Heart Disease & Sudden Cardiac Arrest in Minnesota:

A view from the Minnesota Department of Health

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Overview

MDH Overview  Risk Factors
Staffing      Heart Disease Deaths
Funding       Heart Disease Events
Non-funded activities  Costs
Epidemiologist’s Role  Sudden Cardiac Arrest
Cardiac Care Systems  Questions
• Heart Disease & Stroke Prevention Unit
  • Within the Center for Health Promotion (CHP) in the Health Promotion & Chronic Disease Division (HPCD)
    • CHP also houses Diabetes, Oral Health, Asthma, Injury & Violence Prevention, and *Arthritis & Aging*

• HPCD also houses Cancer Registry, Cancer Control, Occupational Health, and Environmental Public Health Tracking

• Office of Statewide Health Improvement Initiatives (OSHII)
  • OSHII also houses Chronic Disease Risk Reduction, Tobacco, and SHIP
Minnesota Department of Health

- HDSP Unit Staffing
  - 1 FTE Supervisor
  - 2 FTE Epidemiologists
  - 1 FTE Community Planner
  - 1 FTE Quality Improvement Specialist
  - .6 FTE Registered Nurse
  - Occasional Student Intern
Minnesota Department of Health

- HDSP Unit Staffing working on Heart Disease
  - 1 FTE Supervisor
  - .7 FTE Epidemiologist
  - 1 FTE Community Planner
  - 1 FTE Quality Improvement Specialist
  - .4 FTE Registered Nurse
  - Occasional Student Intern

Staff dedicated to other specific initiatives – mostly Stroke
HDSP Unit Mission

To improve cardiovascular health and reduce the burden of heart disease and stroke for all people living in Minnesota
Current Primary Funding

• Centers for Disease Control & Prevention (CDC)
  • State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health (1305, for short)
    – Year 2 of 5
      • Epidemiology, Surveillance & Evaluation
      • **Environmental Strategies** to reinforce healthful behaviors
      • **Health Systems Interventions** for Clinical & Preventive Services
      • **Community-Clinical Connections** to support CD self-management
        (**VERY PRESCRIPTIVE – A MAJOR SHIFT**)
    • All states funded at a basic level, 30 at enhanced level (incl. MN)
    • In year 2, most of our funding was restored

• Newly-funded 1422 Grant - Work with Locals
Current Primary Funding

- Centers for Disease Control & Prevention (CDC)
  - Paul Coverdell National Acute Stroke Program (Year 3 of 3, funded since 2007)
    - Quality Improvement Registry
    - Almost 50 participating hospitals
    - More than 75% of acute stroke hospitalizations in the state
    - Allowed MDH to support the implementation of statewide quality measures for stroke
    - Allowed us to support development of a statewide stroke system
  - Legislation passed in 2013, led by AHA
    - Authorized MDH to designate stroke hospitals - looking to 64 designated hospitals by January (half of the eligibles)
    - 75% of Minnesotans live where their closest hospital is Acute Stroke Ready
Previous Primary Funding

• Centers for Disease Control & Prevention (CDC)
  • Heart Disease & Stroke Prevention State Program (Capacity Building)
    • 2 cycles of funding (since 2002)
    • Disease-specific objectives
    • Parallel to Diabetes, Obesity, and School Health funding streams
  • Choose own work under following
    • Define the burden of heart disease & stroke
    • Develop and update a comprehensive state plan
    • Identify Culturally-appropriate approaches to promote heart disease & stroke prevention
    • Increase public awareness
CDC Grant Responsibilities

• Performance Measures for State Public Health Actions
  • Identify and report on standard, existing performance measures to monitor progress
  • Develop and implement data collection strategies for performance measures that do not exist
  • Identify priority populations for interventions
  • Lead individual components of work plan
    • Community Pharmacists as health care extenders for control of high blood pressure and A1c

• Parallel Performance Measures for 1422 Grant
  • Similar PMs as above, on a local level
Minnesota Stroke Registry

- Analysis support for Inpatient Quality Improvement Registry program for Stroke
  - Performance Measure & Appropriate Care Measure Reports (10 Consensus Measures from CDC/TJC/AHA)
  - Quality of Care Indicator Development
  - Data Stories
  - Support Statewide Stroke System Implementation

- Statewide Quality & Measurement Reporting System
  - Door to Initiation of Imaging within 25 minutes
  - Door to Needle within 60 minutes (tPA)
Other Funding

- Association of State & Territorial Health Officials (ASTHO)
  - Improve Blood Pressure Control to support the Million Hearts Initiative – 2 year project (until June 2015)
- Otto Bremer Foundation
- Medtronic Foundation
- American Heart Association
- Minnesota Resuscitation Consortium

- Zero dollars from the State of Minnesota
Fun, but unfunded

• Respond to public

• Respond to MDH

• Respond to the legislature

• Respond to other funding opportunities

• Collaborate with diverse partners
Working beyond funding

• Funding dictates what and how we do most work

• Creativity and flexibility in how we approach public health problems

• Aligning state and community priorities with funding opportunities is a key piece of our work

• Avoiding policy and priority whiplash
Other Responsibilities

• Define & Monitor Burden of Heart Disease & Stroke
  • Fact Sheets (updated annually)

• Identify Priority Populations for interventions
  • American Indian population (Heart of Many Nations)
  • Rural communities (Statewide Stroke System)
  • Northeast Minnesota (ASTHO Million Hearts)

• Develop indicators to track progress in the State Plan (2011-2020)
Respond to the Public

• Interpret media reports, provide Minnesota context
  • Signs & Symptoms of Stroke
  • Uncontrolled Hypertension
  • Lower Limb Amputation Surveillance
  • Avoidable Deaths

• Assist health organizations or communities with local community assessments

• Sharing Fact Sheets with a broad public

• Speaking at conferences and symposia
Respond to the Agency

• Provide context for heart disease, stroke, vascular disease, and risk factors to MDH leadership

• Connect across chronic disease domains

• Provide data to support external funding applications

• Provide data to support the development of agency priorities
Respond to the Legislature

• Provide context for heart disease, stroke, vascular disease, and risk factors to lawmakers

• Provide data to support development of statewide stroke system

• Report of heart disease & stroke mortality and hospitalizations by Hennepin County Zip Code

• Respond to legislative requests for data to inform policy decisions
Respond to Funding Opportunities

- GIS for State Health Departments (CDC) (2010)
  - Network with other states
  - Collaboration with Hennepin & Washington Counties
  - New tool for evaluation and reporting

- Million Hearts State Learning Collaborative Focus on Hypertension (ASTHO) (2013)
  - Pilot the collection of clinic-level blood pressure control quality measures in NE Minnesota
Collaborate

• Promote the State Plan
  • Participate on external committees
  • Engage with stakeholders on MDH committees

• Jointly pursue a collaborative mission
  • Surveillance of Lower Limb Amputation/PAD Coalition
  • Statewide Acute Stroke System
  • Heart Safe Communities

• Engage new partners
  • Business Leaders, Pharmacists, EMS, Community Members
System Overview

- Stroke system in Minnesota is new and growing
- STEMI care in Minnesota has been well-organized for more than a decade
- Most other states starting from scratch on developing STEMI systems of care
- **Mission Lifeline: Minnesota** specifically targeting improvements in STEMI care for rural Minnesota, and PCI centers outside the Twin Cities and Rochester
- SCA care in similar place to STEMI care several years ago
- In SCA field, Minnesota is a leading state in implementing a systems-based approach focused on education, data collection, and process improvement
Data Overview

- Heart Disease is the Leading cause of death in the United States (2012) and 2\textsuperscript{nd} in Minnesota (2013)
- Minnesota has the lowest heart disease mortality rate of any state
- First state for heart disease to fall to number 2 (behind cancer)
- Highest prevalence & mortality in the southern states
- Highest prevalence & mortality in African-Americans, nationally
- In Minnesota, highest mortality in American Indians
## Prevalence

<table>
<thead>
<tr>
<th>Condition</th>
<th>Survey Year</th>
<th>Minnesota</th>
<th>National State Median</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Attack</td>
<td>2013</td>
<td>3.0%</td>
<td>4.3%</td>
<td>Lower</td>
</tr>
<tr>
<td>Stroke</td>
<td>2013</td>
<td>2.1%</td>
<td>2.8%</td>
<td>Lower</td>
</tr>
<tr>
<td>Obesity</td>
<td>2013</td>
<td>25.5%</td>
<td>27.6%</td>
<td>Lower</td>
</tr>
<tr>
<td>Smoking</td>
<td>2013</td>
<td>18.0%</td>
<td>19.0%</td>
<td>No Difference</td>
</tr>
<tr>
<td>Hypertension</td>
<td>2013</td>
<td>27.0%</td>
<td>30.8%</td>
<td>Lower</td>
</tr>
<tr>
<td>High Cholesterol</td>
<td>2013</td>
<td>33.6%</td>
<td>38.4%</td>
<td>Lower</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>2013</td>
<td>21.2%</td>
<td>21.0%</td>
<td>No Difference</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2013</td>
<td>7.4%</td>
<td>9.7%</td>
<td>Lower</td>
</tr>
</tbody>
</table>

Source: Behavioral Risk Factor Surveillance Survey, CDC
## Mortality

<table>
<thead>
<tr>
<th>Cause of Death in 2013 (ICD-10 code)</th>
<th>Total Deaths</th>
<th>Crude Death Rate per 100,000</th>
<th>% of Total Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malignant Neoplasms (C00-C97)</td>
<td>9,603</td>
<td>177.2</td>
<td>23.4%</td>
</tr>
<tr>
<td>Diseases of the Heart (I00-I09, I11, I13, I20-I51)</td>
<td>7,671</td>
<td>141.5</td>
<td>18.7%</td>
</tr>
<tr>
<td>Accidents (V01-X59, Y85-Y86)</td>
<td>2,487</td>
<td>45.9</td>
<td>6.1%</td>
</tr>
<tr>
<td>Chronic Lower Respiratory Diseases (J40-J47)</td>
<td>2,285</td>
<td>42.2</td>
<td>5.6%</td>
</tr>
<tr>
<td>Cerebrovascular Disease (I60-I69)</td>
<td>2,051</td>
<td>37.8</td>
<td>5.0%</td>
</tr>
<tr>
<td>Alzheimer’s Disease (G30)</td>
<td>1,426</td>
<td>26.3</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

Source: Minnesota Center for Health Statistics
## Mortality

<table>
<thead>
<tr>
<th>Location</th>
<th>Age-Adjusted Death Rate per 100,000 (2008-2010)</th>
<th>Rank</th>
<th>% Change, 1999-2001 to 2008-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>119.1</td>
<td>-</td>
<td>-36.0%</td>
</tr>
<tr>
<td>Minnesota</td>
<td>70.3</td>
<td>1</td>
<td>-41.4%</td>
</tr>
<tr>
<td>Iowa</td>
<td>132.6</td>
<td>42</td>
<td>-28.7%</td>
</tr>
<tr>
<td>North Dakota</td>
<td>111.6</td>
<td>26</td>
<td>-32.7%</td>
</tr>
<tr>
<td>South Dakota</td>
<td>122.1</td>
<td>35</td>
<td>-26.7%</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>103.7</td>
<td>20</td>
<td>-36.3%</td>
</tr>
</tbody>
</table>

Heart Disease Death Rates, 2008-2010
Adults, Ages 35+, by County

Rates are spatially smoothed to enhance the stability of rates in counties with small populations.

Data Source:
National Vital Statistics System
National Center for Health Statistics

CDC
VHDSP
Minnesota Heart Disease
& Stroke Prevention Unit
Mortality

- Highest mortality west and north
- Twin Cities drive low state rate
- Hennepin is lowest
- Mortality in highest rate counties 2x that of the lowest quartile
- Time series shows decline

Source: MDH Center for Health Statistics
Heart Disease Mortality in Minnesota, 2010-2012

Source: CDC Wonder
Mortality

- National statistics show consistently higher heart disease mortality in African-Americans compared to whites
- Lowest mortality nationally in Asian Americans and Hispanics
- Mortality rates for American Indians are underestimated, with high misclassification of race on death certificates *

Source: Indian Health Service. Adjusting for Miscoding of Indian Race on State Death Certificates. Washington, DC: Department of Health and Human Services, Indian Health Services; 1996.
Mortality

- In Minnesota, Historically African-Americans/Africans not significantly higher than for whites
- Minnesota difference may be due to large recent African immigration
- In Minnesota, highest mortality rates for American Indians
- Historically high mortality rates in American Indians may still be underestimated given misclassification
Hospitalizations

- Minnesota Hospital Uniform Billing Data (Discharge Data)
  - ICD-9 codes and DRGs for diagnoses & procedures
  - Admission and discharge dates
  - Admission source and discharge destination
  - Payers & charges
  - Identifiers: Sex, birth date, residential zip code, hospital

- Dataset has limitations for surveillance work
  - No names
  - No race information
  - No unique ID to track multiple events
Hospitalizations

Administrative Data is the only statewide data we have for surveillance of heart disease events

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<tr>
<th>Principal Diagnosis Group</th>
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<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>% Change</th>
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<tr>
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<td>50,365</td>
<td>48,013</td>
<td>46,178</td>
<td>41,668</td>
<td>-10%</td>
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<tr>
<td>Coronary Heart Disease</td>
<td>18,769</td>
<td>17,510</td>
<td>15,939</td>
<td>14,045</td>
<td>-25%</td>
</tr>
<tr>
<td>Acute Myocardial Infarction</td>
<td>8,541</td>
<td>8,461</td>
<td>8,277</td>
<td>7,825</td>
<td>-8.4%</td>
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### Hospitalizations

Great progress with decreasing hospitalizations and events

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But, the most recent drops seem too good to be true – data in this area are challenging.
Hospitalizations

Medicare Beneficiaries
Ages 65 and Older
2008-2010
Heart Disease Hospitalization Rates

- Total US rate = 31.9 per 1,000 beneficiaries
  - MN = 35.3
  - WI = 28.9
  - IA = 31.6
- Close to 1 million hospitalizations annually

Source: Atlas of Heart Disease Hospitalizations Among Medicare Beneficiaries, CDC. 2010.
Costs

- In Minnesota, $785 million in inpatient hospitalization charges only during 2011, down $30 million in one year
- Estimated national direct and indirect cost in 2009 was $204.4 billion
  - Includes inpatient stays, outpatient visits, ED visits, prescribed medications, and home health care
  - Approximately 1% of discharges are in Minnesota, leading to a direct cost estimate of at least $2 billion per year
- Heart Disease is highest in direct costs nationally

Sudden Cardiac Arrest Data

- Two goals

1. Estimate the total coverage of the CARES Registry in Hennepin County

   Is CARES really getting all of the Out-of-hospital Cardiac Arrest cases?

2. Estimate the total number of Out-of-hospital Cardiac Arrest deaths in Minnesota

   Does our estimate in Hennepin County translate to the whole state?
Sudden Cardiac Arrest Data

- Very challenging to get solid numbers on number of deaths
- Some are not transported to the hospital, so are never in the outpatient or inpatient hospitalization data
- Most die before arriving at the hospital, so are never admitted as inpatients
- Less detailed diagnosis code information in mortality data
- Most attributed to Acute Myocardial Infarction (I20-I25)
- Common strategy in research literature is to look for Out-of-hospital Cardiac Arrest
- Employed this methodology in Minnesota utilizing Mortality data, Hospitalization data, CARES data
SCA Events – Hennepin County

- CARES = 100% coverage of Out-of-Hospital (OOH) Cardiac Arrest Events taking place in Hennepin
  - 2012 Hennepin Population + Commuter adjustment = 1.24 Million
  - Estimate OOH Cardiac Arrest Deaths (ICD10 codes I20-I25, I46), Hennepin Average 2006-2010 = 328 annually
  - Adjust for commuters = +15 annually or 343 total
- CARES Hennepin County transports in 2012 that did not start in a nursing home = 478
- Subtract number of cases who are admitted to the hospital (n=138) 478 – 138 = 340 OOH Cardiac Arrest deaths
- 340 out of 343 (Pretty Good!)
- 328 OOH Cardiac Arrest Deaths
CARES = Sporadic coverage of events taking place outside Hennepin

- Estimate OOH Cardiac Arrest Deaths (ICD10 codes I20-I25, I46), Minnesota Average 2006-2010 = 1,973 annually

- CARES Minnesota transports in 2012 that did not start in a nursing home = 1,286

- Subtract number of cases who are admitted to the hospital (n=247) 1,286 - 247 = 1,039 OOH Cardiac Arrest deaths in CARES

- 53% coverage for the state in 2012

- Higher OOH SCA Deaths in Greater Minnesota
  - Hennepin has lowest CHD mortality in state
  - Less ALS ambulance support
  - Long travel distances
OOH SCA Deaths – Minnesota

- 1,973 OOH Sudden Cardiac Arrest deaths
  - Would rank 6th in overall mortality, after Stroke
  - Some are due to Acute Myocardial Infarction
    - Lack of blood supply leading to Cardiac Arrest
  - Many due to underlying rhythm disorders
    - Often identified early, not always treated before an event

- Validates the need for improved emergency response
- MDH is engaged, even if CDC’s funding priorities have shifted to prevention and disease management
Summary

- Minnesota lowest CHD mortality of any state
- Estimate around 2,000 OOH Sudden Cardiac Arrest deaths annually – this is the population the MRC is targeting
- MDH remains engaged in emergency care initiatives for Stroke, Acute Myocardial Infarction and Sudden Cardiac Arrest
Questions & Thoughts

- Minnesota lowest CHD mortality of any state
  - How can we maintain this momentum?
- Estimate around 2,000 OOH Sudden Cardiac Arrest deaths annually
  - How can we increase survival?
- MDH remains engaged in emergency care initiatives for Stroke, Acute Myocardial Infarction and Sudden Cardiac Arrest
  - How can MDH support and advocate for activities around SCA?