CVD Prevention in American Indian & Alaska Native Communities: Opportunities and Challenges for the 21st Century

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Retired USPHS Investigator,
Strong Heart Study
Acknowledgments:

13 Strong Heart Study tribes
SHS investigators & coordinators

Drs. James Galloway, Lyle Best,
Barbara Howard & Dorothy Rhoades
For sharing their slides

http://strongheart.ouhsc.edu/

National Health Lung and Blood Institute
SHS: WHAT WAS THE GOAL?

- Is CVD an important public health problem in Indian communities?
- How does it compare with non-Indian communities?
- Do the prevalences of risk factors differ?
- Do the risk factors work the same?
- Can this kind of research be done in Indian country?
Strong Heart Study Population

4549 American Indians ages 45-74 years

Arizona: Pima/Maricopa/Papago in the Gila River, Salt River, and Ak-Chin Indian communities

Oklahoma: Apache, Caddo, Comanche, Delaware, Fort Sill Apache, Kiowa, and Wichita

South/North Dakota: Oglala Sioux and Cheyenne River Sioux (SD) and the Spirit Lake Tribe in the Fort Totten area (ND)
Strong Heart Study
1988-2003

• Community Mortality Study
  35–74-year-old men and women
  Deaths between 1984 and 1994
  Medical record review of all possible CVD deaths

• Physical Examinations of Cohort
  ECG, Cardiac and Carotid ECHO
  BP and other measurements
  Blood, urine and DNA samples
  Medical, diet and medication history
Strong Heart Study
1988-2003

• **Cohort Surveillance**
  Yearly contact
  Medical record review for all cause and CVD Mortality and nonfatal CVD

• **Family Study**
  120 families of 30 members each
  Examination similar to that of cohort
  Genetic mapping for CVD risk factors
Community Involvement
The Key to the Success of SHS

- Study design and implementation
- American Indian investigators and staff
- Participants referred for medical care
- Data used for community health initiatives
- Education of community youth
- Participation in community health initiatives
Heart disease is a major public health problem!!

Some risk factors higher, some lower - varies by region

Strength of risk factors differs

“Cutting edge” medical research can be done in Indian country

GOALS MET!!!
The Strong Heart Study
Investigators

- Lyle Best, MD
- Linda Cowan, PhD
- Richard Devereux, MD
- Richard Fabsitz, PhD
- James M. Galloway, MD
- Jeffrey Henderson, MD
- Barbara Howard, MD
- Wm. James Howard, MD
- David Kaufman, PhD
- Elisa Lee, PhD
- Sandra Laston, PhD

- Kari North, PhD
- Jean MacCluer, PhD
- Helaine Resnick, PhD
- Everett Rhoades, MD
- Marie Russell, MD
- Maurice Sievers, MD
- Jason Umans, MD, PhD
- Thomas Welty, MD
- Fawn Yeh, PhD
- Jeunliang L. Yeh, PhD
- Ellie Zephier, RD
The Strong Heart Study
Field Staff

- Marcia O’Leary, BSN
- Lillian Brown
- Cherie Kessler
- Daniel Kougl
- Wendy Lawrence, BSN
- Lavonne Looking Elk
- Francine Red Willow, BSN
- Tauqueer Ali, PhD
- Karen Kimberly
- Linda Poolaw
- Stephanie Gomez
- Betty Jarvis, BSN
- Bert Lewis
- Rosinna Briones
- Mary Rybka
- Nanette Oram
CVD Prevention

- CVD Morbidity and Mortality
- CVD Risk Factors
- Primordial Prevention
- Primary Prevention
- Secondary Prevention
- Conclusions
CVD
MORBIDITY
AND
MORTALITY
SHS CVD MORBIDITY

- Cardiac and carotid artery echo studies
- EKG
- Review of health care for heart disease and stroke
- Morbidity Committee:
  Drs. R. Devereux, L. Best, M. Russell, R. Rodeheffer, J. Kizer, J. Bella,
- Stroke: Drs. D. Wiebers, J. Whisnant
Carotid Atherosclerosis in American Indians

ARIC = Atherosclerosis at Risk Study
SHS = Strong Heart Study
CHS = Cardiovascular Health Study

CHD includes fatal and nonfatal events plus revascularization
Fatal and Nonfatal Rates per 1000 person years. The Rising Tide of CVD in AI: The SHS, Circulation, 1999
Age and Misclassification-adjusted CVD Mortality Rates By Population

### Native American Cardiac Mortality By IHS Area, 1994 - 1996

<table>
<thead>
<tr>
<th>Area</th>
<th>Cardiac Mortality (per 100,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total All Areas</td>
<td>156</td>
</tr>
<tr>
<td>Aberdeen</td>
<td>229.7</td>
</tr>
<tr>
<td>Alaska</td>
<td>151.6</td>
</tr>
<tr>
<td>Albuquerque</td>
<td>85.1</td>
</tr>
<tr>
<td>Bemidji</td>
<td>287</td>
</tr>
<tr>
<td>Billings</td>
<td>206.4</td>
</tr>
<tr>
<td>California</td>
<td>129.3</td>
</tr>
<tr>
<td>Nashville</td>
<td>190.4</td>
</tr>
<tr>
<td>Navajo</td>
<td>105.7</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>163.6</td>
</tr>
<tr>
<td>Phoenix</td>
<td>145.9</td>
</tr>
<tr>
<td>Portland</td>
<td>140.9</td>
</tr>
<tr>
<td>Tucson</td>
<td>137.5</td>
</tr>
</tbody>
</table>

**US All Races 138.3**
SHS MORTALITY

- 4549 participants (age 45-74 in 1989-91)
- 1691 (37%) deaths reviewed by May 2005
- 530 (31%) died of CVD
- Each death reviewed by Dr. Mauri Sievers
- Second review: Drs. E. Rhoades, D. Rhoades, J. Henderson, J. Galloway, T. Welty
- Adjudicate when the cause differs:
  - Dr. J. Howard
- Stroke: Drs. D. Wiebers, J. Whisnant
Stroke in Native Americans

Limitations:

- Limited Data
- Wide Variations among Tribes
- Racial Misclassification
- Strong Heart Study analyses in progress
Stroke Mortality for American Indians and Alaska Natives, 1992-96

Rates per 100,000, NCHS; age-adjusted and adjusted for racial misclassification

US All-Races rate (1994)  * Rate significantly different from US rate
CVD RISK FACTORS
AMERICAN INDIAN CHILDHOOD OBESITY AND OVERWEIGHT

- Are high and increasing
- At age 5, 47% of boys and 40% of girls are overweight; 24% of boys and girls are obese in the Northern Plains
- Increasing over 7% per decade

CVD RISK FACTORS
US ALL RACES & AMERICAN INDIAN WOMEN AGES 45-74
NHANES III 1988-91; STRONG HEART STUDY 1989-91

CHOL>239=TOTAL CHOLESTEROL>=240MG/DL  SMOKING=CURRENTLY SMOKING CIGARETTES
HTN=SBP>=140 OR DBP>=90 OR TAKING ANTIHYPERTENSIVE MEDS
OVERWT=BODY MASS INDEX>=27.3  BINGE=5 OR MORE DRINKS ON OCCASION IN LAST YEAR
CVD RISK FACTORS
US ALL RACES & AMERICAN INDIAN MEN AGES 45-74
NHANES III 1988-91; STRONG HEART STUDY 1989-91

MEN 45-74 YEARS OF AGE

CHOL>239=TOTAL CHOLESTEROL>=240MG/DL
SMOKING=CURRENTLY SMOKING CIGARETTES
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Changes in CVD Risk Factors: American Indians Over a 4 Year Period
The Strong Heart Study

Diabetes increased by 6 - 12% in all centers
Prevalence of HTN increased overall by 7 - 9%
Albuminuria increased by 5 - 9% overall.
Changes in LDL cholesterol inconsistent
HDL decreased by more than 9%
Weight decreased for those with DM (mean 1.9 kg), increased for those with NGT (mean increase 1.4 kg)
Smoking prevalence decreased significantly in women

DIABETES INCIDENCE

American Indians Over a 4 Year Period
The Strong Heart Study

- Overall 19.6% (4.9% per year)
- Those with impaired glucose tolerance (IGT) at higher risk developing DM:
  - 37.2% developed DM and gained 1.1 kg
  - 35.2% remained in IGT category and their wt. did not change
  - 27.6% reverted to normal glucose tolerance and they lost 1.0 kg
DM and CVD among Native Americans

What can we do?
ABCs OF CVD PREVENTION

- **A** = A healthier community = Primordial prevention
- **B** = Be healthy = Primary prevention
- **C** = Control = Secondary prevention
ABCs FOR DIABETES

- A = A1c hemoglobin measures glucose control
- B = Blood pressure
- C = Cholesterol
A HEALTHIER COMMUNITY

“THE HEALTH OF AN INDIVIDUAL IS DETERMINED BY THE HEALTH OF THE FAMILY AND COMMUNITY”

Warne D. Native Visions, KAET TV May 11, 2005
Primordial Prevention

- Focus on our youth
- Healthy school lunches
- Get the soda pop out of schools and health care facilities
- Get physical education back in schools
- Environment conducive to walking or jogging-dog control, school facilities open to the community
- Just Move It Program
- Smoke-free facilities/meetings/homes
- Tribal/community leaders & providers as role models-Sally Smith and Tex Hall
“Acknowledging that obesity is epidemic among New York City schoolchildren, the NYC Education Department is:

- reducing the fat content in the 800,000 meals it serves daily and
- banning candy, soda and other sugary snacks from school vending machines.”
Primary Prevention

BE HEALTHY
PATHWAYS STUDY OF PREVENTION OF OBESITY IN AMERICAN INDIAN CHILDREN

- Feasibility 1993-96; Intervention 96-2000
- School-based randomized trial-41 schools
- 1704 3d to 5th grade students
- Improvement in intervention schools:
  Knowledge, attitudes, and behaviors
  Healthy foods in schools
  Parental involvement
  Physical activity at 3 of 4 sites
- No difference in % body fat
Promising Interventions for Childhood Obesity Prevention

- Involve family, friends, and the entire community – primordial prevention
- Further research with preschool & head start students and antenatal patients
- Pathways curriculum available at http://hsc.unm.edu/pathways
INDIAN SPECIFIC HEALTH RISK APPRAISAL

- Developed by AAIHS in 1988 in collaboration with CDC and Carter Center
- Provided feedback to Strong Heart Study participants on how to reduce health risks
- Needs to be updated, integrated with RPMS, and effectiveness evaluated
- Useful for brief clinical interventions by providers
RISK FACTOR KNOWLEDGE
STRONG HEART STUDY

- Knowledge of 9 CVD risk factors ranged from 71 to 90 % among 3226 participants.
- Those with hypertension and diabetes more likely to have knowledge of CVD risk factors. Men, smokers, and those with less education had less knowledge.
- Targeted educational programs needed to raise awareness of CVD risk factors.
- Knowledge needs to lead to behavior change.

Scheweigman, et al, Submitted to Ethnicity & Disease 2005
PREDICTION OF CHD
STRONG HEART STUDY MODEL

- Age
- Gender
- Cholesterol (total, LDL, and HDL)
- Diabetes
- Hypertension
- Smoking
- Albuminuria

Calculates risk of CHD in 10 years
Future integration into RPMS
The Diabetes Prevention Program: Reduction in the incidence of Type 2 DM with lifestyle or metformin

- 3234 adults at high risk for diabetes
  - Randomized to 3 groups:
    - Standard lifestyle recommendations + placebo
    - Standard lifestyle recommendations + metformin (850 BID)
    - Intensive lifestyle modification
      - Goal: at least 7% weight reduction and 150 minutes of exercise weekly

DPP Research Group, NEJM 346:393-403, 2002
The Diabetes Prevention Program: Reduction in the incidence of Type 2 DM with lifestyle or metformin

Enrollment Criteria:

- BMI of 24 or greater
- Fasting serum glucose of 95 to 125 mg/dL
- Plasma glucose of 140 to 199 mg/dL two hours after oral glucose load

- Average follow up of over 2.8 years

DPP Research Group, NEJM 346:393-403, 2002
The Diabetes Prevention Program: Lifestyle Intervention

- 16 session core curriculum (over 24 weeks)
- Long-term maintenance program
- Supervised by a case manager
- Access to lifestyle support staff
  - Dietitian
  - Behavior counselor
  - Exercise specialist

DPP Research Group, NEJM 346:393-403, 2002
The Diabetes Prevention Program: Lifestyle Intervention: Physical Activity Results

- 74% of volunteers assigned to intensive lifestyle achieved the study goal of ≥ 150 minutes of activity per week at 24 weeks
- Promote physical activity addiction
- How can we achieve this in Native communities?
- IHS standards for prediabetes released

DPP Research Group, NEJM 346:393-403, 2002
Percent developing diabetes

All participants

Risk reduction

31% by metformin
58% by lifestyle

The DPP Research Group, *NEJM* 346:393-403, 2002
SHS DIETARY STUDIES

- Phase I: 24 hour recall – Higher intake of fats and cholesterol than NHANES, diets at high risk of increasing risk of chronic disease
- Phase II: 24 hour recall-Intake of most vitamins lower than NHANES
- Healthy foods need to be more available and affordable

Stang J, et al. Submitted JADA 2005
Primary Prevention of DM & CVD Among Native Americans

- Community Developed
- Community Implemented
- Community Integrated
- Supported by Providers and Public Health
- Individual, Provider and Community Focus
SMOKING CESSATION
American Indians Over a 4 Year Period
The Strong Heart Study

• 21 % of smokers quit, a high spontaneous cessation rate.

Usual quit rates:
• Spontaneous ~ 15%
• Post intervention ~ 15-25%.

Older people, those who smoked less and started at an older age, and those with DM more likely to quit

Primary prevention is priority

Henderson PN, et.al. Ethn Dis. 2004;14(2)
CONTROL BP, LIPIDS, GLUCOSE IN PERSONS WITH DM OR CHD
**SANDS: STOP ANTHEROSCLEROSIS IN NATIVE DIABETICS**

Will lowering LDL cholesterol and blood pressure to lower targets than are currently recommended retard CVD?

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDL chol (mg/dl)</td>
<td>&lt;100</td>
<td>&lt;70</td>
</tr>
<tr>
<td>SBP (mm)</td>
<td>130/80</td>
<td>115/75</td>
</tr>
</tbody>
</table>

Ultrasound measures plaque in carotid artery
Mean LDL cholesterol levels lower among American Indians with diabetes than those without. LDL cholesterol remains a strong CVD risk factor in persons with diabetes even at low levels.
# Cumulative Impact of Four CV Protective Medications Post MI

<table>
<thead>
<tr>
<th></th>
<th>Relative-risk</th>
<th>5yr CV event rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>--</td>
<td>20%</td>
</tr>
<tr>
<td>Aspirin</td>
<td>▼25%</td>
<td>15%</td>
</tr>
<tr>
<td>Beta blocker</td>
<td>▼25%</td>
<td>11.3%</td>
</tr>
<tr>
<td>ACE inhibitor</td>
<td>▼25%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Statin</td>
<td>▼30%</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

Cumulative risk reduction if all four medications are used = 70%

Fonarow GC, et al Am J Cardiol. 2001
Apr 1;87(7):819-22
Despite compelling scientific evidence and national treatment guidelines for the prevention and treatment of diabetes & CVD, prevention efforts continue to be underutilized...
What can we do?

**What MUST we do?**

- Cultural Sensitivity
- Cultural Humility
- Cultural Appropriateness

We need the ability to translate this excellent science into changes in community understanding, cultural perceptions and individual lifestyles.
American Heart Association
Indian Health Service

Get With
The Guidelines
Program
EXPENSIVE HIGH TECH LIFE SAVING TREATMENT

- Coronary Artery Bypass Surgery
- Cardiac Transplant
- Dialysis and Kidney Transplant

Need for these interventions can be reduced by primordial, primary and secondary prevention.
OVERCOME FATALISM

Both primary and secondary prevention

Dr. Felicia Hodge and Lorelei Decora, RN spearheaded this intervention.

Talking Circle Intervention reduced fatalism compared to controls.

Can’t prevent diabetes Can’t do nothing about it

I will get diabetes

Fatalism

Dr. Felicia Hodge and Lorelei Decora, RN have spearheaded this intervention.
ABCs OF CVD PREVENTION

A = A healthier community = 
Primordial prevention

B = Be healthy = 
Primary prevention

C = Control = 
Secondary prevention
HIV/AIDS IN AFRICA SIMILAR TO DM/CVD IN NATIVE PEOPLE

- Both are devastating epidemics
- Both are preventable by behavior change
- Both are chronic diseases – require lifelong RX
- For HIV/AIDS successful prevention has reduced HIV seroprevalence in Uganda from 30% to <10%

A = Abstinence
B = Be Faithful
C = Condoms
LEADERSHIP IS A KEY FACTOR

President Museveni of Uganda since 1986 has played a key role in reducing HIV/AIDS.

“When there is a lion in the village, you don’t whisper.” You shout to warn people.

Which Tribe/Native community will be the first to reduce obesity, DM and CVD?

Can effective preventive solutions be replicated in Native communities?
RESOURCES FOR PREVENTION

- Diabetes Prevention Grants for Tribes
- Funding needed for CVD prevention
  - Tex Hall, President of NCAI, supportive
- Tribal/community and provider coalitions are necessary to develop comprehensive preventive programs and obtain funding
- Interventions tailored to common risk factors
- Prevention research-CDC/NIH funds available
CONCLUSIONS

Research in Native communities has led to knowledge that helps to define health problems and to identify interventions that can lead to improved health.

Translation of research findings into practical preventive and clinical interventions must accelerate and receive financial support.

Individuals and communities must overcome fatalism to succeed in reducing DM and CVD.
Comprehensive, culturally appropriate, preventive interventions for communities and families have the greatest chance of success. Tribal/community, clinical, and national leadership and governmental financial support are essential. Further research is needed to determine which preventive interventions are most effective. Successful interventions need to be replicated. Ongoing surveillance of obesity, DM, and CVD is essential to assess the impact of prevention.
TOGETHER WE CAN DO IT