WorkPlace Centers
Metabolic Health
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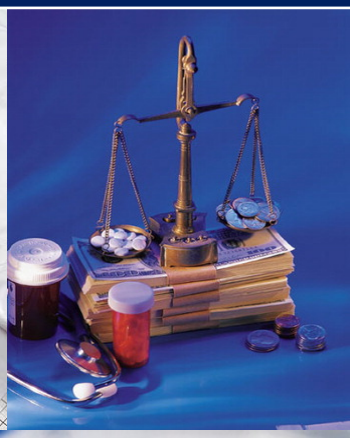
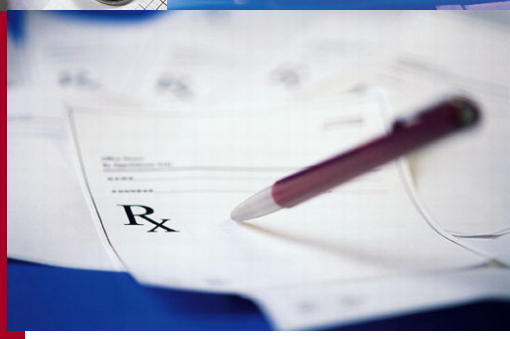
Defining and Managing Metabolic Health in the Workplace

An Agenda-Setting Consensus Conference for Employers and Providers

September 24, 2008 – Chicago, Illinois





CONFERENCE SYLLABUS

Work Place Centers
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Abbott
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IHPM presents a first-time special event

Defining and Managing Metabolic Health in the Workplace

An Agenda-Setting Consensus Conference for Employers and Providers

Hyatt Regency Chicago
Wednesday, September 24, 2008

This Metabolic Health Symposium is Co-Chaired by William Bunn, MD - Vice President of Health, Safety and Productivity at Navistar International, and John Seibel, MD - Past President of the American Association of Clinical Endocrinologists. The program will feature a mix of employers, medical providers and researchers, and will produce a Consensus Statement for the media as well as an article to be submitted for peer-reviewed publication, based on the outcomes from the intervention programs undertaken by IHPM's Workplace Center for Metabolic Health.

8:00 am **Welcome and Introductions** - *Sean Sullivan, JD, President and CEO*
Institute for Health and Productivity Management (IHPM)

8:15 am **Symposium Objectives and Overview**
William Bunn, MD, Co-Chair – Vice President of Health, Safety and Productivity
Navistar International
John Seibel, MD, Co-Chair – Medical Director
New Mexico Medical Review Association (NMMRA)

8:30 am **The Clinical Impact of Metabolic Disease and Related Co-Morbid Conditions**
Michael Davidson, MD, FACC – Professor of Medicine
Director of Preventive Cardiology
University of Chicago

9:00 am **The Financial Impact of Metabolic Disease and its Implications for Employers**
Joseph Leutzinger, PhD, President
Academy for Health and Productivity Management

9:30 am **Modifying Lifestyle Behaviors to Reduce Metabolic and Related Health Risks**
Rick Nevins, MD, Vice President and Chief Research Officer, IHPM
Veronica Costa, Director of Wellness, City of Phoenix
*John Seibel, MD, (*NMMRA)

10:15 am **Break**

10:45 am **Roundtable Discussion on Encouraging Employee Participation and Self- Management**
*Joseph Leutzinger, PhD, A*HPM – Moderator
William Bunn, MD, Navistar International
Veronica Costa, City of Phoenix
David Groves, PhD, formerly Comerica Bank and MGM MIRAGE
Pamella Thomas, MD, Director of Health and Wellness, Lockheed Martin Aeronautics

11:45 am **Audience Q&A**

12:00 pm **Lunch**

1:00 pm **How to Measure the Success of Metabolic Worksite Health Initiatives**
William Bunn, MD, Navistar International
Pamella Thomas, MD, Lockheed Martin Aeronautics
David Groves, PhD, formerly Comerica Bank and MGM MIRAGE

1:30 pm **Case Study: Reducing Metabolic and Related Risk Factors in the Toronto Police Service**
Denise Balch, President, Connex Health

2:00 pm **Value-Based Pharmacy Management to Achieve Optimal Adherence and Clinical Outcomes**
Sean Sullivan, *JD* IHPM – Moderator
David Day , MS, RPh– Head, Pharmacy Outcomes Research
Rick Nevins, MD, IHPM

2:45 pm **Audience Q&A**

3:00 pm **Break**

3:15 pm **Best Practices Learned in Metabolic Health Management**
William Bunn, MD, Navistar International
John Seibel, MD, NMMRA
Rick Nevins, MD, IHPM

3:45 pm **Conclusions and Future Plans**
Sean Sullivan, JD, IHPM

4:00 pm **Adjourn**

INTERNATIONAL TRUCK AND ENGINE CORPORATION
4201 WINFIELD ROAD, P. O. BOX 1488, WARRENVILLE, IL 60555

WILLIAM B. BUNN, III, M.D., J.D., M.P.H.

Vice President - Health, Safety, Security and Productivity
International Truck and Engine Corporation

William B. Bunn is Vice President of Health, Safety, Security and Productivity for International Truck and Engine Corporation. Dr. Bunn came to International as Medical Director in 1995, assumed additional responsibilities as Director of Health Management and Safety in January 1997, Vice President of Health, Safety and Productivity in 1999 and Vice President of Health, Safety, Security and Productivity in 2003. He is a full professor and has taught Environmental Health Sciences since 1997 at Northwestern University Medical School.

Prior to joining International, Dr. Bunn served as Assistant Professor and Director of Research for Occupational and Environmental Medicine and Internal Medicine at Duke University Medical Center; Senior Director for Occupational Health and Environmental Affairs for the Pharmaceutical Research and Development Division of Bristol Myers; Corporate Medical Director and Senior Director of Health, Safety and Environment for the John Manville Corporation; and International Medical Director of the Mobil Corporation.

Dr. Bunn has received faculty appointments at Duke University School of Medicine, Yale University School of Medicine, University of Colorado Schools of Pharmacy and Medicine, the University of Cincinnati School of Medicine, Northwestern University School of Medicine, and University of Illinois School of Public Health. He is co-author/editor of five books and has authored more than 100 scientific publications. Dr. Bunn is also on the editorial boards of several scientific journals including *Occupational Medicine* and is Chief Editor of *The Journal of Health & Productivity Management*. He has received several awards including the Knudsen Award, the highest award of the American College of Occupational and Environmental Medicine.

Dr. Bunn received a Bachelor of Arts in political science and chemistry/zoology from Duke University in 1974. College honors included the Angier B. Duke Scholarship, Phi Beta Kappa and Class Presidency. In 1979, Dr. Bunn earned a J.D. from Duke University School of Law and an M.D. from Duke University School of Medicine. After completing a residency in internal medicine at the Duke University Medical Center, Dr. Bunn received a fellowship in Occupational and Environmental Medicine also at Duke's medical center. He completed a Masters Degree in Public Health from the University of North Carolina in 1983 in epidemiology and environmental sciences. Dr. Bunn received supporting scholarships and training grants from the Angier B. Duke Foundation, National Cancer Institute, National Institutes of Health and the National Institute for Occupational Safety and Health (NIOSH). In 1984, Dr. Bunn became a diplomat of the American Board of Internal Medicine and of the American Board of Preventive Medicine in Occupational Medicine. Dr. Bunn has served on committees of the National Academies Committee (NAS) and currently serves on the NAS Committee for review of NIOSH research programs.

Dr. Bunn is a fellow and former board member and officer of the American College of Occupational and Environmental Medicine. He holds membership in the Society of Toxicology, International Society of Travel Medicine, the American Public Health Association, American Industrial Hygiene Association, International College of Occupational Health and Society of Occupational Medicine.

Revised 8/29/06

John A. Seibel, MD, FACP, MACE

Albuquerque, NM - John Seibel, MD, FACP, MACE, and medical director for the New Mexico Medical Review Association (NMMRA) received the Yank D. Coble, Jr., MD, Distinguished Service Award by the American College of Endocrinology (ACE) at the American Association of Clinical Endocrinologists (AACE) Fifteenth Annual Meeting and Clinical Congress on April 29, 2006. The Yank D. Coble, Jr. MD, Distinguished Service Award is presented annually by ACE to an individual who is recognized by his/her peers as a leader in American medicine and exemplifies personal and professional conduct that reflects the values and vision of AACE.

In addition to serving as NMMRA's medical director, Dr. Seibel has been in private practice in Albuquerque for the past 30 years. He has also served as past president of the New Mexico Medical Society and the New Mexico Review Association and has been a member of the board of the New Mexico Physicians Mutual Insurance Company, American Society of Internal Medicine, and the American College of Physicians Council of Specialty Societies. He was a member of AACE's initial steering committee, served as President in 1996 and served as President of ACE in 1998, and serves as the delegate to the American Medical Association (AMA) for AACE.

He has made many contributions to NMMRA, some of which include overseeing all aspects of medical record review, training NMMRA's physician reviewers and most recently developing a computerized medical record review system allowing physician reviewers to evaluate medical charts electronically. In early 2005, Dr. Seibel was featured in a DVD NMMRA produced highlighting the benefits of electronic health record (EHR) system adoption. The DVD served as a recruitment tool to encourage New Mexico's primary care physician practices statewide to join the Doctor's Office Quality - Information Technology (DOQ-IT) project. According to Dan Jaco, NMMRA's CEO, "We are honored to have Dr. Seibel as a member of our staff. Dr. Seibel is well respected in the medical community and is an excellent role model for his peers. That he is one of the relatively few physicians in New Mexico to have a fully operational electronic health record (EHR) system in his office speaks to his commitment to innovation and new technologies in health care."

Dr. Seibel received his medical doctorate from the University of Minnesota and completed fellowships at the Mayo Graduate School of Medicine in Rochester, Minnesota and the Scripps Clinic in La Jolla, California.

NMMRA is a not-for-profit, physician-sponsored organization that is New Mexico's federally contracted Medicare Quality Improvement Organization (QIO) and External Quality Review Organization (EQRO) for Medicaid. The organization works with health care providers, consumer and health care organizations, and state and federal agencies to improve the quality of health care in New Mexico.

Michael H. Davidson, MD, FACC, FACP
Clinical Professor
Director of Preventive Cardiology
The University of Chicago Pritzker School of Medicine
Executive Medical Director
Radiant Research
Chicago, IL

Michael H. Davidson, MD, is a Clinical Professor at the University of Chicago, where he also serves as Director of Preventive Cardiology. In addition, he is Founder, President, and Chief Executive Officer of the Chicago Center for Clinical Research, currently part of Radiant Research.

Dr. Davidson earned his medical degree from The Ohio State University College of Medicine in Columbus. He then fulfilled his residency in internal medicine at Rush-Presbyterian-St. Luke's Medical Center in Chicago, where he later completed a fellowship in cardiology.

An active researcher, Dr. Davidson's clinical research background encompasses both pharmaceutical and nutritional clinical trials. His extensive research on statins, novel lipid-lowering drugs, and nonpharmacologic risk factor reduction has established him as a key opinion leader in this area. His research also includes extensive work with food additives, dietary supplements, and health claim petitions to the US Food and Drug Administration. A prolific author and lecturer on lipid disorders, nutrition, and atherosclerosis, Dr. Davidson has coordinated more than 700 clinical trials in areas of preventive cardiology and published more than 200 articles for leading medical journals.

Dr. Davidson is board-certified in internal medicine, cardiology, and clinical lipidology. He is a Fellow of the American College of Cardiology and the American College of Chest Physicians. In addition, he served as President of the Midwest Lipid Association and is Board Member of the National Lipid Association. He was listed in America's Top Physicians by the Consumers' Research Council of America, 2004-2005, and named three times in *The Best Doctors in America*.

The Clinical Impact of Metabolic Disease and Related Co-Morbid Conditions

Michael H. Davidson, MD, FACC, FACP
Clinical Professor
Director of Preventive Cardiology
University of Chicago Pritzker School of Medicine
Executive Medical Director
Radiant Research
Chicago, Illinois

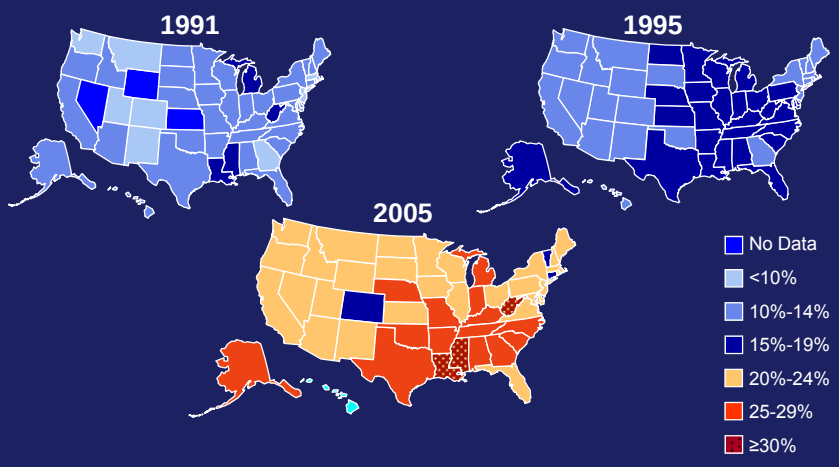
Overview

- Cardiovascular and Diabetes Risk: The Need to Treat
- Statins and Residual Risk
- The Impact of Triglycerides and HDL-C
- National Guideline Recommendations for the Treatment of Dyslipidemia

Cardiovascular and Diabetes Risk: The Need to Treat

Obesity Trends* Among US Adults

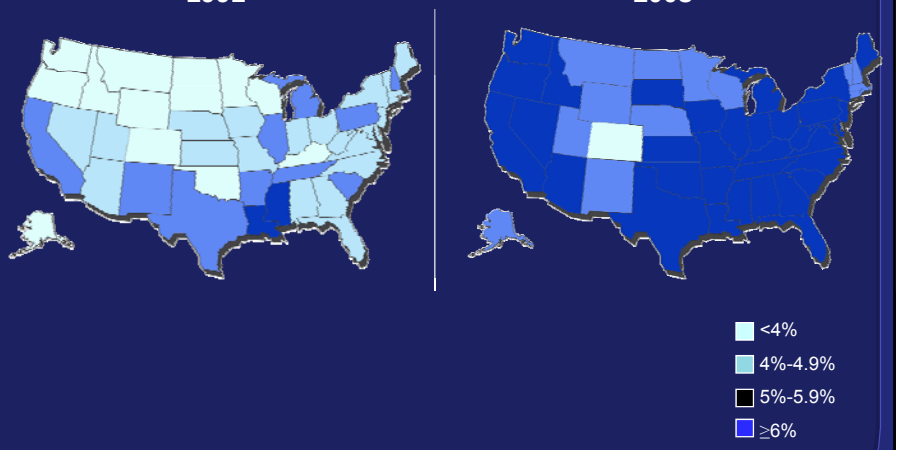
BRFSS, 1991, 1995, 2005



*BMI ≥30, or about 30 lbs overweight for 5'4" person
Behavioral Risk Factor Surveillance System, CDC. 2006.

Age-Standardized Prevalence of Diagnosed Diabetes in Adult US Population

1991 **2003**



Source: Behavioral Risk Factor Surveillance System, CDC

Walking the Dog

Courtesy Jim Sowers

Case Study
Dyslipidemia

Case Study: WJC, 54-Year-Old White Male

- Occupation: former chief executive
- Social history: wife lives principally in Washington, DC; WJC has a personal cook in his suburban NY home
- Lifestyle
  - Nonsmoker (cigarettes), but has a fondness for cigars
  - Has a long-term weight problem
  - States that he never inhaled illegal drugs
  - Likes to play golf
  - Used to walk dog regularly

Case Study
Dyslipidemia

Case Study: WJC, 54-Year-Old White Male

- Examination
  - Height: 6 ft 2 in
  - Weight: 220 lb (BMI: 28 kg/m^2)
  - Waist circumference: 41 in
  - BP: 150/88 mm Hg
  - Pulse: 64 bpm
  - Respiratory rate: 12 breaths/minute
- Cardiopulmonary exam
  - Normal

Case Study
Dyslipidemia

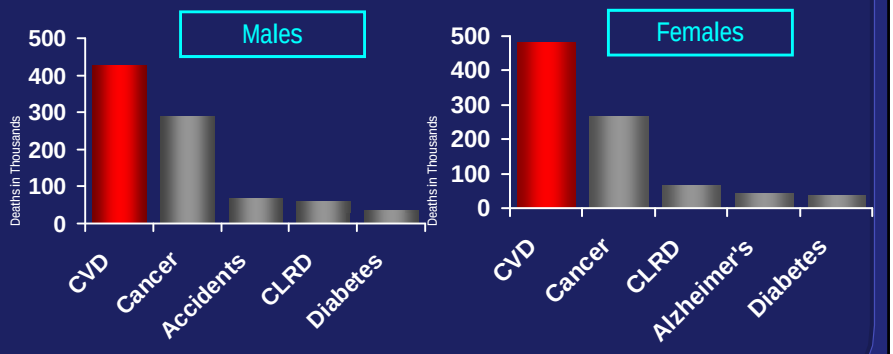
Case Study: WJC, 54-Year-Old White Male

- Medications
  - Sildenafil 50 mg prn
  - Amlodipine 5 mg/day
- Laboratory results
  - Total-C: 220 mg/dL
  - HDL-C: 36 mg/dL
  - LDL-C: 140 mg/dL
  - TG: 220 mg/dL
  - FBS: 120 mg/dL

Passed torch: President and Mrs. Clinton exit McDonald's after his symbolic passage of leadership.

CVD Is the Leading Cause of Death in the US

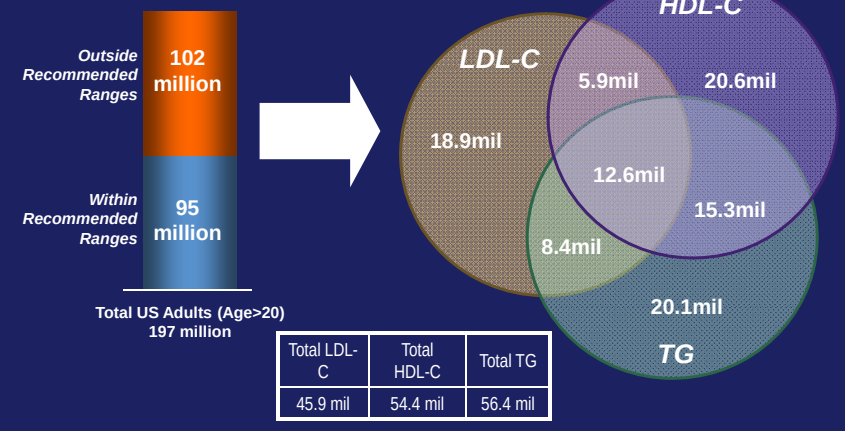
- CVD accounts for ~37% of all deaths in the
- CVD is an underlying or contributing cause of 58% of all deaths



Heart Disease and Stroke Statistics 2006 Update. American Heart Association; 2006.

Dyslipidemia Prevalence is Extraordinary: 102 Million of the US Adult Population of 197 Million

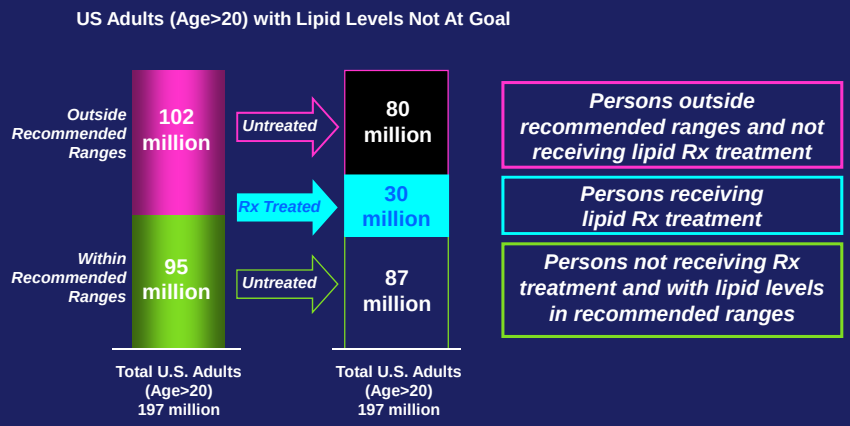
US Adults (Age>20) with Lipid Levels Not At Goal (Treated and Untreated)



Total LDL-C	Total HDL-C	Total TG
45.9 mil	54.4 mil	56.4 mil

Note: Lipid disorder definitions: LDL >=100 for high risk, LDL >=130 for moderately high risk, LDL >=130 for moderate risk, LDL >=160 for low risk; Males: HDL <40; Females: HDL <50; TG >150.
Note: SIMCOR is currently an unapproved product and is under FDA review
Source: NHANES 2003-04 dataset, Analysis Group calculations.

Out of the 102 Million Outside Recommended Ranges, 80 Million are Untreated

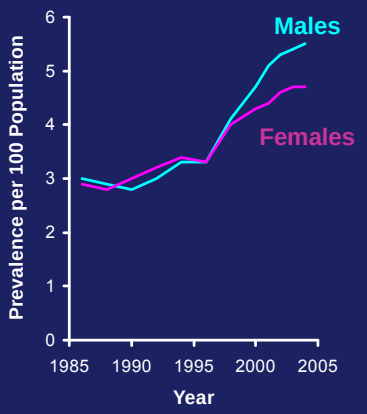


Note: Lipid disorder definitions: LDL >=100 for high risk, LDL >=130 for moderately high risk, LDL >=130 for moderate risk, LDL >=160 for low risk; Males: HDL <40; Females: HDL <50; TG >150.
Note: SIMCOR is currently an unapproved product and is under FDA review
Source: NHANES 2003-04 dataset, Analysis Group calculations.

Diabetes: US Trends 2005

- 20.8 million Americans (7.0%)[1]
  - Diagnosed: 14.6 million
  - Undiagnosed: 6.2 million
- 1.5 million new adult cases/year[1]
- Rapid growth of high-risk populations[2]
  - 30% of US adults are obese*
- 75% to 80% of people with type 2 diabetes ultimately die of CVD[4]

Age-Adjusted Prevalence of Diagnosed Diabetes, US 1986-2004[3]



*BMI >30

Centers for Disease Control and Prevention. 2008.
[1]http://www.cdc.gov/diabetes/pubs/factsheet05.htm.
[2]http://www.cdc.gov/diabetes/statistics/prev/national/tablebysex.htm.
[3]http://www.cdc.gov/nccdphp/dnpa/obesity/.
[4]Grundy SM. *Nat Rev Drug Discov*. 2006;5:295-309.

Cholesterol to Manage

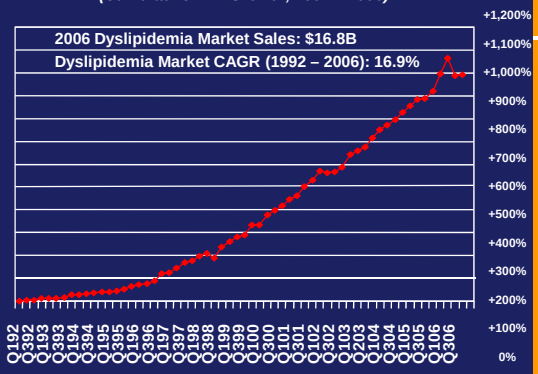
- "Bad cholesterol": LDL-C
- "Good cholesterol": HDL-C
- "Forgotten Fat": Triglycerides

- Type 2 diabetic and pre-diabetic patients typically present with:
  - Elevated TGs
  - Low HDL-C
  - Moderate LDL-C

The Dynamic $17B* Dyslipidemia Market's Future Growth Will be Fueled by Remaining Unmet Medical Need

Extraordinary Dyslipidemia TRx Growth

(Cumulative TRx Growth, 1992 – 2006)



Driven by huge health benefits

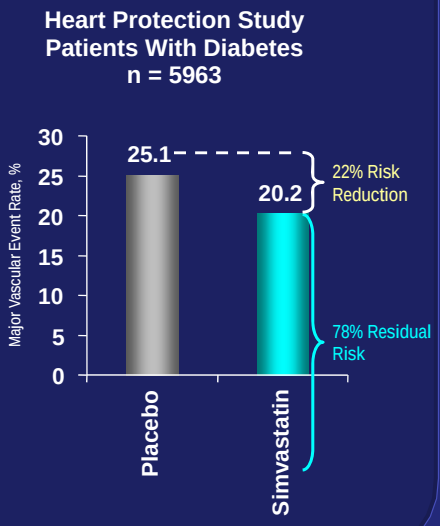
- **LDL-C focused therapies have demonstrated CV outcomes benefits**
- **Guidelines have established aggressive lipid therapy to drive LDL lower**
- ***BUT unmet medical need exists in addressing elevated TG and low HDL-C***

*2006 sales based on IMS data.
Source: IMS – $ include mail order.

Statins and Residual Risk

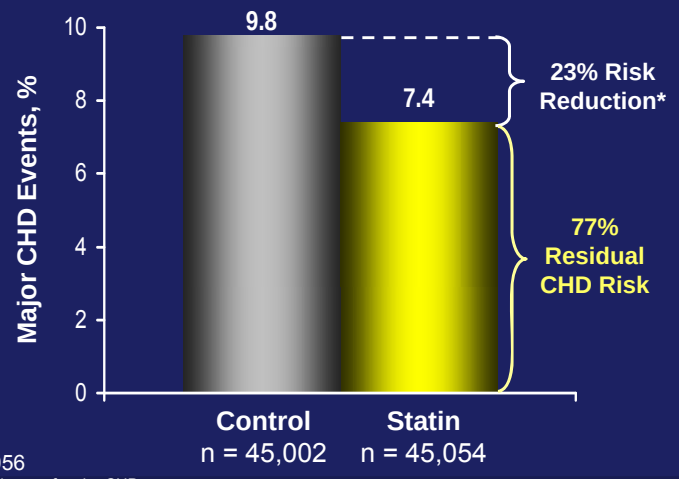
Residual CVD Risk

- Residual Risk is the CVD risk that remains after statin therapy
- Statins **do not** eliminate cardiovascular risk by lowering LDL-C alone



Collins R, et al. *Lancet*. 2003;361:2005-2016.

Relative CHD Risk Reduction With Statins
Meta-Analysis of 14 Statin Trials

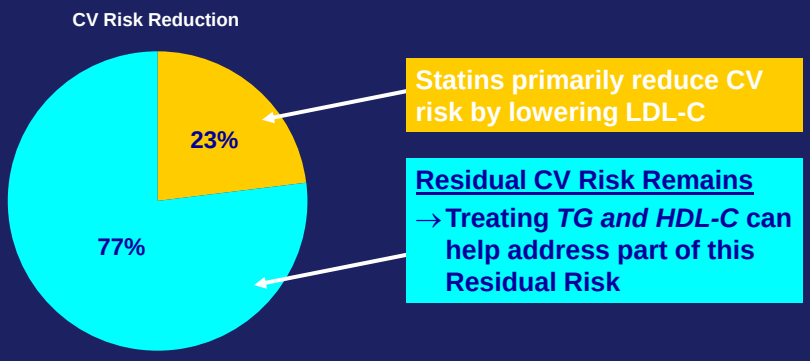


N = 90 056
*In the incidence of major CHD events per mmol/L LDL-C reduction

Adapted from CTT Collaborators. *Lancet*. 2005:366:1267-1278

Significant CVD Risk Remains in Dyslipidemic Patients Treated with Statin Monotherapy

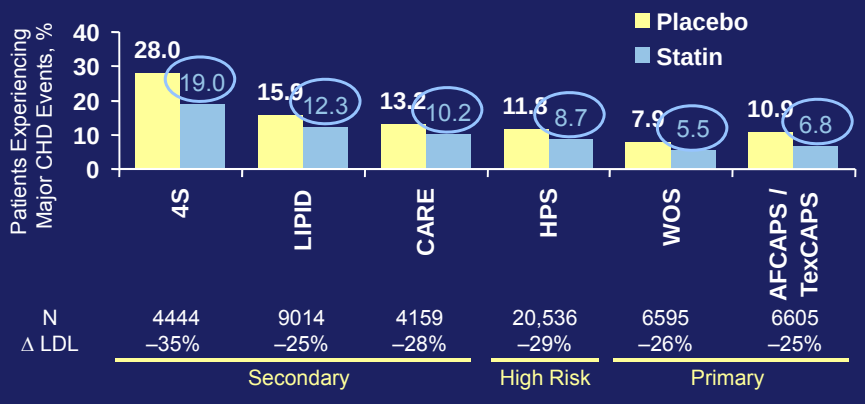
Statins have been proven to reduce CV Risk by approximately 23%. What about the other 77%?



We will change patients lives in the years to come…

Residual CHD Risk in Major Statin Trials

CHD Events Occur in Patients Treated with Statins

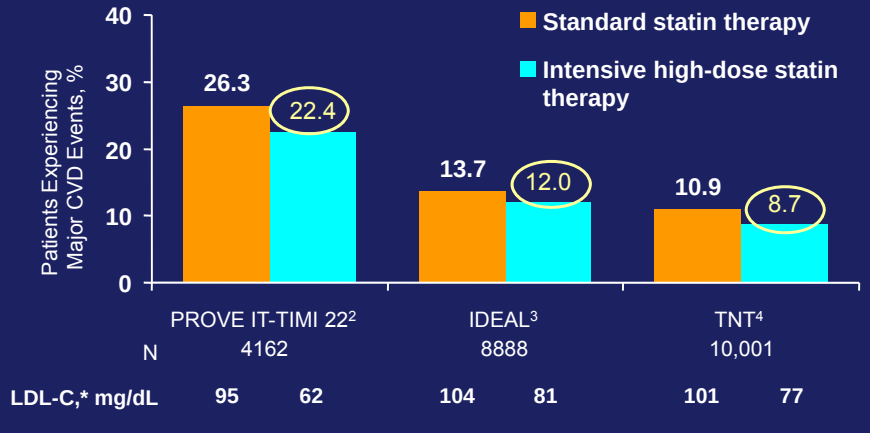


4S, Scandinavian Simvastatin Survival Study; HPS, Heart Protection Study; WOSCOPS, West of Scotland Coronary Prevention Study; AFCAPS/TexCAPS, Air Force/Texas Coronary Atherosclerosis Prevention Study.

[1]4S Group. *Lancet*. 1994;344:1383-1389; [2]LIPID Study Group. *N Engl J Med*. 1998;339:1349-1357; [3]Sacks FM et al. *N Engl J Med*. 1996;335:1001-1009. [4]HPS Collaborative Group. *Lancet*. 2002;360:7-22; [5]Shepherd J et al. *N Engl J Med*. 1995;333:1301-1307; [6]Downs JR et al. *JAMA*. 1998;279:1615-1622.

Residual CVD Risk in Patients Treated With Intensive Statin Therapy

Statistically Significant, but Clinically Inadequate CVD Reduction[1]

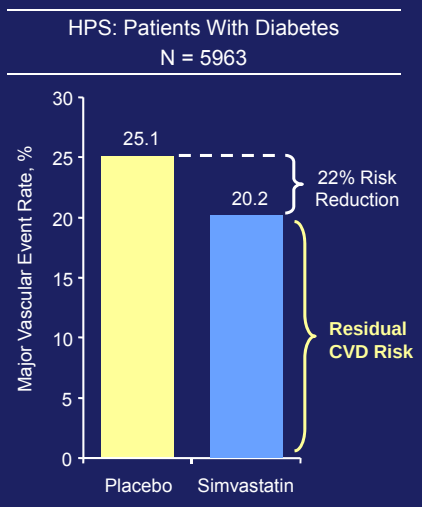


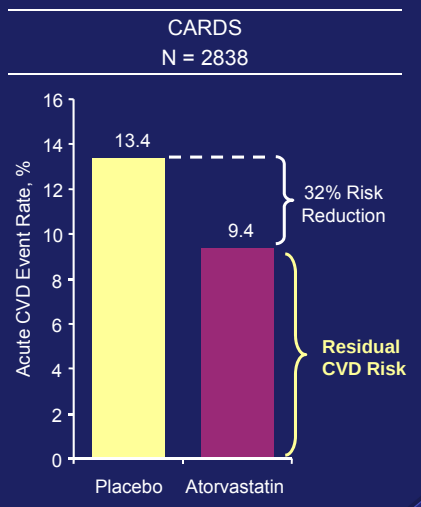
PROVE IT-TIMI 22, Pravastatin or Atorvastatin Evaluation and Infection Therapy–Thrombolysis In Myocardial Infarction 22; IDEAL, Incremental Decrease in End Points Through Aggressive Lipid Lowering; TNT, Treating to New Targets.

*Mean or median LDL-C after treatment.

[1]Superko HR. *Br J Cardiol*. 2006;13:131-136; [2]Cannon CP et al. *N Engl J Med*. 2004;350:1495-1504; [3]Pedersen TR et al. *JAMA*. 2005;294:2437-2445; [4]LaRosa JC et al. *N Engl J Med*. 2005;352:1425-1435.

Residual CVD Risk in Patients With Diabetes Treated With Statins





Collins R et al. *Lancet*. 2003;361:2005-2016.

CARDS, Collaborative Atorvastatin Diabetes Study.
Colhoun HM et al. *Lancet*. 2004;364:685-696.

Patients With Diabetes Have Particularly High Residual CVD Risk After Statin Treatment

	Event Rate (No Diabetes)		Event Rate (Diabetes)	
	On Statin	On Placebo	On Statin	On Placebo
HPS[1]* (CHD patients)	19.8%	25.7%	33.4%	37.8%
CARE[2]†	19.4%	24.6%	28.7%	36.8%
LIPID[3]‡	11.7%	15.2%	19.2%	22.8%
PROSPER[4]§	13.1%	16.0%	23.1%	18.4%
ASCOT-LLA[5]‡	4.9%	8.7%	9.6%	11.4%
TNT[6]‖	7.8%	9.7%	13.8%	17.9%

*CHD death, nonfatal MI, stroke, revascularizations
†CHD death, nonfatal MI, CABG, PTCA
‡CHD death and nonfatal MI
§CHD death, nonfatal MI, stroke
‖CHD death, nonfatal MI, resuscitated cardiac arrest, stroke (80 mg versus 10mg atorvastatin)

[1]HPS Collaborative Group. *Lancet*. 2003;361:2005-2016.
[2]Sacks FM, et al. *N Engl J Med*. 1996;335:1001-1009.
[3]LIPID Study Group. *N Engl J Med*. 1998;339:1349-1357.
[4]Shepherd J, et al. *Lancet*. 2002;360:1623-1630.
[5]Sever PS, et al. *Lancet*. 2003;361:1149-1158.
[6]Shepherd J, et al. *Diabetes Care*. 2006;29:1220-1226.

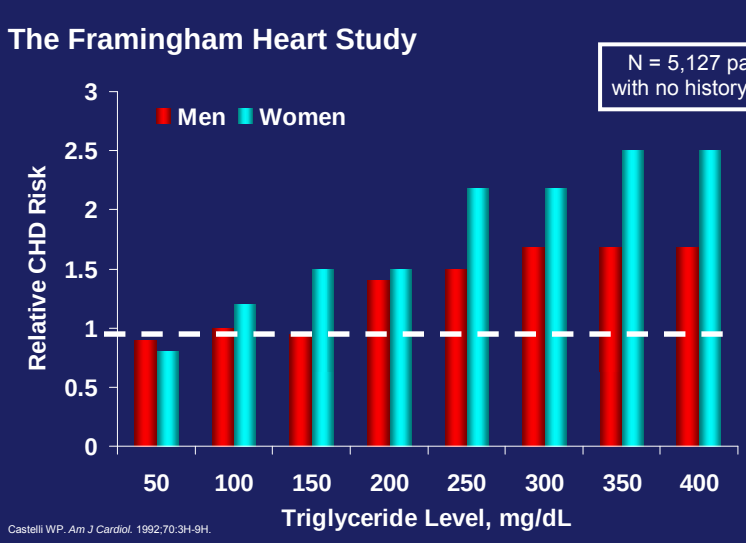
The Impact of Triglycerides and Low HDL-C

Association Between TC, TG, and HDL-C and CHD Risk

Lipid Level		CHD Risk
TC[1]	Each 10 mg/dL increase in TC	9% increase in CVD death
TG[2]	Each 1 mmol/L (89 mg/dL) increase in TG	75% increase in the risk of CVD in women and 30% increased risk in men
HDL-C[3]	Each 1 mg/dL decrease in HDL-C	4% increase in CVD death in women and 5% increase in CVD death in men

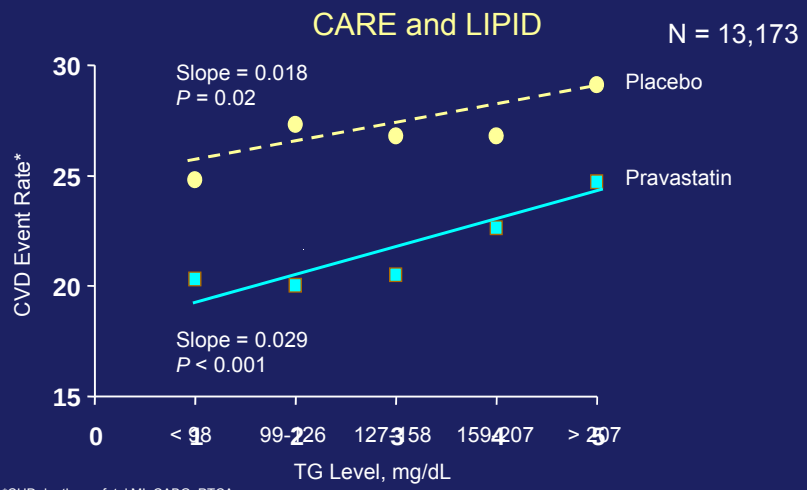
1. Anderson KM et al. *JAMA*. 1987;257:2176-2180.
2. Hokanson JE et al. *J Cardiovasc Risk*. 1996;3:213-219.
3. Gordon DJ et al. *Circulation*. 1989;79:8-15.

Risk of CHD by Triglyceride Level



Castelli WP. *Am J Cardiol.* 1992;70:3H-9H.

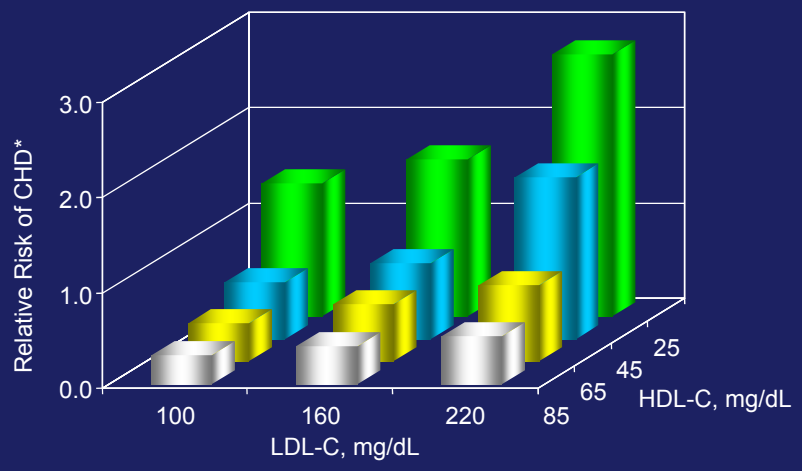
TG Level Remains CVD Risk Factor in Patients Treated With Statins



*CHD death, nonfatal MI, CABG, PTCA.
CARE, Cholesterol and Recurrent Events; LIPID, long-term Intervention with Pravastatin in Ischemic Disease.

Reprinted from Sacks FM et al. *Circulation.* 2000;102:1893-1900, with permission from Lippincott Williams & Wilkins (www.lww.com).

Risk of CHD Related to Low HDL-C Framingham Heart Study



*Risk of coronary artery disease (CAD) in men aged 50 to 70 years according to HDL-C and LDL-C levels over 4 years of follow-up in the Framingham Heart Study.

Castelli WP. *Can J Cardiol*. 1988;4:5A-10A.

HDL-C Is a Modifier of Risk at All Levels of LDL-C

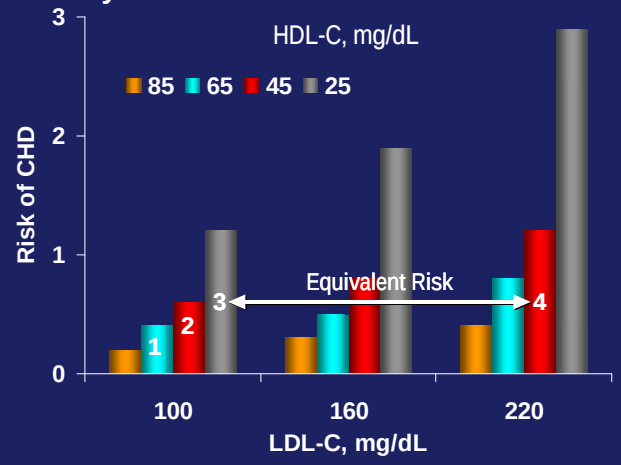
The Framingham Study*

Patient 1
LDL-C 100 mg/dL
HDL-C 65 mg/dL
Risk level **0.4**

Patient 2
LDL-C 100 mg/dL
HDL-C 45 mg/dL
Risk level **0.6**

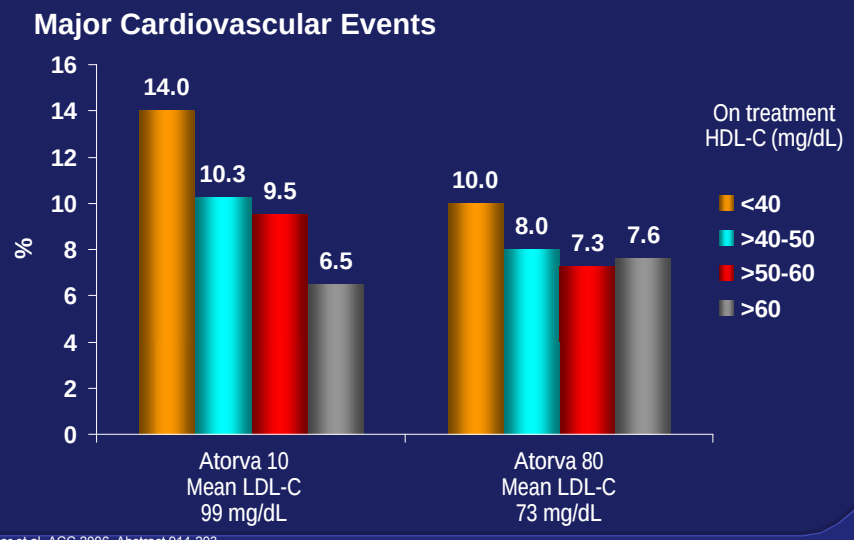
Patient 3
LDL-C 100 mg/dL
HDL-C 25 mg/dL
Risk level **1.2**

Patient 4
LDL-C 220 mg/dL
HDL-C 45 mg/dL
Risk level **1.2**



*Men 50 to 70 years of age.
Castelli WP. *Can J Cardiol*. 1988;4(suppl A):5A-10A.

Cardiovascular Events in TNT According to On-treatment HDL-C



Barter et al. ACC 2006. Abstract 914-203.

National Guideline Recommendations for the Treatment of Dyslipidemia

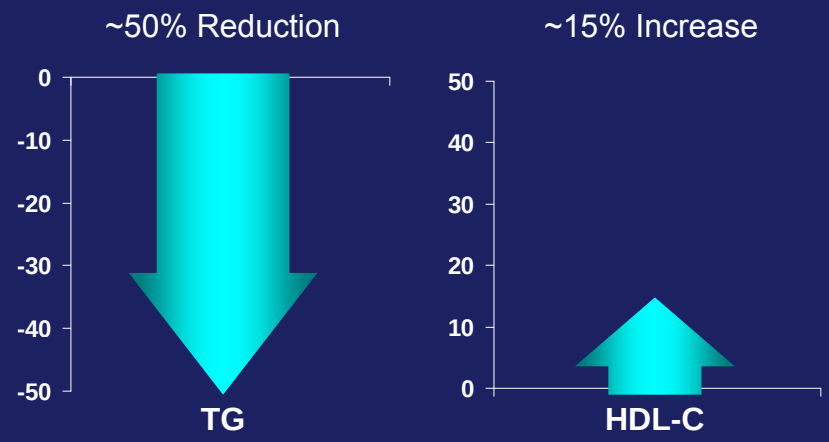
NCEP ATP III Guidelines and 2004 Update
TG and HDL-C Recommendations

Lipid Parameter (mg/dL)	Therapy
TG ≥ 500 (TG primary goal)	Fibrates or nicotinic acid
TG 200-499 (non–HDL-C secondary target of therapy)	Intensify therapy with an LDL-C–lowering drug; second, consider adding a fibrate or nicotinic acid
HDL-C <40 (baseline LDL-C 100-129)	Fibrates or nicotinic acid are an option; may be preferable with an LDL-C–lowering drug
HDL-C <40 and/or TG ≥ 200 (baseline LDL-C <100)	Fibrates, nicotinic acid as alternatives to statins or in combination with statins can be considered

"For those high risk patients who have elevated triglycerides or low HDL-C levels, addition of a fibrate or nicotinic acid to LDL-lowering therapy can be considered."

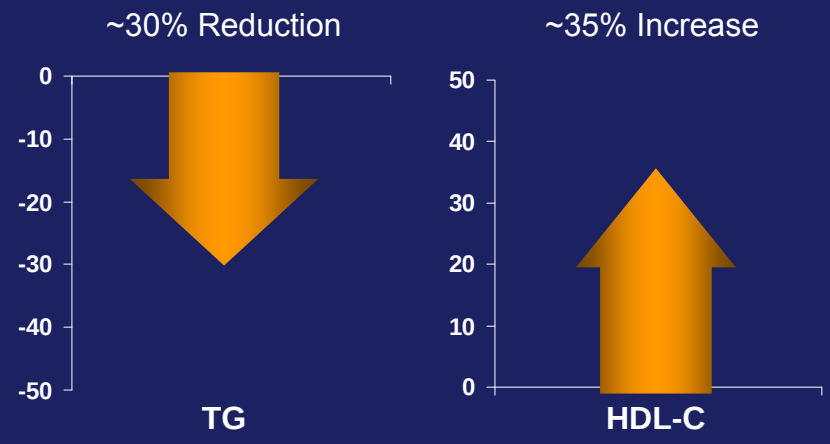
Executive Summary of the Third Report of NCEP ATP III. *JAMA*. 2001;285:2486-2497.
Grundy SM, et al. *Circulation*. 2004;110:227-239.

Fenofibrate Efficacy



National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III). *Circulation*. 2002;106:3143-3421.

Niacin Efficacy



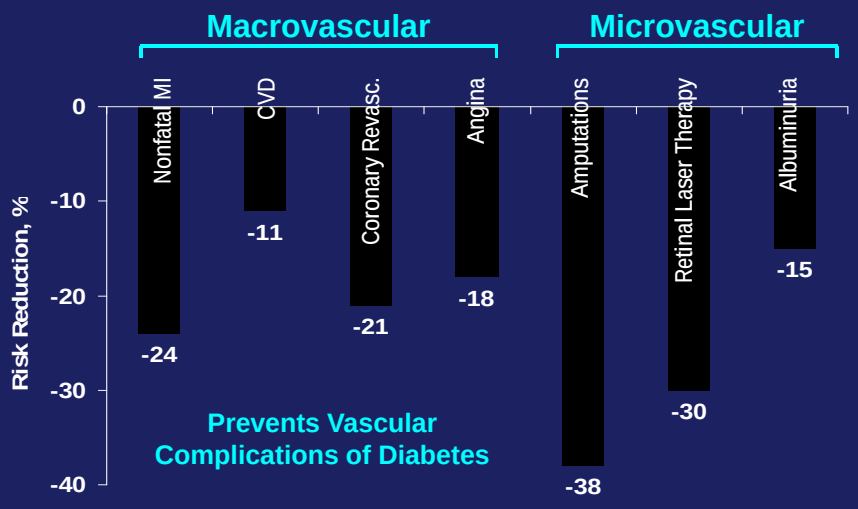
National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III). *Circulation*. 2002;106:3143-3421.

According to Major Cholesterol Guidelines: Best in Class Agents

- Fibrates are highly effective for reducing TG
  - *"Fibrates are effective for modifying atherogenic dyslipidemia, and particularly for lowering serum triglycerides"* NCEP ATP III
- Niacin is the best agent for raising HDL-C
  - *"Niacin is the most effective drug for raising HDL"* ADA Standards of Medical Care in Diabetes, 2007

National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (ATP III). Circulation. 2002;106:3143-3421.
American Diabetes Association. *Diabetes Care*. 2007;30(suppl 1):S4-S41.

FIELD: Significant Clinical Benefits of Fenofibrate



Keech A, et al. *Lancet.* 2005;366:1849-1861.
Keech A. *Atherosclerosis Supplements.* 2006;7:342. Abstract.

Simultaneous LDL-C Lowering and HDL-C Elevation for Optimal CVD Reduction

Meta-Analysis of 23 Lipid Trials

- The cardiovascular event rate reductions associated with a decrease in LDL-C and an increase in HDL-C are statistically independent
- Meta-analysis revealed that the sum of % increase in HDL-C and % decrease in LDL-C (%ΔHDL + %ΔLDL) predicts cardiovascular benefits more effectively than either component alone
- This analysis supports the notion that a readily attainable 40% reduction in LDL-C combined with a 30% elevation in HDL-C will result in ~70% CHD risk reduction and a *revolution in cardiovascular prevention*

N = 83 000

Brown BG, et al. *Curr Opin Lipidol.* 2006;17:631-636.

Superior doctors prevent the disease.
Mediocre doctors treat the disease before evident.
Inferior doctors treat the full blown disease.

— Huang Dee: Nai-Ching (2600 BC; first Chinese medical text).

Joseph A. Leutzinger, PhD **President -** ACADEMY FOR HEALTH AND PRODUCTIVITY MANAGEMENT

Principal, *Health Improvement Solutions*

Joseph A. Leutzinger is principal of Health Improvement Solutions, founded in January 2005. Through evaluation processes Joe identifies the right health improvement products for organizations and develops strategic plans and programs, integrating human capital related functions. He also conducts worksite field research projects.

Joe Leutzinger was named President of the Academy for Health and Productivity Management (AHPM), the teaching division of the Institute for Health and Productivity Management (IHPM), in June 2003. He is responsible for setting and overseeing the direction of the Academy and delivering the various training components including live and web-based training sessions through expert faculty.

From February 2003 through December 2004, Leutzinger joined WELCOA (Wellness Councils of America) as a senior consultant, and was responsible for developing its consulting division. Prior to joining WELCOA, he was the Director-Health Promotion at Union Pacific Railroad where he assumed responsibility for the development, delivery and evaluation of the company's health promotion program. Under his management UPRR received nine national awards and became one of only two companies to be a three time recipient of the C. Everett Koop Health Project Award, as well as a three time recipient of the gold level certification from the Wellness Council of the Midlands. In 2001, Union Pacific was the first large employer to receive the Platinum Level Award from the Wellness Councils of America and also was honored with the Health and Productivity Leadership Award from the Institute for Health and Productivity Management.

In 2004, Leutzinger co-edited *The Platinum Book: Practical Applications of the Health & Productivity Management Model*, published by the Institute for Health & Productivity Management.

Joe has authored more than 20 articles and chapters on worksite health promotion topics and lectures worldwide on worksite health and productivity related issues. He is a Fellow with the Association for Worksite Health Promotion and in 2001 received the Distinguished Alumni Award from the University of Nebraska-Omaha.

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Metabolic Syndrome Review of Literature

Defining and Managing Metabolic Health in the Workplace

24 September 2008

IHPM

The Financial Impact of Metabolic Disease and its Implications for Employers

Joseph A. Leutzinger, Ph.D.
President, Academy for Health & Productivity Management

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A Comprehensive Review of Metabolic Syndrome: Impact on the Individual and the Employer

University of Michigan
Health Management Research Center
May 2005

Article Recognition

Chris Herman
Alyssa Schultz
Dee W. Edington

The University of Michigan Health Management Research Center

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Literature Review Outline

I. Statement of Purpose

II. Metabolic Syndrome Etiology and Risks

III. Metabolic Syndrome Sequelae

IV. Metabolic Syndrome and Medical Costs

V. Metabolic Syndrome and Productivity Costs

VI. Metabolic Syndrome Interventions

VII. Interventions Going Forward

VIII. Conclusions

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Literature Search Process

- Search of medical literature using PubMed (Medline) from the National Library of Medicine was completed for definitions, prevalence, risk factors, and other medical information
- Literature searches using MD Consult, Proquest, Wilson, CINAHL, and ACCESSUM database were conducted for interventions and costs associated with metabolic syndrome or individual risk factors
- Key search words included "Metabolic Syndrome", "Pre-Diabetes", "Syndrome X", and cluster searches of individual risk factors

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Literature Search Process

- Journal articles obtained online through the University of Michigan's library website (all medical journal articles), or hard copies made from journals within University library system
- References used met Abbott's recommended criteria of using sources 1998-Present. A few studies published prior to 1998 were included to maintain the scientific integrity of this literature review
- A more extensive review of obesity (a key predictor of the metabolic syndrome) was provided using obesity-related articles provided by Abbott

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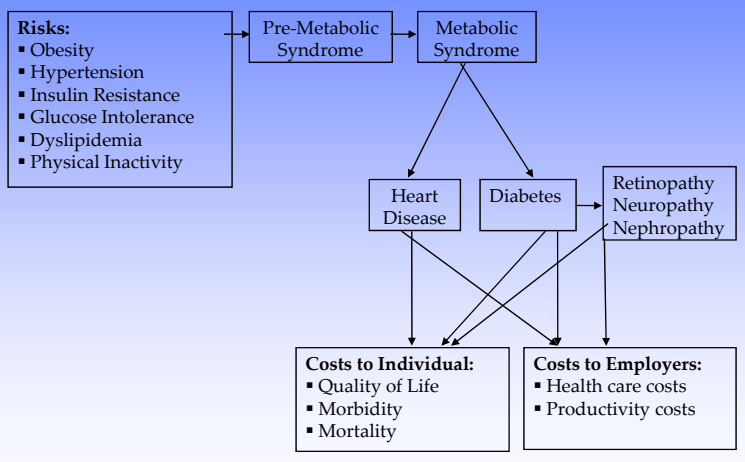
Development and Consequences of Metabolic Syndrome



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Summary of Definitions

WHO Definition of Metabolic Syndrome	ATP III Definition of Metabolic Syndrome*
Blood Pressure ≥ 160/90 mmHg	Blood Pressure ≥ 130/85 mmHg
Triglycerides ≥ 150 mg/dl	Triglycerides ≥ 150 mg/dl
HDL <35 mg/dl in men and < 39 mg/dl in women	HDL <40 mg/dl in men and <50 mg/dl in women
Waist-to-hip ratio of >0.90 in men or >0.85 in women and/or BMI >30 kg/m^2	Waist Circumference >102 cm (40 inches) in men and >88 cm (35 inches) in women
Urinary albumin excretion rate ≥ 20 µg/min or an albumin-to-creatinine ratio ≥ 20 mg/g.	Fasting Glucose ≥ 110 mg/dl

*** More Recent and Widely Used Metabolic Syndrome Criteria**

Metabolic Syndrome Prevalence

- Prevalence studies have compared the two definitions
- Most prevalence studies used the NCEP definition
- A similar prevalence comparison was assessed among a type 2 diabetic population

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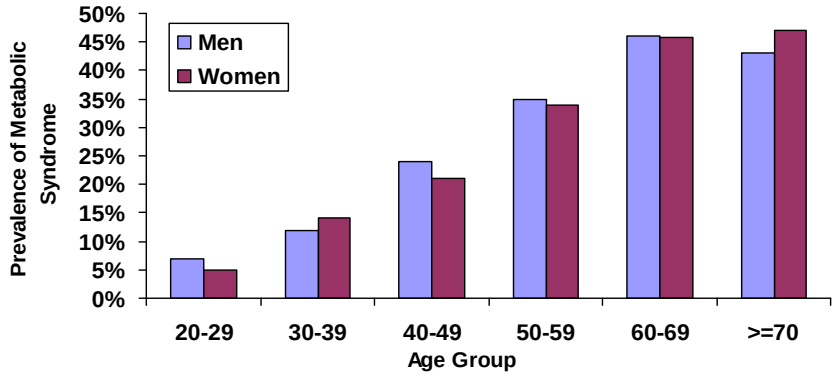
Summary of Prevalence Findings

Study	Definition	Subjects	Key Findings
Ford, 2003	NCEP / WHO	8,608	23.9% vs. 25.1% (86% similarity); NCEP=CVD
Marchesini, 2004	NCEP / WHO	1,569 type 2 Diabetics	81% WHO vs. 78% NCEP (83% similarity)
Park, 2002	NCEP	12,000	~23% Prevalence
Ford, 2002	NCEP	8,814	23.7% Prevalence (31.9% - Mexican-Americans)
Ford, 2004*	NCEP	1,677	27.0% Prevalence

***Used most recent NHANES data, reported metabolic syndrome prevalence is increasing**

Prevalence of Metabolic Syndrome by Age



Ford ES, Giles, WH, Dietz WH. Prevalence of metabolic syndrome among US adults. *JAMA*. 2002;287:356-359

Prevalence of Metabolic Syndrome by Gender and Ethnicity

Ethnicity	Prevalence of Metabolic Syndrome	
	Men	Women
Caucasian	24.8%	22.8%
African American	16.4%	25.7%
Mexican American	28.3%	35.6%
Other	20.9%	19.9%

Ford ES, Giles, WH, Dietz WH. Prevalence of metabolic syndrome among US adults. *JAMA*. 2002;287:356-359

Pre-Metabolic Syndrome to Metabolic Syndrome: Clustering of Risk Factors

- Pre-Metabolic Syndrome - individuals with 1 or 2 primary metabolic risk factors in addition to an underlying condition such as family history or a sedentary lifestyle
- Individuals developing a cluster of three or more of the primary metabolic risk factors have an increased risk for cardiovascular disease, diabetes, and chronic renal disease
- Those with multiple risk factors are more likely to have inflammation and thrombosis

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Metabolic Syndrome and Heart Disease

Study	Subjects	Key Findings
Wilson, 1999	4,976 Men & Women	Clusters of ≥3 metabolic syndrome risk factors indicated a 2.39 times greater risk for heart disease in men and a 5.90 times greater risk in women
Lakka, 2002	1209 Men Aged 42-60	After 11 yrs., men with the metabolic syndrome were 2.9 times as likely to die of heart disease
Alexander, 2003	3,510 (over 50 yrs. old)	Heart Disease Prevalence was greatest among individuals with diabetes & MS (19%) and people with the MS but not diabetes (14%). Prevalence was lower among people with diabetes but no MS (7.5%), and individuals with neither diabetes nor MS (8.7%)
Malik, 2004	6,255 men and women aged 30-75	The metabolic syndrome strongly predicts heart disease; CHD/CVD mortality risk increased in individuals with 1 or 2 metabolic syndrome components
Hu, 2004	6,156 Men; 5,356 Women	There is increased Cardiovascular mortality in individuals with the metabolic syndrome, as Hazard Ratios indicated a 2.26 times greater mortality risk in men and 2.78 times greater mortality risk in women; adjusted for age, cholesterol, smoking status

Metabolic Syndrome Individual Component Costs

- Available data of metabolic syndrome risk factors and their associated costs were reviewed
  - Obesity / Waist Circumference / BMI
  - Physical Inactivity
  - Hypertension
- At this time, research has not examined / estimated the overall cost of metabolic syndrome

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Costs Related to Metabolic Syndrome Predictors (1/3)

Study	Risk Factor	Key Findings
Colditz, 1999	Obesity	Cost of obesity is $70 billion or 7% of total U.S. health care costs
Thompson, 2001	Obesity	Overweight and obese individuals had health care cost ratios 1.37 and 1.36 times greater than normal weight
Wang, 2003	Obesity	Medical costs increased as BMI increased across six weight groupings defined by the NHLBI weight guidelines
Colditz, 1999	Physical Inactivity	Cost of physical inactivity is $24 billion or 2.4% of total U.S. health care costs
Wang, 2004	Physical Inactivity/ Obesity	Active individuals had $250 less annual health care costs vs. sedentary individuals across all weight categories

Costs Related to Metabolic Syndrome Predictors (2/3)

Study	Risk Factor	Key Findings
Hodgson, 2001	Hypertension	Total cost of hypertension, including complications and comorbidities was $109 billion in 1998, accounting for 12.6% of total US health care expenditures
Kiiskinen, 1998	Hypertension	Diastolic BP >140 mmHg: 1. Life lost was 2.7 yrs. for hypertensive men and 2.0 yrs. for hypertensive women 2. Productivity lost was 2.6 yrs. for hypertensive men and 2.2 yrs. for hypertensive women 3. Hypertensive men cost $86,000 more when including both medical and productivity costs compared to normotensives (DBP < 95)

Costs Related to Metabolic Syndrome Predictors (3/3)

Study	Risk Factor	Key Findings
Killilea, 2002	Type 2 diabetes	$98 billion spent in 1997 for direct and indirect health care of Type 2 diabetes in U.S.
Nichols, 2000	Type 2 diabetes	Excess costs of diabetes averaged $1205 per patient per year in the eight years prior to diagnosis
Caro, 2002	Type 2 diabetes	Complications of diabetes cost $47,240 per patient per year. Macrovascular disease accounted for 52% followed by nephropathy, neuropathy and retinopathy.

Metabolic Syndrome and Productivity Costs

- Lost productivity includes Time Away from Work: Illness-related scattered absences, short- and long-term disability, and workers' compensation
- Lost productivity also includes: presenteeism--decreased on-the-job performance

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Health Risks and Productivity

- Many studies report health risks are associated with productivity losses, both in terms of Time Away from Work and Presenteeism
- Excess time away from work due to excess health risks was 36.2% of the total time away from work costs or approximately $1.7 million at one company (Wright et al., 2002)

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Medical Conditions and Productivity

- In addition to health risks, medical conditions are also associated with productivity losses
- Burton et al. (2004) reported productivity loss associations with diabetes, depression, arthritis, low back pain, and other conditions

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Productivity Costs Related to Metabolic Syndrome Predictors (1/2)

Study	Risk Factor	Key Findings
Bertera, 1991	All	Employees with any behavioral risk had higher absenteeism costs compared to those with no risks. Excess illness estimated to cost the company $70.8 million per year.
Burton, 1998	Obesity	Employees at risk for BMI are more likely to have short-term disability and illness absences.
Burton, 1999	All	Presenteeism accounted for 63% of total direct and indirect costs. Objectively measured productivity decreased as health risks increased.
Musich, 2001	All	85% of workers' compensation costs attributed to excess health risks or program non-participants.
Wright, 2002	All	High-risk individuals have more time away from work than low-risk individuals. Excess time away from work due to excess risk cost one employer $1.7M or 36% of total time away from work costs.

Productivity Costs Related to Metabolic Syndrome Predictors (2/2)

Study	Risk Factor	Key Findings
Schultz, 2002	All	Participation in worksite health promotion program associated with smaller increase in disability absences compared to non-participants.
Lakdawalla, 2004	Obesity	Obese individuals are more likely to become disabled.
Goetzel, 2004	All	Heart disease-related absences cost 6.8 days per year; 0.9 days for hypertension; 2.0 days for diabetes.
Pelletier, 2004	All	Reducing one risk factor was associated with 9% reduction in presenteeism and 2% reduction in absenteeism.
Boles, 2004	All	Those with more health risks reported greater productivity losses. Significant loss associated with diabetes.

Conclusions – Health Risks

- Cluster of 3 or more health risk factors comprise the metabolic syndrome and increase risk for diabetes and especially heart disease
- Research suggests the presence of 1 or 2 metabolic syndrome risk factors appears to raise heart disease risk compared to controls without any risk factors
- Obesity seems to be key predictor of the syndrome, as the recent increase in obesity prevalence is correlated with the increased prevalence of the metabolic syndrome
- Impaired insulin resistance and glucose intolerance (pre-diabetes) are also syndrome predictors, albeit to a lesser extent compared with obesity

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Conclusions - Costs

- Metabolic syndrome health risks are associated with productivity loss in absenteeism and presenteeism
- Individuals with more health risks report greater productivity losses
- Health and financial costs associated with Metabolic Syndrome are high
- Metabolic Syndrome prevalence is a problem for employers

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Richard L. Nevins, MD - Vice President, Chief Research Officer

IHPM

Rick Nevins is a health care strategist and consultant to both the care delivery and business side of the medical profession and is VP and Chief Research Officer, IHPM. His areas of interest include the design and development of evidenced-based clinical care delivery systems for acute and chronic care management, the use of predictive modeling and analysis of patterns of care to improve clinical, financial, functional and human outcomes from healthcare delivery, the design and development of telemedicine and Internet healthcare systems, the development and maintenance of compliance with healthcare law, policy and best-practice care delivery standards, the development of solutions that increase efficiency and value for providers including practice management and benefits solutions, and the creation of care delivery systems that enhance the relationship between providers and patients.

Dr. Nevins has more than 20 years of experience improving healthcare delivery systems in the United States and other nations. He was responsible for clinical knowledge bases and co-responsible for software design for clinical care applications for demand and disease management programs in several countries while serving as Medical Director for National Health Enhancement Systems and as VP of Medical Affairs for HBO & Company and McKesson. As a member of various committees of the Pan American Health Organization, World Health Organization, Caribbean Latin American Action, Americas' Healthnet, Center for Telemedicine Law, the InterAmerican Development Bank and URAC, he has helped design, implement and enhance telecommunication and digital healthcare solutions in the United States and other countries. He is currently developing a network of 75 family practice, pediatric and internal medicine clinics that will be digitized and will offer services through a membership model.

Dr. Nevins has consulted with Heads of State and Ministers of Health of several countries regarding healthcare quality, delivery, funding and access. He co-developed one of the first telemedicine systems in Latin America and is currently designing telemedicine-equipped mobile healthcare clinics. He and his wife Debbie have funded medical clinics in Central America and Nepal and have coordinated and led healthcare teams to Central America where he has personally treated over 10,000 indigent and rural people.

Dr. Nevins is a Member of the Board of Governors and a former member of the Board of Directors of Medical Assistance Programs International, a 501(c) 3 public, Christian foundation that provides healthcare resources, education, essential medications and crisis relief globally. He is founder and chairman of Master's Plan, a 501(c)3 Christian foundation established to meet the needs of developing regions of the world through improving access to and quality of healthcare. He is a member of Pinnacle Forum, a non-profit organization that encourages the use of Christian leadership principles by senior management in corporate America and a member of the executive committee of the Physicians' Resource Council of the Center for Arizona Policy, an affiliate of Focus on the Family.

Dr. Nevins has been an occupational and employee health physician for several national companies, including Mobil Oil, Yellow Freight, Consolidated Freightways, Iowa Beef Packing, National Beef Packing, National Carriers, Northern Natural Gas Company, Panhandle Easter Pipeline Company, Anadarko and National Helium, as well as numerous local and regional companies and public entities. He has served as Chief Medical Officer, Medical Director, Chief Information Officer and Chief Clinical Information Officer for several companies. He has served as a Senior Editorial Consultant for Micromedex, as a Senior Physician Panel member for McNeil Consumer Products of Johnson and Johnson and as a member of several clinical and technical advisory boards. He speaks at conferences and on radio regarding healthcare trends, healthcare economics, telecommunications and digital solutions for healthcare. Dr. Nevins has authored chapters on telemedicine and medical call center software and technology and serves as the Medical Advisor for an entrepreneur course at the University of Arizona.

Dr. Nevins graduated from the University of Oklahoma School of Medicine. Following an emergency medicine residency, he practiced emergency and family medicine for 22 years. He has been a diplomat of the American Board of Family Practice since 1978 and a Fellow of the American Academy of Family Physicians since 1981. He was a Clinical Instructor in Emergency Medicine and Family Practice for the University of Kansas School of Medicine for 10 years. In 1988 he was the recipient of the first "Heartiest Five" award from the American Heart Association for excellence in teaching and practicing the principles of cardiovascular risk factor reduction.

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Modifying Lifestyle Behaviors to Reduce Metabolic Risks

Metabolic Health In The Workplace

Summary of Three Projects

Rick Nevins, MD
VP, Chief Research Officer
Institute for Health and Productivity Management

Metabolic Health Initiative

Comprehensive education, compliance and lifestyle behavior change pilot focused on hypertension, diabetes, excess weight and lipid disorders

- Partnership - Abbott and the Institute for Health and Productivity Management (IHPM) for employees of
  - City of Phoenix, AZ
  - City of Albuquerque, NM
  - Saint Luke's Health System, Kansas City, MO
  - State of Washington

Value of the Metabolic Health Initiative for Employers

- New business approach for employee health
  - Methodology and value of quantifying prevalence and severity of major causes of employee health problems
    - Personal health and productivity survey
    - Laboratory tests
    - Physical measurements
    - Alternative to claims-based approaches

Value of the Metabolic Health Initiative for Employers

- Categorize employee health costs
  - Investment in human capital
    - Not an expense item in the budget
    - Requires same decision making process as other types of capital investments
    - Employers must take active, not passive, role in employee health

Value of the Metabolic Health Initiative for Employers

- Presenteeism - impact of chronic illness on employee performance and organizational productivity
  - Quantify functional impairment due to chronic health conditions in employees at work
  - Improve bottom line by improving employee health which can improve workplace performance

Value of the Metabolic Health Initiative for Employees

- Identify many previously unrecognized metabolic risk factors and diseases in participants
- Enhance awareness and understanding of the significance of metabolic risk factors and diseases
- Engage in education, training and compliance programs that actually do improve health and reduce risks

Value of the Metabolic Health Initiative for Employees

- Learn how to be better partners with health care providers – communication
  - Learn which questions to ask
  - Challenge health care providers
- Learn how to become better purchasers and consumers of health care products and services

Value of the Metabolic Health Initiative for Employees

- Participate in measurement efforts to determine baseline status, intervention outcomes and improvements in health and performance
- Understand the impact of lifestyle behaviors on health, health risks and workplace performance

Intervention

- Dedicated, interactive web sites
- Comprehensive baseline and monitoring
  - FBG, lipid profile, BP, height, weight, waist circumference
  - Health risk survey
  - WLQ productivity survey

Intervention

- Education / information
  - Web sites
  - On-site classes
  - Library of video classes
  - Content experts
    - MDs, Registered Dieticians, PhDs, PharmDs, Advanced Degree Nurses

Intervention

- Exercise training and nutrition education
  - Body-*for*-LIFE and Biosignia
  - Changes That Last a Lifetime
  - On-site classes, rallies, training sessions

Changes That Last a Lifetime®

Goals

- Prevent onset of metabolic conditions
- Prevent individuals living with metabolic conditions from getting worse
- Help to reverse chronic metabolic conditions
- Improve employee satisfaction and well being
- Create a culture of health in workplace

Changes That Last a Lifetime®

CTLL Objectives

Improve individual health and health risk management
- drive lower healthcare costs to the employer
- improve functional capacity and productivity
- enhance benefits for employees and their families

Changes That Last a Lifetime®

Key success factors
- CTLL is a twelve week individual and group challenge for employees with an overall objective to improve health and have fun
- CTLL is focused on health behavioral modification with a fitness and nutrition regimen
- Biometric screening with 'Know Your Number' reports, before and after the challenge, identifies chronic conditions and unidentified health risks

Changes That Last a Lifetime®

Key success factors

- Pre and post screenings measure individual and group success via aggregate data
- Personalized daily emails represent a creative way to keep employees engaged and retain talent
- CTLL represents a 'supplement' to other programs offered by the employer

Average Change in Scores Among Improved Phx Participants

	Female		Male		All Participants	
	% People Who Improved	Actual Improvement	% People Who Improved	Actual Improvement	% People Who Improved	Actual Improvement
Lab Measurements						
Glucose Lower (mg %)	54.0%	12.6	66.7%	11.0	57.6%	12.0
A1c Lower (%)	21.4%	0.2	31.4%	0.4	24.3%	0.3
Total Cholesterol Lower (mg %)	53.2%	27.6	45.1%	26.3	50.8%	27.3
HDL Cholesterol Higher (mg %)	27.0%	7.1	45.1%	6.4	32.2%	6.9
Total Cholesterol / HDL Lower	36.5%	1.0	49.0%	0.7	40.1%	0.9
Triglycerides Lower (mg %)	61.1%	46.2	72.5%	65.8	64.4%	52.6
LDL Cholesterol Lower (mg %)	41.3%	24.7	35.3%	20.8	39.5%	23.7
Physical Measurements						
Blood Pressure Lower						
Systolic (mm)	50.0%	13.3	43.1%	12.1	48.0%	13.0
Diastolic (mm)	42.9%	8.2	49.0%	7.8	44.6%	8.1
Waist Circumference smaller (inches)	54.8%	2.6	60.8%	3.0	56.5%	2.7
Weight Loss (lbs)	68.4%	8.8	57.4%	11.0	65.2%	9.3
Step Test (Pulse Lower)	19.0%	10.7	39.2%	13.3	24.9%	11.9
Hand Grip Strength						
Left Hand Increase (kg)	63.5%	7.5	68.6%	14.2	65.0%	9.6
Right Hand Increase (kg)	57.1%	8.0	70.6%	12.4	61.0%	9.5
Sit and Reach Increase (cm)	69.8%	2.3	76.5%	2.9	71.8%	2.5

Average Change in Scores Among SLHS Participants Who Improved

	Male		Female		All Participants	
	% People Who Improved	Actual Improvement	% People Who Improved	Actual Improvement	% People Who Improved	Actual Improvement
Lab Measurements						
Glucose Lower (mg %)	46.5%	8.1	45.8%	9.4	46.5%	8.2
Total Cholesterol Lower (mg %)	49.2%	19.4	62.5%	17.6	50.7%	19.2
HDL Cholesterol Higher (mg %)	48.4%	6.8	45.8%	3.8	48.6%	6.7
TC / HDL Cholesterol Ratio Lower	45.8%	0.9	54.9%	0.5	54.1%	0.5
Triglycerides Lower (mg %)	37.2%	29.5	41.7%	36.3	37.9%	30.5
LDL Cholesterol Lower (mg %)	17.8%	18.1	33.3%	20.0	19.5%	18.6
Physical Measurements						
Blood Pressure Lower						
Systolic (mm)	49.2%	11.6	58.3%	7.4	50.0%	11.2
Diastolic (mm)	46.9%	8.5	62.5%	8.3	48.2%	8.5
Waist Circumference smaller (inches)	64.7%	2.4	79.2%	2.3	66.0%	2.4
Weight Lower (lbs.)	70.8%	18.2	61.9%	7.3	62.6%	8.3

Unrecognized risk factors in Phx employees

Condition	Known	New	Pre-
Elevated FBS	73	82	165
Increased BP	187	116	232
Reduced HDL	57	145	n/a
Elevated Trig	124	157	n/a
Increased Waist Circ.	477	3	n/a
Total	918	503	397

900 cases previously unrecognized / 1818 total cases
1/2 or 49.5% of total cases unrecognized before MHI

Unrecognized risk factors in SLHS employees

Condition	Known	New
Elevated FBS	26	27
Increased BP	75	137
Reduced HDL	79	54
Elevated Trig	30	11
Increased Waist Circ.	126	52
Total	336	281

281 cases previously unrecognized out of 617 total cases
45.5% of total cases unrecognized before SLMHI

Unrecognized risk factors in ABQ employees

Condition	Known	New
Elevated FBS	5	4
Increased BP	20	41
Reduced HDL	7	11
Elevated Trig	4	9
Increased Waist Circ.	31	14
Total	67	79

79 cases previously unrecognized out of 146 total cases
54.11% of total cases unrecognized before ABQ

Participation / Completion

- Qualifications for pilot
  - Volunteer, web site registration, participation consent
  - Intervention
  - Pre-post surveys, lab, physical measurements
- Completion rate
  - Phoenix - 50%
  - Saint Luke's Health System – 56.6%
  - ABQ – 29% (first round)
  - National average – 12% – 15%

Eliminated Risk Factors - Phx

- **328 completed**
  - 212 (65%) people ***eliminated*** at least 1 risk factor
    - 83 eliminated only 1 risk factor
    - 62 eliminated 2 risk factors
    - 41 eliminated 3 risk factors
    - 21 eliminated 4 risk factors
    - 4 eliminated 5 risk factors
    - 1 eliminated 6 risk factors
    - 440 risk factors ***eliminated*** in 212 participants
- **2.08 risk factors *eliminated* per participant who eliminated at least one risk factor**
  - **Does not include risk factors improved but still above target**

Improved Risk Factors – Phx

Risk factors improved but still above target

- **328 completed**
  - 212 people ***eliminated*** at least 1 risk factor
  - 116 people ***did not eliminate*** at least 1 risk factor
  - 107 / 116 (32%) people ***improved*** in at least 1 risk factor
    - 13 people improved in 1 risk factor
    - 12 people improved in 2 risk factors
    - 25 people improved in 3 risk factors
    - 14 people improved in 4 risk factors
    - 25 people improved in 5 risk factors
    - 11 people improved in 6 risk factors
    - 4 people improved in 7 risk factors
    - 3 people improved in 8 risk factors

    411 risk factors ***improved*** in 107 participants
- **3.84 risk factors *improved* per participant who improved at least one risk factor**

Risk Factor Elimination and Improvement Among 281 SLHS Participants

Risk Factor Elimination

- 91 (32.3%) people eliminated at least 1 risk factor
  - 56 eliminated only 1 risk factor
  - 26 eliminated 2 risk factors
  - 8 eliminated 3 risk factors
  - 1 eliminated 4 risk factors
- **136 risk factors eliminated in 91 people**
- 1.49 risk factors eliminated per participant who improved

Risk Factor Improvement

- Of the 190 who did not eliminate any risk factors, 186 (66% of total) improved in at least 1 risk factor
  - 18 improved in 1 risk factor
  - 32 improved in 2 risk factors
  - 49 improved in 3 risk factors
  - 40 improved in 4 risk factors
  - 32 improved in 5 risk factors
  - 13 improved in 6 risk factors
  - 2 improved in 7 risk factors
- **641 risk factors improved in 186 people**
- 3.44 risk factors improved per participants who improved

Eliminated / Improved Risk Factors – ABQ (interim)

- **62 total participants**
  - **Eliminated risk factors**
    - 48 participants (77.42%) eliminated at least 1 risk factor
      - 27 eliminated only 1 risk factor
      - 14 eliminated 2 risk factors
      - 4 eliminated 3 risk factors
      - 3 eliminated 4 risk factors
      - 79 risk factors eliminated in 48 people
  - **1.65 risk factors *eliminated* per participant who eliminated risk factors**
  - **Improved but not eliminated risk factors**
    - 9 participants (14.52%) improved but did not eliminate at least 1 risk factor
      - 3 improved only 1 risk factor
      - 4 improved 2 risk factors
      - 1 improved 3 risk factors
      - 1 improved 4 risk factors
      - 18 risk factors improved in 9 people
  - **2.00 risk factors *improved* per participant who improved risk factors**

Risk Factor Changes

- Eliminated risk factors per participants who eliminated at least one risk factor
  - 2.08 risk factors eliminated per participant – Phx
  - 1.49 risk factors eliminated per participant – SLHS
  - 1.65 risk factors eliminated per participant - ABQ (interim)
- Improved risk factors (above goal) per participants who improved at least one risk factor
  - 3.84 risk factors improved, not to goal – Phx
  - 3.44 risk factors improved, not to goal – SLHS
  - 2.00 risk factors improved, not to goal ABQ (interim)

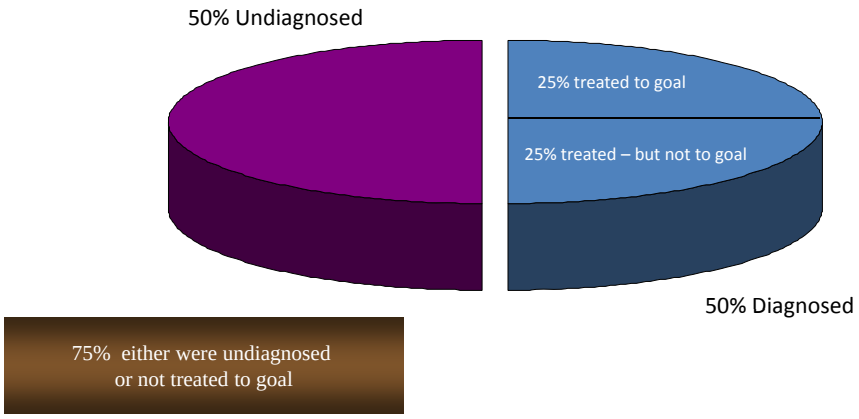
Outcomes of Risk Factor Analysis

- Early detection of single and multiple risk factors
  - Impact on co-morbidities
  - Impact on complications
- Prevention
  - Reversal of risk trends stops migration
  - Risk elimination
  - Risk reduction

Health Impact of not Controlling Blood Pressure

- 40 – 70 years old
  - Each increment of 20 mmHg in systolic or
  - Each increment of 10 mmHg in diastolic
  - Doubles risk of CVD across the entire BP range from 115 / 75 to 185 / 115

High Blood Pressure
Making the Business Case

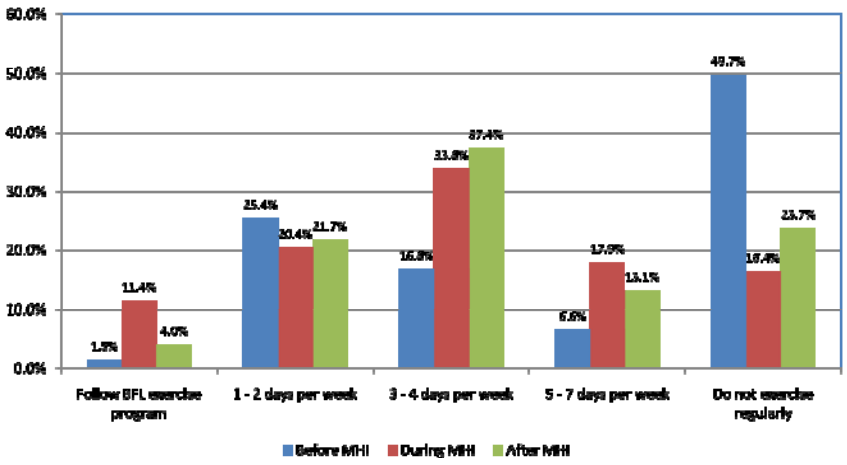


75% either were undiagnosed or not treated to goal

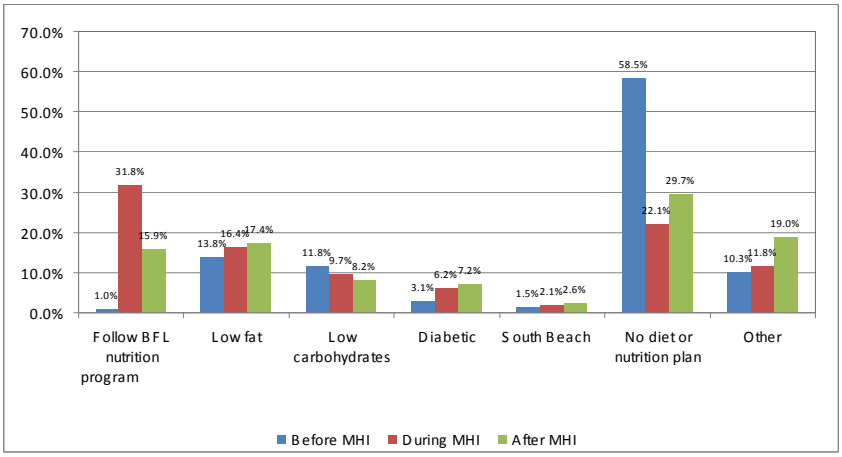
Health Risks Related to Hypertension

- 50% of people – high blood pressure at first heart attack
- 66% of people – high blood pressure at first stoke
- 91% of people with congestive heart failure (CHF) have high blood pressure

How many days in an average week do you exercise regularly?

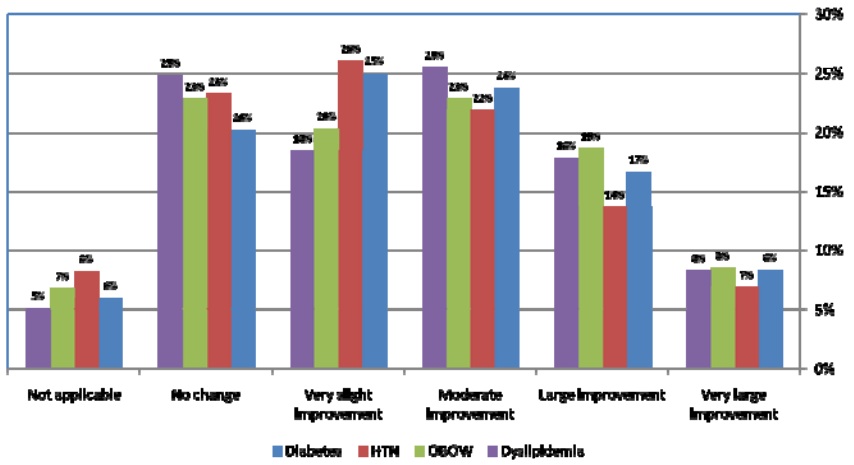


What type of diet or nutrition plan do you regularly follow?



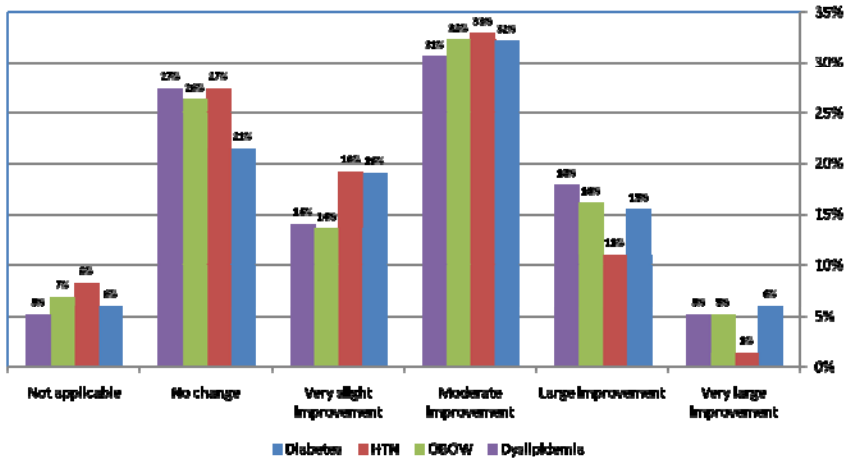
Which best describes your changes as a result of MHI?

Physical Energy



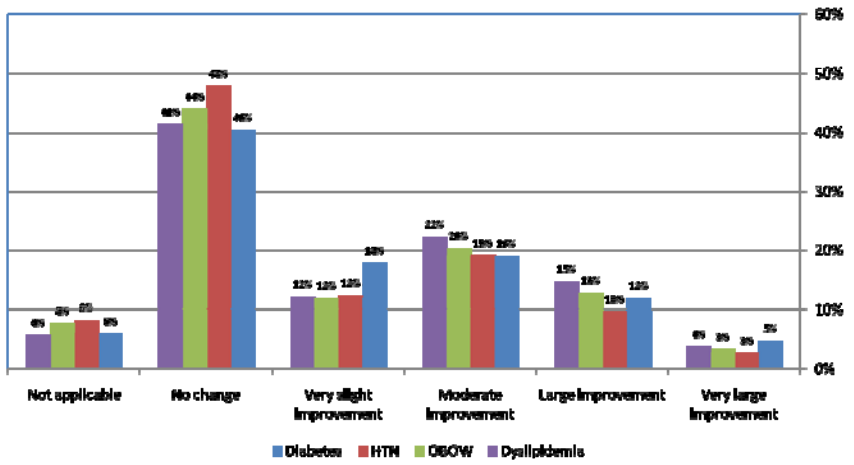
Which best describes your changes as a result of MHI?

Mental Energy



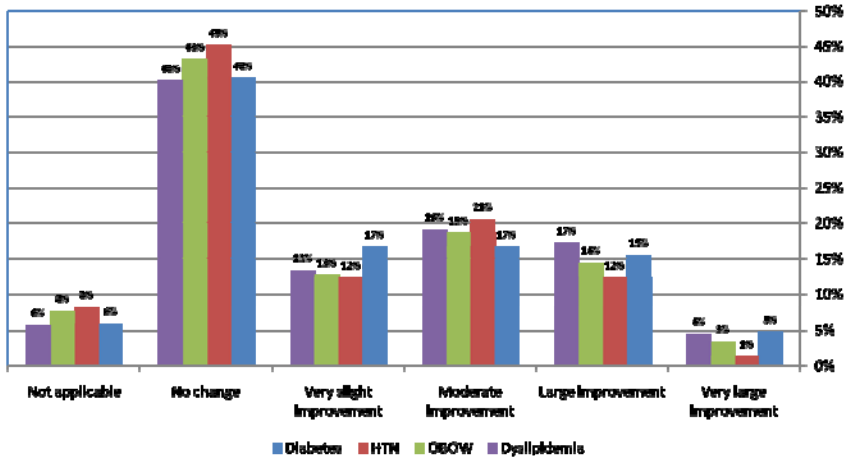
Which best describes your changes as a result of MHI?

Amount of sleep



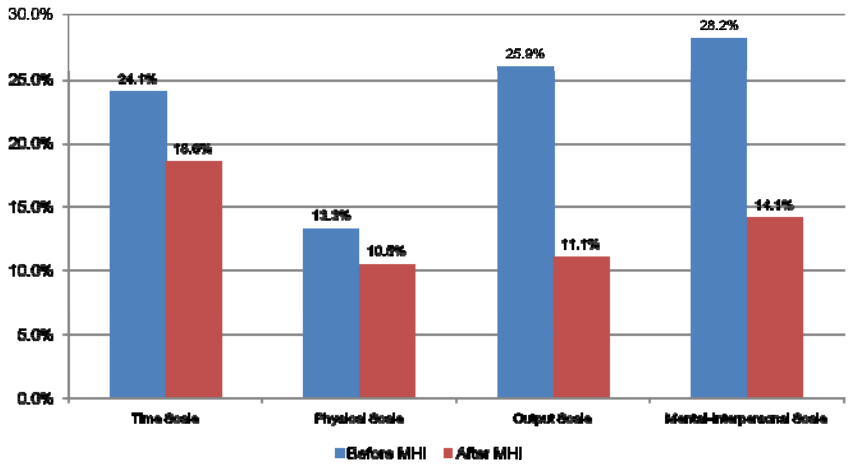
Which best describes your changes as a result of MHI?

Quality of sleep



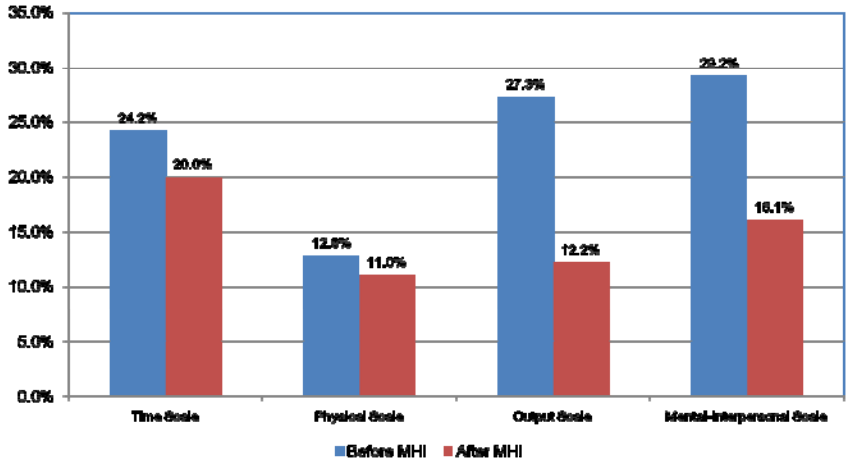
Phx Changes in Productivity – 46%

All Valid Participants Who Took Both WLQ Surveys, regardless of Risk Factor Changes



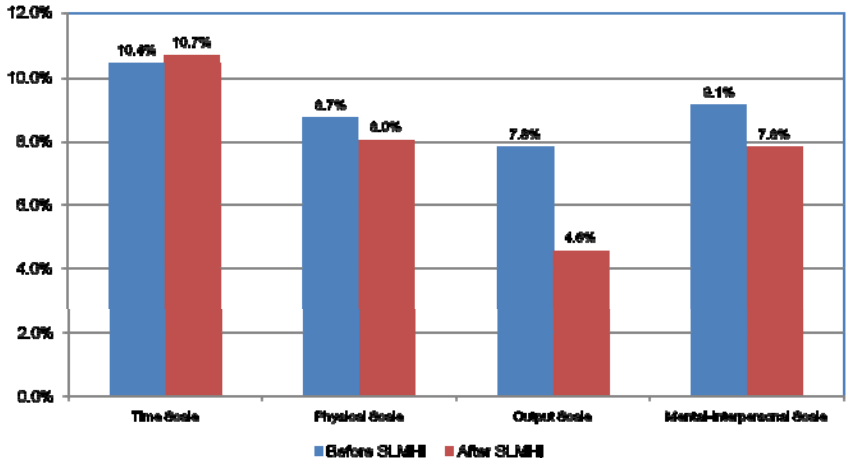
Phx Changes in Productivity – 42%

All Valid Participants Who Took Both WLQ Surveys with Improved Glucose



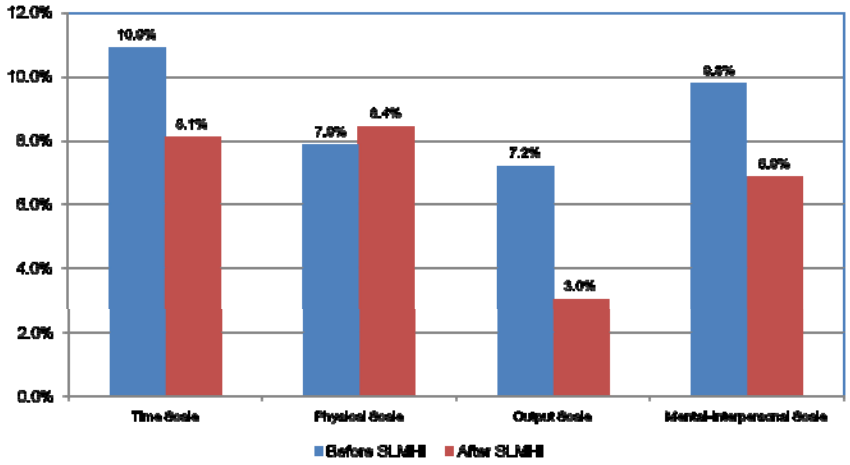
SLHS Changes in Productivity – 20%

All Valid Participants Who Took Both WLQ Surveys, regardless of Risk Factor Changes



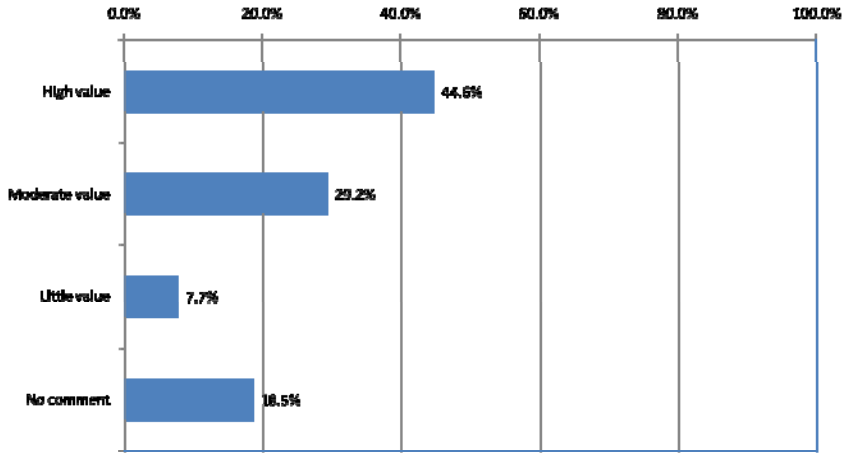
SLHS Changes in Productivity – 32% *All Valid*

Participants Who Took Both WLQ Surveys with Improved Systolic BP



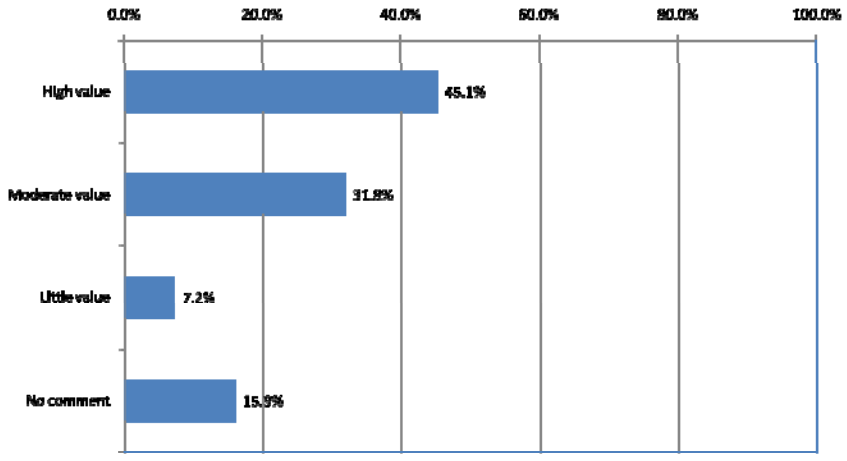
Describe how you evaluate the following part of MHI

Body-*for*-LIFE nutrition plan



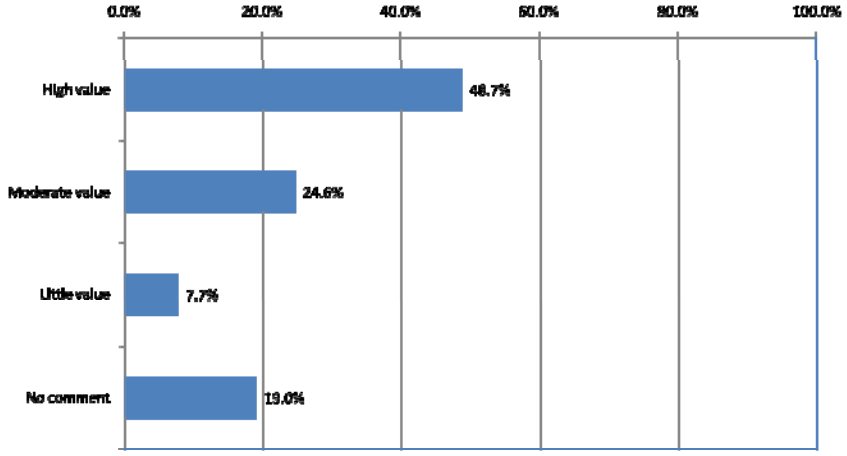
Describe how you evaluate the following part of MHI

Body-*for*-LIFE exercise plan



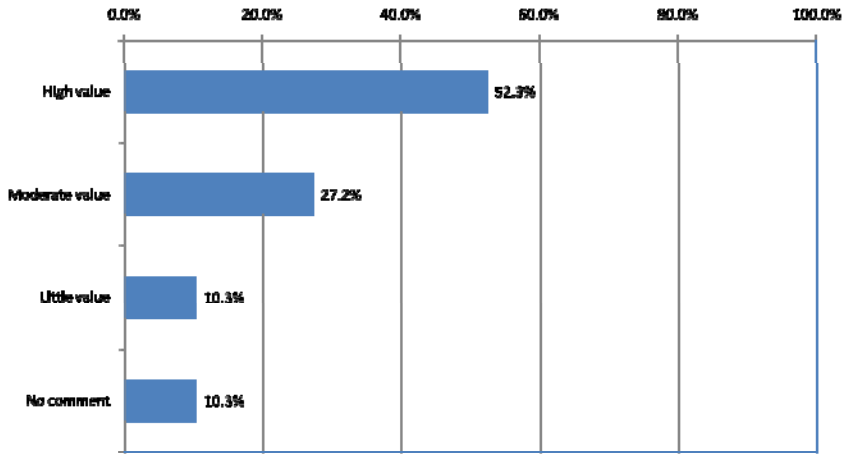
Describe how you evaluate the following part of MHI

Metabolic Health Education Classes by Provider

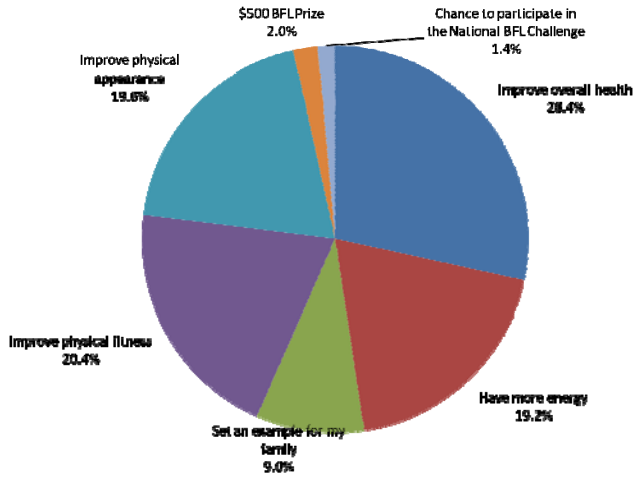


Describe how you evaluate the following part of MHI

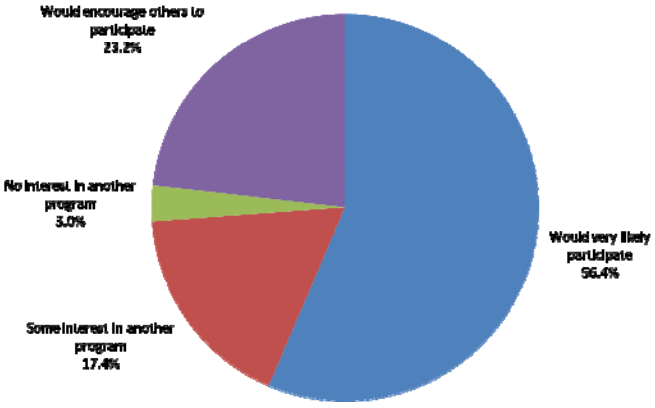
Email notification



What was your main motivation for participating in SLMHI?



Which best describes your interest in future health programs from your employer?



08 -09 IHPM Field Research Focus for Multiple Diseases and Risks

- Impact of various models to improve prescription medication compliance
  - Pharmacist phone calls and email communications
  - Pro-Change "Readiness to Change" by Dr. James Prochaska
  - On-line only program
  - Co-pay / co-insurance reduction / elimination

Modifying Lifestyle Behaviors to Reduce Metabolic Risks

Metabolic Health In The Workplace

Summary of Three Projects

Rick Nevins, MD
VP, Chief Research Officer
Institute for Health and Productivity Management

Sean Sullivan, JD President & CEO - IHPM

Sean Sullivan is co-founder, President and CEO of the Institute for Health and Productivity Management (IHPM) – a global enterprise working with employers to improve their employees' health and maximize its impact on business performance; and CEO of the Initiative for Value-Based Health Benefits (IVB). Health and productivity management is emerging as the only health delivery model that can maximize employers' return on their investment in workers' health.

Since its founding in 1997 the Institute has served as the catalyst and champion of an expanding international movement to make health a leading human capital asset for the 21st century.

Prior to founding the Institute, Mr. Sullivan was the original President and CEO of the National Business Coalition on Health, and also spent ten years as a Washington-based health policy analyst – as a fellow at the American Enterprise Institute for Public Policy Research, and as Executive Vice President of New Directions for Policy. He is the author of articles and monographs on health policy and health care market trends, and has testified on these subjects before Congress and state legislatures.

Mr. Sullivan is Editor-in-Chief of the quarterly magazine *Health & Productivity Management*, is on the editorial board of *Managed Healthcare Executive*, and is a reviewer for the *Journal of Occupational and Environmental Medicine*. He also serves on the National Advisory Board of the Corporate Health Improvement Program. He speaks both nationally and internationally on health and productivity management as a leading business strategy for the modern knowledge-based economy.

Mr. Sullivan holds degrees in economics from Harvard, and law from Stanford.

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sean@ihpm.org

David Day, MS, RPh

Director, Outcomes Research – Aetna Pharmacy Management

David Day is the Director of Outcomes Research for Aetna Pharmacy Management. He is responsible for the development and execution of Aetna's outcomes research, pharmacoeconomics, and pharmacovigilance programs that are used to make evidence-based formulary decisions and guide Aetna's medical department in the refinement of care considerations related to drug therapy. David provides input to Aetna's Value-Based Insurance Design programs with emphasis on medication adherence improvement measurement and interventions.

Prior to joining Aetna, David was Senior Director of Clinical Applications for Pfizer Inc. and was responsible for management of several medication adherence initiatives for Pfizer. David co-authored the *Case Management Adherence Guidelines* for the Case management Society of America and has developed many software applications to assess the impact of medication adherence on total healthcare costs, management of cardiovascular risk factors, patient satisfaction with drug therapy, and assessment of the economic impact of drug modifiers on healthcare outcomes.

David's background includes 12 years of service as a hospital pharmacy director with focus on the impact of pharmaceuticals on acute care outcomes and risk mitigation through detection and avoidance of adverse drug reactions and medication errors.

Value-Based Benefits

Medication Adherence and associated opportunities with fully integrated health benefits

David Day, Ms, RPh
Director – Outcomes Research, Pharmacoeconomics, and Pharmacovigilance

Aetna Pharmacy Management

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Agenda

- Adherence overview
  - Issues
  - statistics
- Solutions from an integrated benefit design perspective
- Pitfalls for the self-insured employer
- The multiplier effect of integrating adherence with other member outreaches
- Questions

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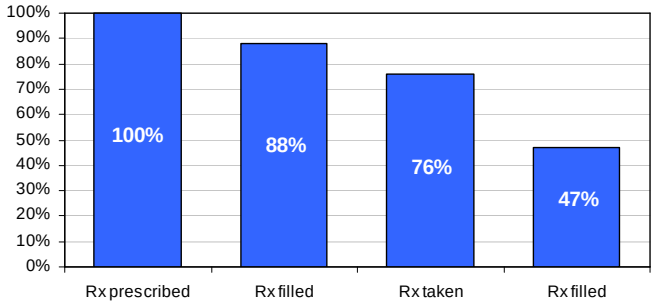
2

U.S. Patients Do Not Take Medications as Prescribed

* 22% of U.S. patients take less of the medication than is prescribed



American Heart Association: Statistics you need to know. http://www.americanheart.org/presenter.jhtml?identifier=107 Accessed November 21, 2007.

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Statin adherence as measured by proportion of days covered (PDC)

- Below 80% PDC was considered suboptimal adherence.
- Within 3 months, mean PDC had fallen to 79%.
- After 3 months, 40% of patients had suboptimal adherence.
- After 12 months, 61% had suboptimal adherence.

Benner JS, Glynn RJ, Mogun H, Neumann PJ, Weinstein MC, Avorn J. Long-term persistence in use of statin therapy in elderly patients. JAMA 2002;288:455-461

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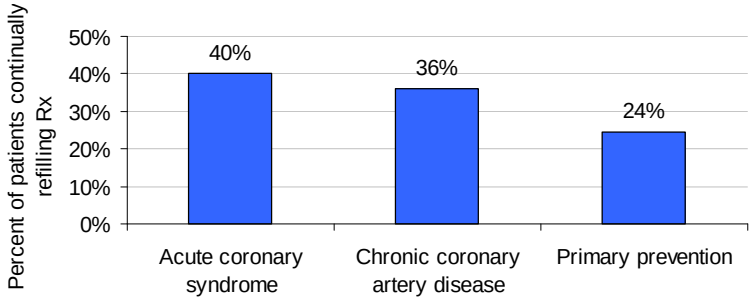
4

Adherence to statins after two years, by condition



Jackevicius CA, Mamdani M, Tu JV. Adherence with statin therapy in elderly patients with and without acute coronary syndromes. JAMA 2002;288:462-467

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Why adherence matters

Failure to adhere to prescribed medications can result in:

- Poor health outcomes
- Increased hospitalization
- Increased costs
- Decreased quality of life
- Decreased productivity
- Patient death

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Non-Adherence Costs

"Of all medication-related hospital admissions in the United States, 33 to 69 percent are due to poor medication adherence, with a resultant cost of approximately $100 billion a year."

Osterberg L, Blaschke T. Adherence to Medication. NEJM 2005;353:487-497

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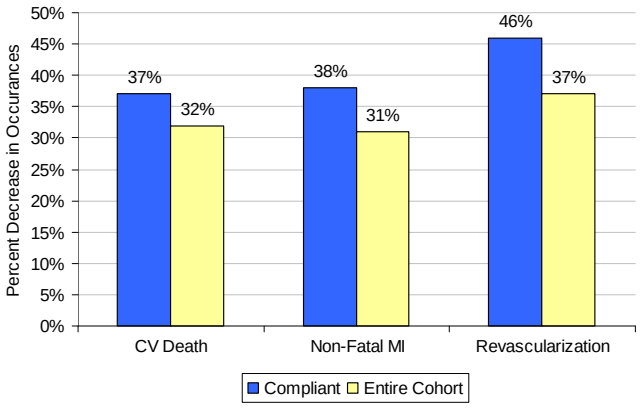
Statin Therapy Adherence Demonstrated to Improve Three Specific Outcomes



West of Scotland Coronary Prevention Study (WOSCOPS). Compliance and adverse event withdrawal:their impact. Eur Heart J 1997;18:1718-1724

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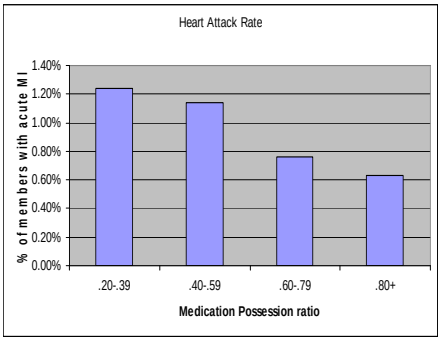
Adherence appears to be a more important factor than marginal differences in potential product performance in avoiding costly events.

3 year acute MI rates Intent to treat - continuers	Drug	n	n MI	% MI
	Crestor	702	7	1.00%
	Lipitor	3839	23	0.60%
	Simvastatin	1985	15	0.77%

3 year acute MI rates DIscontinuers	Drug	n	n MI	% MI
	Crestor	1778	21	1.18%
	Lipitor	10730	115	1.07%
	Simvastatin	6508	71	1.09%

3 year acute MI rates Continuers without switch	Drug	n	n MI	% MI
	Crestor	500	4	0.80%
	Lipitor	3284	19	0.58%
	Simvastatin	1623	9	0.55%



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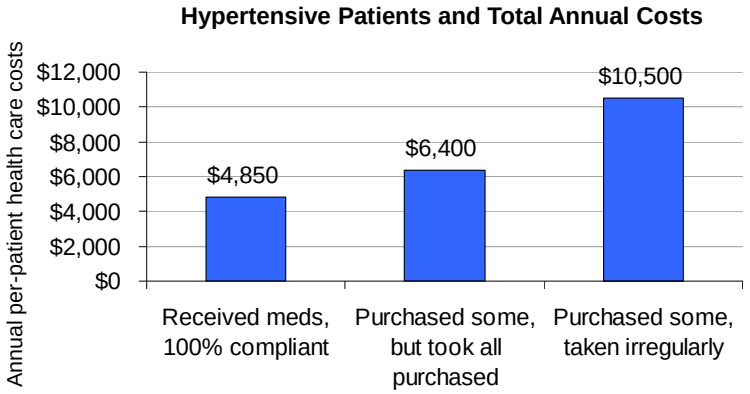
Poor adherence increases total health care costs



Smith DL. The effect of patient non-compliance on health care costs. Medical Interface 1993:April; 74-84

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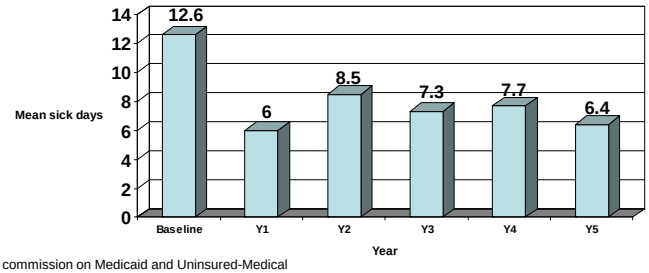
Poor adherence impacts wellness and productivity

- 47% of employees postponing care report significant loss of time at work
- 53% report significant temporary disability resulting in significant pain and suffering
- 17% report long-term disability from postponing care. **(1)**

Annual sick days - Asheville project (2)

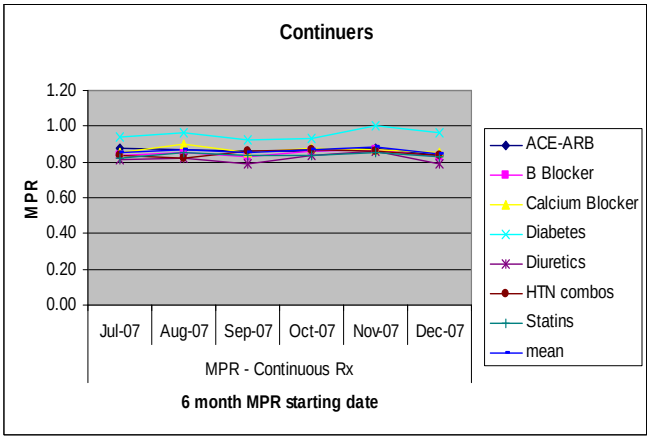


1. Kaiser commission on Medicaid and Uninsured-Medical Debt and Access to healthcare: Executive Summary, September 20905

2. Cranor, CW et al. The Asheville Project:Long-term clinical and economic outcomes of a community pharmacy diabetes care program. L Am Pharm Assoc, 2003; 43:173-84.

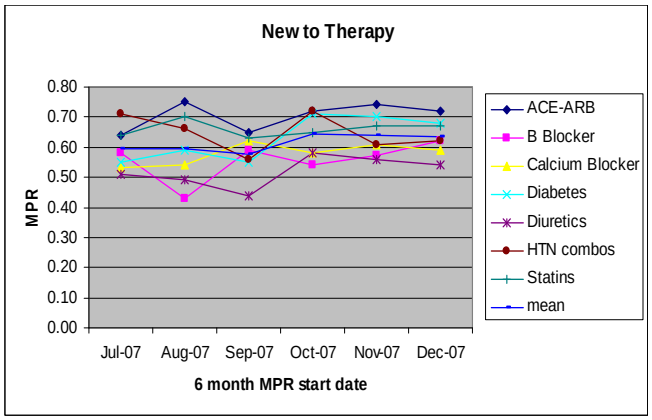
11

Adherence will vary depending upon the patient's experience with taking medicines.



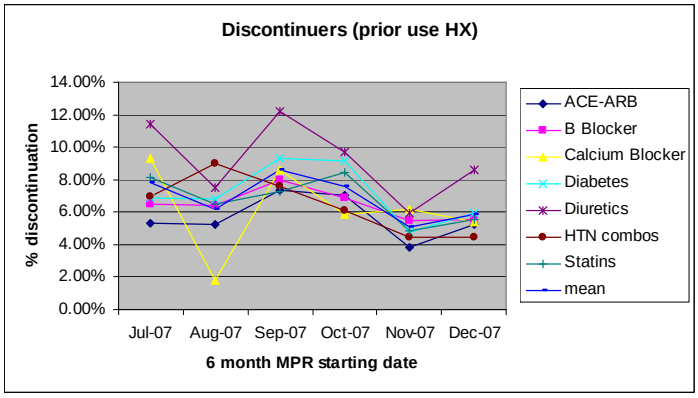
12

Adherence will vary depending upon the patient's experience with taking medicines.



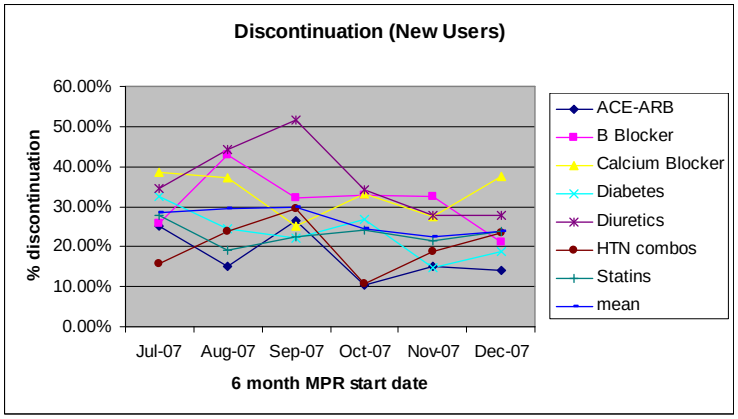
13

Adherence will vary depending upon the patient's experience with taking medicines.



14

Adherence will vary depending upon the patient's experience with taking medicines.



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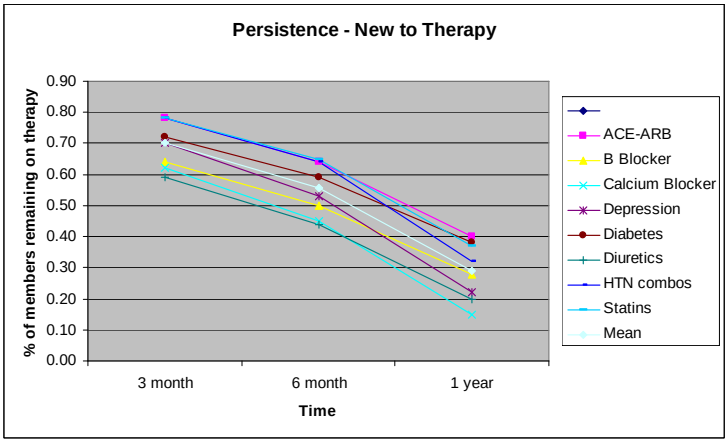
Adherence will vary depending upon the patient's experience with taking medicines AND drug type.



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Solutions from an Integrated benefit design perspective

- Formulary
  - Value-Based Insurance Design
- Clinical edit programs
- Pharmacist and Case manager Interventions and Support
  - High risk members and disease states
  - Specialty medications
  - MTMP (Medicare)

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The Copay Effect

- Adherence with statin therapy consistently has been found to be far from optimal even in populations with full drug insurance coverage.
- Already bad adherence to newly initiated statin therapy was further reduced by 5 percentage points as a consequence of a fixed copayment policy and a subsequent coinsurance policy

Schneeweiss S, Patrick AR, Maclure M, et al. Adherence to statin therapy under drug cost sharing in patients with and without acute myocardial infarction. Circulation 2007; DOI: 10.1161/circulationaha.106.665992

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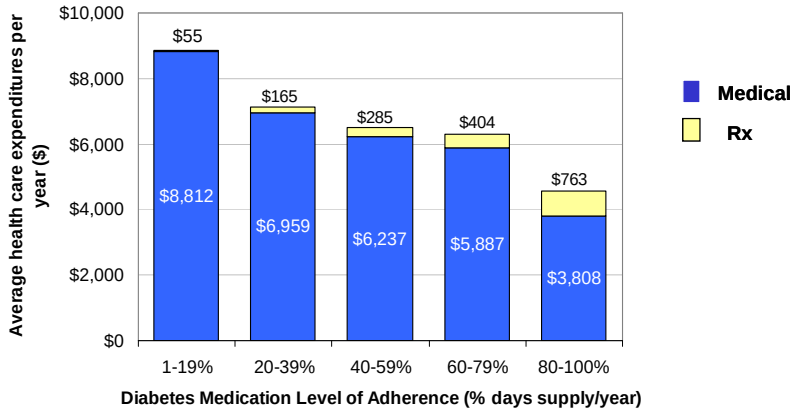
18

Investment in Medication Adherence can Lead to Dramatic Reductions in Overall Cost of Care



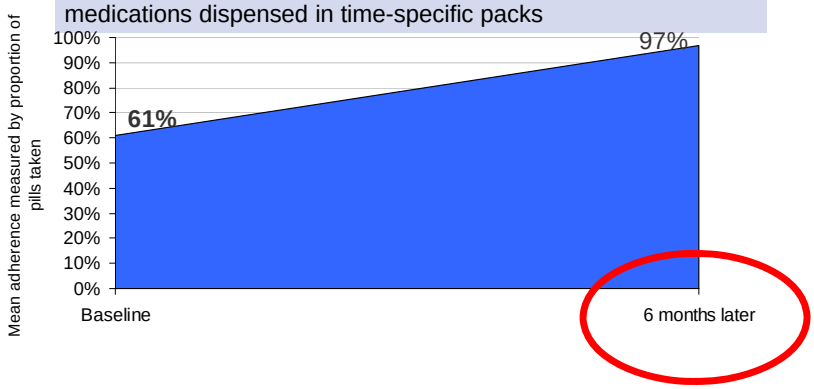
Outcome is significantly higher than outcome for 80-100% adherence group ($P<0.05$). Differences were tested for medical cost and hospitalization risk.

Sokol M et al. Impact of Medication Adherence on Hospitalization Risk and Healthcare Cost. Medical Care. Volume 43, Number 6, June 2005

19

The Education and Outreach Effect

Mean adherence following a six-month program of standardized medication education, regular follow-up by pharmacists, and medications dispensed in time-specific packs



Lee JK, Grace KA, Taylor AJ. Effect of a pharmacy care program on medication adherence and persistence, blood pressure, and low-density lipoprotein cholesterol: a randomized controlled trial. JAMA. 2006 Dec 6;296(21):2563-71.

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Aetna Healthy Actions Provides A Targeted Copay Solution

- Reduce copays selectively for members with chronic conditions
- Motivate members requiring but not receiving essential drugs to begin taking them
- Motivate members already taking essential drugs to remain compliant

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Rx Savings Plan Design Goals

- Identify members requiring chronic drug therapy and offer them discounts to:
  - Improve member compliance
  - Improve quality of care
  - Decrease adverse events
  - Decrease healthcare costs for both members and employers
  - Improve member satisfaction
  - Utilize information technology to identify and target appropriate members

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Rx Savings Design Options

- Copayments reduced to encourage members to continue taking prescriptions for chronic conditions
- Copayments reduced to incent members to begin taking important medications when CareEngine finds they these are missing
  - Generics: up to 100% copay reduction
  - Formulary brand: up to 50% copay reduction

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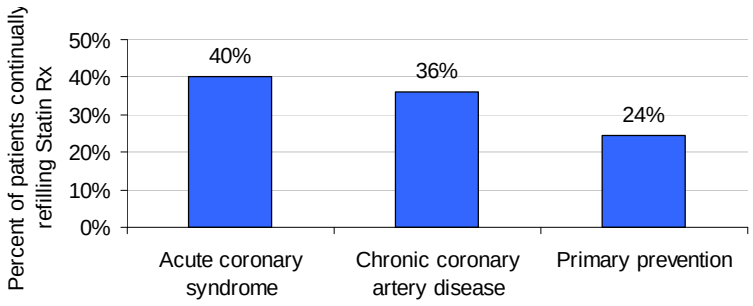
Pitfalls for the self-insured employer

- Sustaining adherence is critical to achieving savings



Jackevicius CA, Mamdani M, Tu JV. Adherence with statin therapy in elderly patients with and without acute coronary syndromes. JAMA 2002;288:462-467

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Pitfalls for the self-insured employer

- Cost is not the only factor in adherence
  - Competing priorities (I forgot syndrome) (24%)
  - Side Effects (20%)
  - Cost (17%)
  - Perception of illness and medicines –don't need the drug (14%)
  - Difficulties in getting refills (10%)
  - Cultural issues
  - Age
  - Life events
  - Others

Boston Consulting Group and Harris Interactive, Dec 2003.

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Questions?

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ARTICLES

WorkPlace Centers

Metabolic Health

A division of IHPM

Abbott
A Promise for Life

Founding Sponsor 2004™

By Linda Roberts

In May 2004, IHPM announced the creation of the WorkPlace Center for Metabolic Health, with Abbott as the founding sponsor. This is the first of several WorkPlace Centers to be established as a new division of IHPM. The Center's Mission is to improve health, productivity and quality of life by applying evidence-based, best practices for prevention, diagnosis and treatment of Metabolic Syndrome and its related medical conditions – obesity, diabetes, hypertension, dyslipidemia, and renal disease.

Key Center Deliverables

- Identify current challenges and possible solutions associated with Metabolic Syndrome.
- Implement worksite interventions to improve diagnosis and treatment of metabolic risk factors and conditions.
- Measure their effectiveness and publish the results to provide examples for others to follow.

Significance of Metabolic Syndrome

Metabolic Syndrome (also known as Syndrome X or Insulin Resistance Syndrome) describes a cluster of conditions that increase the risk of heart disease, stroke and diabetes. A recent Centers for Disease Control (CDC) report estimates that more than 30 percent of adults in the U.S. have Metabolic Syndrome. The number one disease contributing to the growing numbers of patients being diagnosed with Metabolic Syndrome is obesity; more than two-thirds of the U.S. population is either overweight or obese.

Data released by Medco Health Solutions, Inc., revealed that the average annual pharmacy cost of treating adult patients with Metabolic Syndrome exceeds $4,000, more than four times the average annual drug cost for all other patients. One of the Metabolic Center's objectives is to promote medical consensus on drug therapy and treatment guidelines.

Progress Report

- An Advisory Board Meeting was held on Tuesday, April 26, 2005.
- The University of Michigan conducted a literature review. In June, 2005, "A Comprehensive Review of Metabolic Syndrome: Impact on the Individual and the Employer" was completed.
- Four potential sites have been identified for the workplace interventions.
- Recruitment of participants for the interventions has begun.

Current Initiatives

IHPM Breaks Ground in China

Abbott, BioSignia and IHPM, in association with WellTech (a subsidiary of BioSignia and the first registered Disease State Management vendor in China) and Huadong (East China) Hospital (the leading and most prestigious nutritional hospital and university in China) have combined resources to bring the first preventive and active-stage diabetes management program to employers in China.

Their mission is to reduce health risks and complications associated with diabetes and cardiovascular disease by implementing an evidence-based program of screening, behavioral modification and lifestyle intervention according to established

ADVISORY BOARD TO THE WORKPLACE CENTER FOR METABOLIC HEALTH

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Bill Landschulz, MD, PhD	VP, Metabolic Disease Development
Mark Pirner, MD, PhD	Director, Medical Nutritionals, Abbott International
Clinical	
Ken Fujioka, MD	Director, Nutrition and Metabolic Research Center, Scripps Clinic Del Mar
Anne Wolf, MS, RD	Instructor of Research, University of Virginia
Employers	
Bill Bunn, MD	VP & CMO, International Truck and Engine
Pamela Thomas, MD	Director, Health & Wellness, Lockheed Martin
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Dennis Richling, MD	CEO, Midwest Business Group on Health
Managed Care	
Art Small, MD	Senior VP, United Healthcare
Ron Loeppke, MD, MPH	Executive VP and Chief Medical Officer, CorSolutions

TABLE 1

Shanghai Turbines Group Co. Ltd. and Shanghai Electric Motor Company allowed their employees to take one and a half hours off the assembly lines to attend the educational meeting, a practice that is rare for China and this industry.

best practices for diabetes prevention and management.

The intervention officially began May 12, 2005. A celebratory meeting honored the providers and participants in the project. Participants received education and training on how to manage diabetes, and the importance of nutrition and exercise.

Interest in health and productivity improvement is on the rise in China, as evidenced by the commitment of the participant companies. Shanghai Turbines Group Co. Ltd. and Shanghai Electric Motor Company allowed their employees to take 1.5 hours off the assembly lines to attend the educational meeting, a practice that is rare for China and this industry. Mr. Zhaokai Zhu, Labor Union Vice President from Shanghai Turbines, spoke of his company's commitment to invest in the health of its employees.

Midpoint study results will be shared at this year's IHPM Annual International Conference in Phoenix, Arizona. IHPM plans to expand its presence in China with the continued support of Abbott and BioSignia.

Get Healthy Tri-City Challenge

Every year, *Men's Fitness* magazine publishes a "Top 10" list of the fattest U.S. cities. Chicago, Detroit and Houston have landed spots within the top 5 for several years.

Abbott, BioSignia and IHPM have teamed up to bring the "Get Healthy Tri-City Challenge™" to these three cities.

Four employers have been selected to represent their respective cities in the challenge –- these include International Truck & Engine from Chicago, Chevron Texaco from Houston and two from Detroit – Wayne County Airport Authority and ArvinMeritor.

Porter Freeman, 1997 Body-*for*-Life winner and author of Finally Fit at 50 motivates participants at Chicago site Orientation.

The Get Healthy Tri-City Challenge™ is a challenging, fun and rewarding way for employees to get healthy. The intervention is based on the Body-*for*-LIFE™ program developed by EAS founder Bill Phillips, and represents an integrated, life-long approach to exercise training, proper nutrition and goal setting.

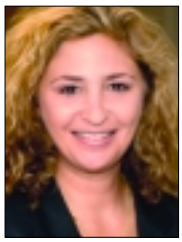
The 12-week program teaches people how to build muscle and burn fat by following a combination weight and cardio fitness routine, and eating small but frequent nutritious meals to boost their metabolism and burn more calories.

All employees are required to complete productivity surveys, pass a physical exam, attend three lab draws, and record their exercise and meal selections in journals throughout the intervention. Lifestyle coaching is also required.

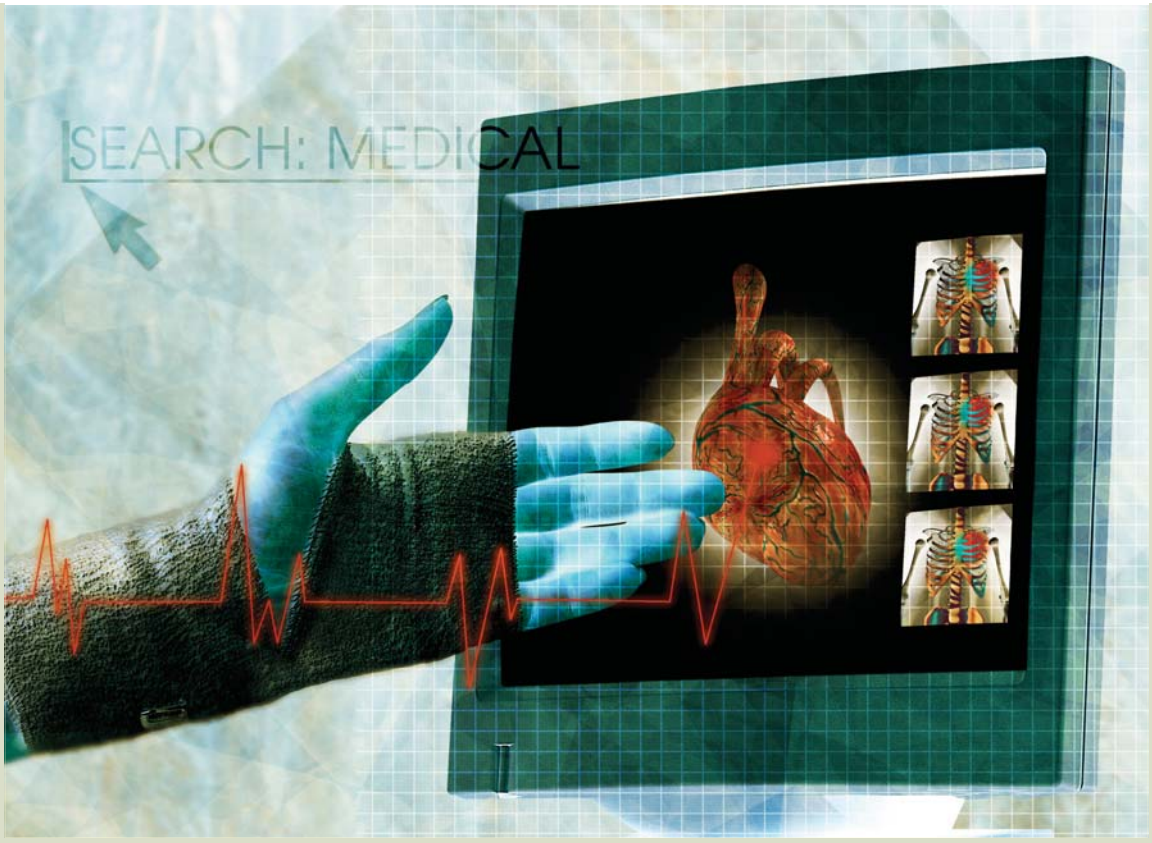
BioSignia's "Know Your Number™" modifiable risk assessment tool will be used to measure the program's impact on employee health.

Employees will be able to win individual prizes based on the official Body-*for*-Life™ rules (50/50 weighting of physical and mental transformation). Each will also receive a $100 incentive for completing the six-month program and submitting all required documentation. The winning company will be determined by the percentage improvement in all modifiable risk factors for its employees.

The intervention officially began July 22, 2005. Results will be presented at the IHPM 2nd Annual Health Management conference next spring. HPM



Linda Roberts is Manager in Corporate Marketing and Business Development for Abbott. During her 15-year tenure with Abbott, she has led and developed diverse initiatives in emerging markets throughout Europe, Asia, Latin American and the Middle East. She helped start the employer initiative at Abbott and was nominated Account Manager of the Year by Benefit Managers in 2003/2004. Linda holds a degree in Business Administration and Psychology and is pursuing her MBA from the Keller Graduate School of Management.



Incidence of **Atherosclerotic Vascular Diseases Increases** When Individual Metabolic Syndrome **Risk Factors Cluster**

By Rick Nevins, MD

The real pathophysiology of the metabolic syndrome is atherosclerotic vascular disease (ASVD) or plaque formation in arteries. ASVD can result in cardiovascular, cerebrovascular and peripheral vascular diseases, as well as aneurysms and small vessel disease. In these conditions, lipids, platelets and other blood elements obstruct arteries and reduce blood flow and oxygen supply to tissues and cells.

It is because of this common outcome that the combined diseases of the metabolic syndrome are so powerful in creating significant physical and fiscal burdens.

Any one of the four metabolic syndrome diseases can be, by itself, a significant health problem and risk factor for the development of atherosclerosis. Additionally, the metabolic syndrome diseases are co-morbidities for each other – increasing the incidence, accelerating the progression and complications, and making the medical management of the other diseases more difficult. Therefore, each of the four diseases of the metabolic syndrome brings its own pathology and co-morbidity dynamics.

The following findings are preliminary analyses of self-reported data from a field project for metabolic syndrome. The data illustrate the impact of multiple risk factors on the incidence of metabolic syndrome, comparing obesity/overweight (OB/OW) with the other four risk factors in 994 respondents. While OB/OW alone may be present in one-third of the respondents, the other risk factors combine for the other two-thirds in this group, demonstrating the additive effect of additional risks:

34.5 percent indicate likelihood of metabolic syndrome
17.5 percent have OB/OW as only risk factor

Treating individual risk factors singly inadequately addresses the adverse clinical and economic impact of metabolic syndrome diseases, leaving residual risk.

Treatment of metabolic syndrome must include optimizing the management of each disease – not just one or even two. Management must include recognizing that a patient with one or two of these diseases will likely develop at least one more of the diseases over time. This progression of disease can

The need to focus on all **of the** metabolic syndrome diseases **and** risk factors is obvious**, and management that treats only** blood glucose levels **will leave** substantial residual risks.

be delayed or prevented if diagnosed early or its risk factors managed aggressively.

The following examples, using diabetes and OB/OW, illustrate the interaction of multiple co-morbidities to produce atherosclerosis and the need to address all of these co-morbidities.

The traditional focus of diabetes treatment has been to manage blood glucose levels to avoid hypoglycemic and hyperglycemic events that could result in complications or death. Additionally, excess glucose can bind to substances in the blood and cells, creating glycated products that damage tissues, cause blindness, decrease immunity and result in neurological signs and symptoms. Controlling glucose levels is a very important component of the overall management of diabetes, but it must not be the only focus.

Many Type 2 diabetics are obese and have hypertension and diabetic dyslipidemia – defined as increased triglycerides, increased LDL and reduced HDL. Most diabetic deaths result from dyslipidemia-induced atherosclerosis – 50 percent from myocardial infarctions (heart attacks) and 25 percent from strokes – both made more likely by hypertension and OB/OW.

Multiple studies over the last several years demonstrate that abdominal adiposity (increased visceral fat/central adiposity) is a significant risk factor or co-morbidity for Type 2 diabetes, dyslipidemia and hypertension and, thus, for development of atherosclerosis. Waist/hip ratio and body mass index (BMI), which are more commonly used, are less reliable measures of metabolic syndrome risks.

Strategic Approach to the Metabolic Syndrome

The appropriate management of metabolic syndrome emphasizes education and compliance with medical recommendations for the six factors involved with metabolic syndrome – diabetes, hypertension, elevated triglycerides, obesity/overweight and reduced HDL, plus proper nutrition and exercise.

These last two are crucial factors in the long-term management of metabolic syndrome. It is very difficult to successfully manage metabolic syndrome without the right kinds of nutrition and exercise programs as the foundation of therapeutic lifestyle changes. Education and behavior change initiatives must include several methods to inform and educate patients, with the goal of influencing behavior to increase employee participation in management of their own diseases.

Program participants should receive education, information and instruction in several ways – print materials, from a dedicated web site, or during on-site and virtual classes and health fairs. All educational and instructional content should be delivered multiple times in various formats to maximize the learning benefits of repeated exposure to program content.

The curricula should involve experts from various field including physicians, nurse educators, registered dieticians, PharmDs, behavioral therapists, exercise physiologists, etc. Likewise, mentoring and health coaching should be delivered by various kinds of experts and over the same communications platforms used for the education curricula.

The instructional design of a metabolic syndrome intervention should include:

- comprehensive curricula on diabetes, hypertension, dyslipidemia, obesity/overweight, nutrition, exercise;
- integrated content delivery by instructors/educators/clinicians;
- a combination of education, coaching and mentoring to improve compliance and effect behavior change; and
- instruction, education and communications using multiple platforms – dedicated web site, classes, hard copy, telephone. HPM

Rick Nevins is a strategist and consultant to both the care delivery and business sides of the healthcare profession, designing and developing evidence-based clinical care delivery systems, integrating benefit design, configuring formularies, and analyzing patterns of care to improve clinical, financial, and functional outcomes for employers and their employees.

He was responsible for clinical knowledge bases and software design of clinical care applications in several countries while serving as Medical Director for National Health Enhancement Systems and as VP of Medical Affairs for HBO & Company and McKesson.

Dr. Nevins has been an occupational and employee health physician for national employers, including Mobil Oil, Yellow Freight, and Consolidated Freightways. He speaks at conferences and writes on healthcare trends economic and digital solutions for healthcare, with particular interest in the relationship between employee health and individual and company productivity.

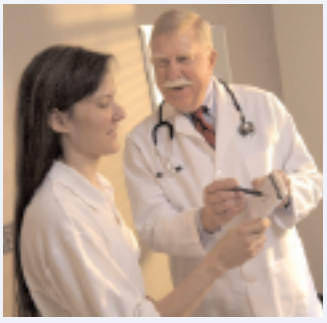
Dr. Nevins received his MD from the University of Oklahoma School of Medicine. He practiced emergency and family medicine for over 20 years, is a diplomat of the American Board of Family Practice and a Fellow of the American Academy of Family Physicians. In 1988 he was the recipient of the first "Heartiest Five" award from the American Heart Association for excellence in teaching and practicing the principles of cardiovascular risk factor reduction.

PERSPECTIVES

Position on Metabolic Syndrome

By Anne Wolf, MS, RD

Recently, the American Diabetes Association and the European Association for the Study of Diabetes (ADA/EASD) published a joint statement questioning the scientific validity of metabolic syndrome.[1]



They assert that its value in clinical practice is questionable because of doubt about a unifying etiology, the imprecision of some criteria, and its questionable utility in cardiovascular risk assessment beyond established tools. They do not imply, however, that use of "metabolic syndrome" in clinical practice harmfully displaces other risk assessment tools or deters the use of appropriate therapies in patients at high risk.

I do agree that at this time the scientific community does not fully understand the pathophysiology of metabolic syndrome and that insulin resistance does not necessarily underlie all cases of metabolic syndrome … and that the evolving understanding of metabolic syndrome has and will continue to impact the definitions of metabolic syndrome.[1,2,3]

But, when has medical science stopped because of an evolving understanding? Because research is closely linked to medical practice, by definition, medical science is always in an evolving state. And the evolving understanding of metabolic syndrome, to date, has little changed the clinical assessment and treatment of this cluster of risk factors.

From a clinical perspective, on the other hand, the concept "metabolic syndrome" has been very useful to clinicians who "saw" this cluster of risk factors repeatedly in their practice, but were not addressing it holistically until the concept took firmer root.

Having a "syndrome," even if it does not incur greater risk than the individual risk factors alone, does encourage the clinician to assess and treat global risk. And, importantly, the metabolic syndrome brings the necessary attention on abdominal adiposity, HDL-cholesterol and triglycerides – risk factors that received inadequate attention and treatment because of the emphasis on LDL cholesterol in guidelines.

Because of the obesity epidemic, more attention is being paid to body mass index (BMI) in clinical practice; this is important. However, the National Heart, Lung, and Blood Institute (NHLBI) guidelines on the overweight and obesity[4] clearly mark the importance of waist circumference, the clinical surrogate for measuring abdominal or visceral fat.

Visceral fat, in excess, is linked to insulin resistance and proinflammatory states, and acts as a highly active organ that responds to a host of endocrine or neurological signals.[5] Visceral adiposity appears to be a better indicator of cardiovascular and metabolic risk than obesity alone[6]; but few measure it in clinical practice.

With the advent of metabolic syndrome, clinicians are becoming more aware of the importance of measuring waist circumference as well as BMI. And because of the concept of "metabolic syndrome" clinicians have become more attentive of the triad of high waist circumference, high triglyceride levels and low HDL-C levels as it relates to cardiovascular risk.[7, 8]

For clinicians, the assessment of high waist circumference and triglyceride levels and low HDL-cholesterol levels are not only signals to prescribe lifestyle treatment (diet and physical activity) but are also important and simple indicators of high risk in patients who, because of normal LDL cholesterol, would otherwise go unidentified as high risk for cardiovascular disease. HPM

Anne Wolf is a clinician researcher who has worked with obesity and the cost of obesity for the last 15 years, and is an investigator of research in the Department of Health Evaluation Sciences at the University of Virginia School of Medicine. As President of Anne Wolf & Associates, Wolf consults and works with companies on issues related to nutrition, obesity, weight management and the economic impact of obesity.

Her research addresses the economic impact of obesity and she has authored over 30 articles and abstracts on this topic. Wolf has been actively involved in public policy and committee work in the area of obesity, physical activity and the economic impact of obesity. She was the Chair of the North American Association for the Study of Obesity (NAASO) TOOLS Task Force. She was a member of a WHO panel on cost-effectiveness of physical activity, as well as two CDC panels on the economic impact of obesity and physical inactivity.

Please contact Deborah@ihpm.org to acquire references for *Perspectives: Position on Metabolic Syndrome* (pp. 16).

IHPM

INSTITUTE FOR HEALTH AND PRODUCTIVITY MANAGEMENT

What is IHPM?

The Institute for Health and Productivity Management (IHPM) is a global enterprise created in 1997 to establish the full value of employee health and maximize its impact on business performance. It does this by helping employers to:

1. Identify the total cost impact of employee health on business performance;
2. choose the best opportunities to reduce this cost impact and improve performance;
3. measure the success of their efforts.

IHPM works with all who have a stake in employee health: employers, providers, suppliers, health plans and workers themselves. Through its national advisory groups and an expanding network of alliances and affiliates, the Institute is building the evidence-based business case for managing health to produce gains in productivity.

IHPM offers educational opportunities through its teaching arm – the Academy for Health and Productivity Management (AHPM). Academies are taken onsite to customer locations and designed for their specific learning needs. Its expert faculty is taken from industry, academe, and consulting and its Board of Education is made up largely of corporate representatives who are recognized as leaders in the field of Health and Productivity Management (HPM). More information on the Academy can be found by visiting: www.ahpm.org

IHPM Mission

The Mission of the institute is to establish the value of employee health as a business investment in corporate success. It does this by:

1. serving as a global resource on health and productivity;
2. developing the tools, metrics, and methods to drive and measure enhanced corporate performance;
3. championing investment in health capital as a strategy for corporate success;
4. educating and equipping purchasers, providers, and suppliers to gain greater value from improving employee health.

We invite you to participate in the rapidly expanding activities of IHPM. Depending on membership level, Institute members benefit from:

- preferred access to the latest research findings on HPM, and our extensive network of HPM resources;
- opportunities to participate in health and disease management initiatives;
- IHPM electronic newsletter (e-news);
- discounted registration fees to training events and conferences;
- subscriptions to the quarterly magazine, *Health & Productivity Management,* and the semi annual peer-reviewed journal - *Journal of Health & Productivity*;
- opportunity to present at IHPM events;
- discounts on training through the Academy.

IHPM has become a driving force for changing the healthcare model to deliver enhanced workplace performance as the ultimate outcome for employers. The Institute is pursuing its mission of making the health of employees an investment in the success of the total business enterprise by working with all major stakeholders – purchasers, providers, health plans, pharmaceutical makers and consumers.

We invite you to join us in this mission by becoming a member at any level:

- Advisory Council
- Advisory Committee
- Affiliate
- Employer Group
- Individual

For more information about IHPM, AHPM, and our conferences and events please visit us at www.ihpm.org and www.ahpm.org

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