD < 70 mg/dL (1.8 mmol/L)
  - HDL >50 (1.3 mmol/L) W, >40 (1.0 mmol/L) M
  - TG < 150 mg/dL (1.7 mmol/L)
- **HbA1c** < 7.0%
- **At least 150 mins/wk moderate aerobic**
- **No smoking**
Nursing Opportunities
FIGURE 6.1 Growing toward heart health: Influences and opportunities into adulthood.
Estimated costs of five priority interventions for non-communicable disease (NCDs) in three countries.

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Cost per person per year (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>China</td>
</tr>
<tr>
<td>1. Tobacco use</td>
<td>0.14</td>
</tr>
<tr>
<td>Accelerated implementation of the WHO Framework</td>
<td></td>
</tr>
<tr>
<td>Convention on Tobacco Control</td>
<td></td>
</tr>
<tr>
<td>2. Dietary salt</td>
<td>0.05</td>
</tr>
<tr>
<td>Mass-media campaigns and voluntary action by food</td>
<td></td>
</tr>
<tr>
<td>industry to reduce consumption</td>
<td></td>
</tr>
<tr>
<td>3. Obesity, unhealthy diet, and physical inactivity</td>
<td>0.43</td>
</tr>
<tr>
<td>Mass-media campaigns, food taxes, subsidies,</td>
<td></td>
</tr>
<tr>
<td>labelling, and marketing restrictions</td>
<td></td>
</tr>
<tr>
<td>4. Harmful alcohol intake</td>
<td>0.07</td>
</tr>
<tr>
<td>Tax increases, advertising bans, and restricted</td>
<td></td>
</tr>
<tr>
<td>access</td>
<td></td>
</tr>
<tr>
<td>5. Cardiovascular risk reduction</td>
<td>1.02</td>
</tr>
<tr>
<td>Combination of drugs for individuals at high risk</td>
<td></td>
</tr>
<tr>
<td>of NCDs</td>
<td></td>
</tr>
<tr>
<td>Total cost per person*</td>
<td>1.72</td>
</tr>
</tbody>
</table>

CVD Prevention Opportunities

Primordial
- Healthy eating factors
- Ideal weight
- Predisposition

Primary
- Lipids
- Hypertension
- Smoking cessation
- Diabetes
- + Primary

Secondary
- ASA
- ACE
- Rehab
- Beta-blockers
- + Primary

Benjamin and Smith et al., JACC 2002;40:579-61
Ideal Cardiovascular Health

- Simultaneous presence of 4 favorable health behaviors: abstinence from smoking with past year, ideal body mass index (BMI), physical activity at goal, and consumption of dietary pattern promoting CV health
- Simultaneous presence of 4 favorable health factors: abstinence from smoking with past year, untreated total cholesterol < 200 mg/dL, (5.2 mmol/L), untreated blood pressure < 120/80 mm Hg, and absence of diabetes
- Absence of clinical CVD

Lloyd-Jones et al., Circulation, 2010;121:586-613
Principles of Risk Reduction

• Population versus individual
• Primary prevention focuses on individuals known to be at risk
  – Screen and treat
• Most events occur in individuals with only moderate elevation of numerous risk factors
  – Population-based strategies needed
  – Developmentally appropriate, culturally sensitive student-level school-based interventions WITH modifications of school food and physical activity
Overall geriatric assessment
General Prevention Guidelines for All Average Risk Adults

Provide advice to patients on nutrition and physical activity:
• Achieve and maintain a healthy weight.
• Exercise for at least 30 minutes on 5 or more days a week.
• Eat at least 5 servings of vegetables and fruits daily.
Ask patients about tobacco use and provide cessation counseling and pharmacotherapy.

<table>
<thead>
<tr>
<th>TEST</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50+</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI</td>
<td>Each regular health care visit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>Each regular health care visit (or at least once every 2 years if BP &lt;120/80 mm Hg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lipid Profile</td>
<td>Every 5 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood Glucose test</td>
<td>Every 3 years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Breast Exam (CBE) and Mammography</td>
<td>CBE every 3 years</td>
<td>Yearly CBE and Mammography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pap test</td>
<td>Yearly</td>
<td>Every 1-3 years, depends on type of test and past results</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colorectal Screening</td>
<td></td>
<td>Frequency depends on test preferred</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prostate specific antigen test and digital rectal exam</td>
<td>Offer yearly, assist informed decisions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

My Research Program

- Grew out of my clinical experiences as a nurse in Emergency Department, CCU and ICUs
  - Many with diabetes and complications
    - Heart disease, peripheral vascular disease, stroke
    - Neuropathy, nephropathy, retinopathy
- PhD education in Epidemiology and concept of “at-risk”
  - Identify patients at “high-risk” to prevent or intervene early
Program of Research (2)

- Outcomes after myocardial infarction (MI) in older adults with T2DM-
- Screening for asymptomatic (silent) heart disease in T2DM
- Diabetes self-management in Black America women with type 2 diabetes
- Multidisciplinary intervention in asymptomatic heart disease and T2DM
- Multiple chronic conditions
Research Problem #1

- 1 out of 4 older adults have type 2 diabetes (T2DM)
- Most will die from cardiovascular disease – at least 2-4 times higher
- 1.5-2 times greater risk of death after MI
Research Problem #1

- But not known **WHY?**

As a nurse, who should we watch more closely = who is a higher risk? -
The Prognostic Importance of Diabetes Mellitus in Elderly Patients with Myocardial Infarction (MI)

Chyun, Vaccarino, Murillo, Young, & Krumholz

Mortality at 30 and 365 Days According to Diabetes Status

- **NonDM**: p = .442
- **NIRxDM**: p = .003
- **IRxDM**: p = .003
HF and Recurrent MI

- HF
- MI

- NonDM
- NIRxDM
- IRxDM

p = .001
Clinical Implications

- Rates of death, HF and MI high in elderly with diabetes and merit attention in development of strategies to improve.

- Risk of death, HF and MI accounted for by factors that cluster with diabetes and co-morbidities, highlighting importance of preventive strategies.
  - Need for focus on multifactorial risk reduction.

- Identify high-risk subjects – in-hospital and after discharge.
Problem #2 - Asymptomatic Ischemia

- Long theorized that CAD in diabetes occurs in absence of symptoms
  - Pain is LAST step in ischemic cascade in anyone
  - Many ischemic episodes occur without pain
- Cardiac neuropathy may contribute/cause
- Sympathetic & parasympathetic nerves innervate heart (and blood vessels) -
  - Just as susceptible to neuropathy
Detection of Ischemia in Asymptomatic Diabetics Study (DIAD)

Frans J. Th. Wackers, MD
Deborah A. Chyun, RN, PhD
Silvio E. Inzucchi, MD
Lawrence H. Young, MD

- Diabetes Care, 2011;34:204-9
- JAMA, 2009; 301:1-9
- Diabetes Care, 2007; 30:2892-8
Asymptomatic Patients with Diabetes

1,123 Eligible Consented Patients

(Clinical Profile, Biomarkers)

Randomization

561 Patients

Aden-SPECT (522)

563 Patients

No-Testing

Follow-up

Normal (409) Abnormal (113) 22%

Follow-up

2.9% MI/cardiac death 8.4% cardiac event
Multivariate Analysis: Factors associated with Moderate-Large Defects

- Male sex: 2.5 (1.1-5.7)
- Cardiac autonomic neuropathy: 5.6 (2.6-12.4)
- Duration:
  - < 2.8 years: 5.2 (1.8-14.9)
  - > 11.7 years: 5.6 (2.0-15.3)
Clinical Implications

- Importance of autonomic function
  - Screening – HR and BP
- Multifactorial focus on factors contributing to autonomic dysfunction
  - Glucose control
  - Lipid control
  - Blood pressure control
  - Smoking
Cardiac Events According to MIBI Results (n=561)

<table>
<thead>
<tr>
<th>Follow-up, y</th>
<th>No. at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No MIBI</td>
</tr>
<tr>
<td>1</td>
<td>39</td>
</tr>
<tr>
<td>2</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>35</td>
</tr>
<tr>
<td>4</td>
<td>35</td>
</tr>
<tr>
<td>5</td>
<td>34</td>
</tr>
<tr>
<td>6</td>
<td>26</td>
</tr>
</tbody>
</table>

Log-Rank p = .005

Cumulative Incidence of Cardiac Events

- Moderate-Large Defect
- Small Defect
- Non-Perfusion Abnormality
- Normal Screen
- MIBI Not Performed
DIAD Risk Score

Points
Family History
Peripheral Numbness
No Insulin
Glucose Control Past 3M
Duration of DM
Hip to Waist Ratio
Race
ECG Abnormality
Physical Activity
Pulse Pressure
Abnormal Valsalva Ratio
Total Points
Linear Predictor
3-year Survival
5-year Survival
QOL & anxiety improved with screening and provider discussion. Lower DM competence and higher controlled motivation (diet & ex) with poorer outcomes.

Younger age, women, anxiety, and living alone associated poorer control, but differences across outcomes.

82% ↑ anxiety; 14% depressive symptoms (DS)
Females, peripheral/autonomic neuropathy, physical inactivity, ↑ BMI, anxiety and DS with poorer QOL
Multidisciplinary Opportunity

- 9 medical students, residents and fellows
- 12 Master’s nursing students
- 1 Yale PhD student - NRSA
- Endothelial dysfunction
- Cardiac neuropathy
- Angiographic findings
- Electrocardiographic predictors
- Gender differences
- Health disparities
The Resting Electrocardiogram (rECG) in Type 2 Diabetes: A Useful Screening Tool for Asymptomatic Coronary Artery Disease?

PR Martinez Jr, S Abdillahi, J May, TA Wardrop, R Carman, J Darna, JA Davey, LH Young, FJTh Wackers, & DA Chyun for the DIAD Investigators

Yale Schools of Nursing and Medicine
New Haven, Connecticut
Racial Patterns in the Evaluation of Coronary Artery Disease in Asymptomatic Patients with Type 2 Diabetes

MA Connolly, DA Chyun, JA Davey, SE Inzucchi, FJ Wackers, LH Young
Yale University School of Nursing, Yale University School of Medicine
AHA, Chicago 2006
<table>
<thead>
<tr>
<th>Factor</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.98 (0.96, 1.02)</td>
<td>0.96 (0.92, 0.99)</td>
</tr>
<tr>
<td>AA</td>
<td>0.46 (0.20, 1.02)</td>
<td>0.38 (0.16, 0.91)</td>
</tr>
<tr>
<td>Income ≥50K</td>
<td>0.61 (0.33, 1.13)</td>
<td>0.47 (0.24, 0.92)</td>
</tr>
<tr>
<td>DM duration</td>
<td>1.05 (1.02, 1.08)</td>
<td>1.06 (1.03, 1.09)</td>
</tr>
<tr>
<td>Abn CST</td>
<td>7.66 (4.74, 12.4)</td>
<td>7.90 (4.8, 12.98)</td>
</tr>
</tbody>
</table>
Predictors of Physical Inactivity in Men and Women with Type 2 Diabetes
Levels of Physical Inactivity

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>5 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Results: Predictors of Physical Inactivity at 5 Years

<table>
<thead>
<tr>
<th>Predictors</th>
<th>All</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Ethnicity</td>
<td></td>
<td></td>
<td>OR=1.73</td>
</tr>
<tr>
<td>Level of Education</td>
<td>OR=0.91</td>
<td>OR=0.93</td>
<td>OR=0.88</td>
</tr>
<tr>
<td>Baseline level of PA</td>
<td>OR=3.3</td>
<td>OR=3.56</td>
<td>OR=3.38</td>
</tr>
<tr>
<td>Presence of Peripheral Neuropathy</td>
<td>OR=1.3</td>
<td>OR=1.54</td>
<td></td>
</tr>
<tr>
<td>HbA1C</td>
<td>OR=1.14</td>
<td>OR=1.17</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>OR=1.05</td>
<td>OR=1.06</td>
<td></td>
</tr>
<tr>
<td>Level of HDL</td>
<td></td>
<td>OR=1.02</td>
<td></td>
</tr>
<tr>
<td>Waist Circumference</td>
<td></td>
<td></td>
<td>OR=1.06</td>
</tr>
</tbody>
</table>
Clinical Implications – Follow-up

- Rates of events in older adults with diabetes lower than anticipated
- Risk of asymptomatic ischemia and events accounted for by factors that cluster with diabetes and co-morbidities, highlighting importance of preventive strategies
  - Need for focus on multifactorial risk reduction
Clinical Implications – Follow-up (2)

- Identify high-risk subjects
  - Factors associated with poorer glucose control
    - Glucose (HbA1c)
    - Duration
    - Peripheral neuropathy
    - Cardiac autonomic neuropathy
  - Minor nonspecific ST-T abnormalities
  - Physical inactivity
OK, so what do you do with all of this?????

Problem #3 and #4 – Designing and assessing a multifactorial, multidisciplinary intervention
Melkus, G., Grey, M., Chyun, D., Spollett, G.  

**Biological Research for Nursing, 12(1):7-19**

- Journal of Transcultural Nursing
- International Journal of Psychiatry
- Ethnicity and Disease
- Journal of The American Dietetic Association
- Applied Nursing Research
- Nursing Research

2 Master’s students
2 PhD – NRSA
1 Post-doc

Director, Virginia and Muriel Pless Center for Nursing Research
Focus Groups of Health Beliefs & Practices of Black Women with T2D

Need for diabetes education

Implications of cultural traditions

Importance of culturally appropriate education materials

Need for care provider rapport

Importance of family support

Feasibility Study - Tested a one group pretest/posttest, culturally relevant, cognitive-behavioral group diabetes self-management intervention

6 weeks, 2 hour sessions
With Monthly NP care visits
Randomized Trial (n=109)

Change in HbA1c

Time  $p < .0001$
Randomized Trial (n=109)

Emotional Distress

Group X Time p=.02
Conclusions

• Traditional /customary diabetes patient education appears beneficial for women who have never received such services.

• Culturally tailored DM education & coping skills training decreases diabetes related emotional distress

• DM self-management interventions of education and psychosocial care need to be offered on a continued basis similar to medical care visits
A Multidisciplinary Intervention for Asymptomatic Myocardial Ischemia (MIAMI)

D Chyun, G Melkus, L Young, S Langerman, J Coviello, S Talley, G Insabella, J Wagner, T Gallagher, F Lee, S Inzucchi, & F Wackers

The Beatrice Renfield-Yale School of Nursing Clinical Research Initiatives Fund

The Center for Self and Family Management of Vulnerable Populations

Yale University School of Nursing, P30NR008999
Cognitive – Behavioral Intervention

- Education and coping skills training (8 sessions)
  - 8 weeks plus telephone follow-up for 3 months total
  - 8 weeks plus randomization to motivational interviewing for physical activity support
- Psychological assessment and referral
- Increase levels of daily activity
  - Evaluated by exercise physiologist
  - Individual goals (pedometer)
Blood sugar and CVD factors

Amount of improvement

Blood sugar
Blood pressure
Bad cholesterol
Weight
Depressive symptoms, anxiety, QOL

![Bar chart showing improvement in depressive symptoms, anxiety, physical function, and emotional function.](chart.png)
An Investigation of Self-Care Practices and Educational Needs among Adults with Cancer and Comorbidities

Marilyn J. Hammer, PhD, DC, RN
Victoria Vaughan Dickson, PhD, RN, FAHA
Frances Cartwright, PhD, RN, AOCN
Deborah Chyun, PhD, RN, FAHA, FAAN
Gail Melkus, EdD, C-NP, FAAN

NEW YORK UNIVERSITY
Systematic Review of Nurse-Led Experimental Studies of Self-Management Interventions for Chronic Illness

Victoria Vaughan Dickson, PhD, CRNP
Marilyn Hammer, PhD, DC, RN
Kelley Newlin, DNSc, RN
Elizabeth Ercolano, DNSc, RN
Deborah Chyun, PhD, RN, FAAN, FAHA
Gail D’Eramo Melkus, EdD, RN, FAAN
Jill Nocella, MSN, RN
Nancy Arbaugh, MSN, RN
Sarah Nowlin, MSN, RN
Alissa Levine Wong, BA,
Background

- Chronic conditions are highly prevalent globally
- Current healthcare systems are inadequate in meeting the challenges of preventing and managing these conditions\(^1,2,3\)
- Comorbidities impact daily life through aggregated symptoms of multiple diseases
- Average of 9 symptoms reported with multiple comorbid conditions → distress and depression\(^4\)
- Clinical practice guidelines do not address complexity of managing patients with comorbidities\(^4\)

\(^1\) IOM (2001). Crossing the quality chasm, National Academy Press
\(^2\) CDC (2011). National Center for Chronic Disease Prevention and Health Promotion
\(^3\) Notle E. & McKee (2008). WHO: A Health System Perspective
\(^4\) Riegel et al. (2009)., Circulation, 120: 1141-63.
Purpose

- To determine extent of nurse-directed self-management intervention studies;

- To analyze evidence for common definitions and methods;

- To determine evidence for intervention effectiveness based on unique program attributes.
Approach

• Systematic Integrative Review based on PRISMA guidelines

• Nurse-directed experimental and quasi-experimental studies in Diabetes, Cardiovascular and Cancer literature

Search Strategy Overview

Databases: CINAHL, MedLine, PubMed, Web of Science, Cochrane

Years: 2000-2010

Key Words: self-management, self-care, symptom management, patient education (disease specific words)

Limits: RCT, quasi-experimental AND nurse as PI
123 Studies Reviewed

**Diabetes**
- 205 abstracts met initial criteria
- 153 excluded:
  - 134 PI not nurse
  - 19 not RCT
- 52 studies reviewed

**CVD**
- 81 abstracts met initial criteria
- 49 excluded:
  - 32 PI not nurse
  - 10 not RCT
  - 3 incomplete studies
  - 1 dissertation
- 29 studies reviewed

**Cancer**
- 246 abstracts met initial criteria
- 204 excluded:
  - 204 PI not nurse
- 42 studies reviewed

3 DM focus
# Informational Matrix

<table>
<thead>
<tr>
<th>Authors</th>
<th>Purpose/Aim</th>
<th>Target Population</th>
<th>Design/ Sample Size</th>
<th>Theoretical Framework</th>
<th>Intervention</th>
<th>Outcomes measured</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melkus, et al, (2010), Biological Research in Nursing Online</td>
<td>To evaluate the effectiveness of a tested 12-week nurse-led, culturally relevant, cognitive-behavioral, group diabetes self-management training and coping skills training intervention.</td>
<td>Older African-American women with Type 2 Diabetes (age&gt;48)</td>
<td>RCT N-109</td>
<td>Social Learning Theory</td>
<td>An 11-week culturally relevant group diabetes self-management training (DSMT), coping skills training (CST), and diabetes care.</td>
<td>Hemoglobin A1C, LDL (low-density lipoprotein cholesterol), BP (systolic blood pressure), QOL</td>
<td>Hgb A1c improved in both groups from baseline to 3 months (p &lt; .0001). Systolic BP (p =.01) and LDL levels (p &lt; .05) improved in both groups from baseline to 24 months.</td>
</tr>
<tr>
<td>McKinley, et al, (2009) International Journal of Nursing Studies, 46: 1037-46.</td>
<td>To test the effect of an education and counseling intervention on knowledge, attitudes and beliefs about ACS symptoms and response to symptoms.</td>
<td>Adults with CHD</td>
<td>RCT N=3522</td>
<td>Knowledge, Attitudes &amp; Beliefs</td>
<td>Intervention: 1:1 counseling session (40 minutes) Control: usual care. Length: 1 session</td>
<td>Knowledge, attitudes, beliefs related to acute coronary syndrome (ACS)</td>
<td>IG showed significant positive changes in outcomes in IG at 3m and 12m (p=.0005)</td>
</tr>
<tr>
<td>Miaskowski et al. (2007) Pain</td>
<td>Assess effectiveness of a psycho-educational intervention to decrease pain scores in patients with pain from bone mets; and influence on mood status and QOL.</td>
<td>Oncology outpatients with bone metastasis from 7 outpatient facilities in Northern California</td>
<td>RCT N=212</td>
<td>Dodd's Symptom Management</td>
<td>PRO-SELF intervention: in-home nurse visits at 1, 3, 6 wks &amp; telephone interviews at 2, 4, &amp; 5 wks. Control: Usual care Length: 6 weeks.</td>
<td>Pain: Karnofsky score, daily rating of pain level, BPI Mood: Profile of Mood States QOL: SF-36;</td>
<td>No significant differences between intervention and control groups. Significant differences within responder groups of intervention</td>
</tr>
</tbody>
</table>
Results:
Intervention Strategies & Methods

- Cognitive Behavioral Therapy
- Treatment focused (exercise plans, acupuncture)
- Disease Management
- Coaching
- Informatics (web-based, audiotapes, videos)

Diabetes
- Bundled
- Telephonic
- Group based
- Web-based
- Individualized
- CDE

Cardiovascular
- Bundled
- Telephonic
- Group based
- 1:1 Protocol Driven
- Individualized by RN/APN

Cancer
- Symptom-focused
- Support Groups
- In-home
- Telephonic
# Results

- **Population**
  - 20% ethnic minorities

- **Outcomes and effectiveness**

<table>
<thead>
<tr>
<th></th>
<th>Common Outcomes</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diabetes</strong></td>
<td>Physiological measures: HbA1C</td>
<td>Significant improvement in clinical outcomes</td>
</tr>
<tr>
<td><strong>CVD</strong></td>
<td>Quality of Life: general SF-36 and cardiac-specific</td>
<td>Mixed: Lacked sustainability</td>
</tr>
<tr>
<td><strong>Cancer</strong></td>
<td>Symptom experience: Fatigue and pain</td>
<td>Mixed: Lacked sustainability</td>
</tr>
</tbody>
</table>
Discussion: Intervention

- 40% bundled interventions
  - unable to disentangle program components
- Interventions were not well-described
  - unable to duplicate.
- Minimal differences between intervention and usual care.
- Treatment fidelity weak
  - Self-monitoring
  - Audiotaping
  - Checklist
Discussion: Measurement Issues

• Statistical analysis
• Self-care measurement inconsistent
  – few studies were able to link intervention to outcome
• Few differences between treatment and control groups
  – Significant changes overtime in treatment groups.
  – Most results were not sustained over time
Implications

• Research is needed to understand the effect of components of bundled interventions
• Consistent measurement
  – Self-care measures
  – Physiological outcomes
• Intervention dose
• Culturally-relevant interventions critical
Conclusions

• Advancing Nursing Science
  – Multiple definitions of key concepts and varied outcomes
  – Consistent measurement
  – Methodological rigor
Self-Care Practices and Educational Needs among Adults with Cancer and Comorbidities

Describe the self-care behaviors of adult/older adult patients with cancer who concurrently have T2D and/or CVD and identify factors that facilitate or impede self-care.

NYU Cancer Institute: Translational Research Pilot Award
Patients with cancer often present with chronic comorbid conditions, commonly
- Type 2 Diabetes (T2D)
- Cardiovascular Disease (CVD)

Comorbidities can occur prior to or following a cancer diagnosis

Cancer, T2D, and CVD
- Targeted focus of global health concerns²,³
- Share modifiable risk factors

Associations between cancer, T2D, & CVD are complex and often bidirectional

² CDC (2011). National Center for Chronic Disease Prevention and Health Promotion
Aims

In 30 adult/older adults with cancer who also have T2D and/or CVD
1) Describe patient perceptions about self-care of chronic comorbid conditions including self-care practices and resources essential to self-care
2) Identify factors that facilitate or impede self-care of chronic comorbid conditions
Methods

- Mixed methods pilot study
- Patients with hematological malignancies receiving chemotherapy treatment at the NYU Clinical Cancer Center who have the comorbid conditions of T2D and/or CVD
- Quantitative data
  - Sociodemographic questionnaire
  - Charlson Comorbidity Index
  - SF-36v2 (health & wellness questionnaire)
  - Summary of Diabetes Self-Care Activities questionnaire
  - Self Care of the Heart Disease Index
- Qualitative data
  - Guided semi-structured interviews
Cancer fear

Current symptoms were more important than
  - what disease they had
  - which disease was causing the symptom
Conclusions & Implications

– Multiple burdensome challenges
– Physical functioning is related to QOL
– Self-confidence is related to self-care
– Symptoms trump concerns about specific diseases

• Implications
  – Focus on physical functioning and symptom management is paramount
  – Improving self-confidence may ↑ self-care
  – Coordination of care is essential
Summary

• Importance of co-morbid conditions in contributing to adverse outcomes
• Interventions feasible and effective to improve risk factor status in individuals with T2DM and CVD
• Need for ongoing research
Audience Participation

- Reducing the global burden of CVD and DM
  - Clinical perspectives
  - Research opportunities
Diagnostic Criteria

Criteria confirmed on subsequent day:

1. HbA1c $\geq$ 6.5%  OR
2. FPG $\geq$ 126 mg/dl (7.0 mmol/l)  OR
3. 2hPG $\geq$ 200 mg/dl (11.1 mmol/L) during an OGTT with glucose load equivalent of 75g  OR
4. Symptoms + random plasma glucose $\geq$ 200 mg/dl (11.1 mmol/L)

Diabetes Care 2014;37: S81-S90
Increased Risk for Diabetes (prediabetes)

- FPG 100 (5.6 mmol/L) to 125 mg/dl (6.9 mmol/L) (IFG)
- 2h PG 75-g OGTT 140 mg/dl (7.8 mmol/L) to 199 mg/dl (11.0 mmol/L)
- A1C 5.7-6.4%

*Diabetes Care 2014;37: S81-S90*
Epidemiologic Considerations

• Elevated risk ↓, but not eliminated when other risk factors accounted for
• Established risk factors account for no more than half of the excess CHD risk in DM
• Mechanisms accounting for remaining risk not understood
Epidemiologic Considerations

• **Strength and consistency**
  – Risk factor for CVD in DM subjects
  – Others - not as independent factor
  – Inconsistent in IGT or non-DM

• **Temporal sequence**
  – Duration of DM, after age accounted for, not associated with ↑ CHD risk
  – Risk ↑ even in newly diagnosed DM
Influences on Identified Risk Factors

- Type 1 vs type 2 DM
- Gender and age effects
- Inter-relationships among factors
- CHD outcomes
  - MI, fatal MI, CVD mortality
  - Carotid intimal-medial thickness
  - Perfusion abnormalities
  - Lack of screening for underlying CHD