Wellness at the Workplace Conference
1982 to 2006

THE UNIVERSITY OF MICHIGAN
HEALTH MANAGEMENT RESEARCH CENTER
WW I to WW XXV

Themes
WW I to WW XXV

Learnings from WW Conferences

and

From the UM-HMRC
Key Research Learnings from HMRC

1980  Implement and disseminate HRA from CDC/Carter Center to Move from Mortality outcomes to medical, pharmacy and time away from work as our primary outcome measures

1990  Consult and implement Wellness Programs in 20+ companies

1991  High risk persons are high cost (prospective data)
      a.) Individual risks
      b.) Cumulative risks (0-2, 3-4, 5 or more)

1993  Absenteeism shows the same relationships to risks as medical costs

1993  Excess costs are related to excess risks

1994  Changes in costs follow changes in risks (medical and pharmacy)

1995  Risk combinations are the most dangerous predictors of cost

1996  Low risk maintenance is an important program strategy
Key Research Learnings (Continued)

1996  Changes in risk drive changes in cost when targeted according to specific risk combinations: resource optimization

1997  Benchmarking by wellness score and company health score

1998  Risk and cost moderation is related to participation

1998  Program opportunities are in preventive services, low-risk maintenance high-risk intervention and disease management

1999  Presenteeism introduced as a measure of productivity and influenced by risks and disease

2000  Define the total value of health to an organization

2001  Establish the natural flow of risks and Costs

2002  Focus on the person and not the risk or the disease
Key Research Learnings (Continued)

2002  Changes in costs follow changes in risks (time away from work)

2003  Employer sponsored programs can result in improved population health status

2004  Proof of Concept requires bending the cost trends

2004  Percent participation and percent low-risk proposed as the important elements or a Health Management scorecard

2005  Pre-retirement participation can influence post-retirement participation

2006  Interventions are susceptible to severe “step down” participation

2006  Changes in costs follow changes in risks (presenteeism)

2007 and beyond
Learnings: To obtain the total value of a healthy and productive workplace requires a combination of leadership, environmental, individual and population interventions.
UM-HMRC Corporate Consortium

- Steelcase
- Bank One
- Progressive
- We Energies
- General Motors
- Crown Equipment
- Foote Health System
- Medical Mutual of Ohio
- St Luke’s Health System
- Cuyahoga Community College
- Blue Cross Blue Shield Rhode Island
- United Auto Workers-General Motors
- Wisconsin Education Association Trust
- Southwest Michigan Healthcare Coalition
- Australian Health Management Corporation
- Kellogg
- Gulf Power
- Weyerhaeuser
- Delphi Automotive
- Network Health Plan
- Florida Power & Light

*The consortium members provide health care insurance for over two million Americans. Data are available from eight to 18 years. Meet on First Wednesday of each December in Ann Arbor.
Health Management in the Workplace

Healthier Person → Productive Employee → Gains for The Organization

Lifestyle Choices

Health Management Programs

Job Performance
1. Individual attitudes
2. Group attitudes
3. Energy levels
4. Vitality
5. Empowerment

1. Health Status
2. Life Expectancy
3. Health Care Costs
4. Productivity
   a. Absence
   b. Disability
   c. Worker’s Compensation
   d. Presenteeism
   e. Quality Multiplier
5. Recruitment and Retention
6. Company Visibility
7. Social Responsibility
Health Management

March 15, 2006

1. Introduction: Societal Need
2. Level 1: Basic Risk-Cost Relationship: Excess Costs
3. Level 2: Business Case: Costs follow Risks
4. Level 3: Health Management: Proof of Concept
5. Level 4: Serious Business Strategy: Implementation
7. Level 6: Next Generation: Individual, Company, Community, State, Nation

Slides available via e-mail attachment
Level 2

Basic Risk-Cost Relationship

Excess Costs related to Excess Risks
# Health Risks and Behaviors

<table>
<thead>
<tr>
<th>Health Risk Measure</th>
<th>High Risk Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>More than 14 drinks/week</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>Systolic &gt;139 mmHg or Diastolic &gt;89 mmHg</td>
</tr>
<tr>
<td>Body Weight</td>
<td>BMI ( \geq 27.5 )</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>Greater than 239 mg/dl</td>
</tr>
<tr>
<td>Existing Medical Problem</td>
<td>Heart, Cancer, Diabetes, Stroke</td>
</tr>
<tr>
<td>HDL</td>
<td>Less than 35 mg/dl</td>
</tr>
<tr>
<td>Illness Days</td>
<td>&gt;5 days last year</td>
</tr>
<tr>
<td>Life Satisfaction</td>
<td>Partly or not satisfied</td>
</tr>
<tr>
<td>Perception of Health</td>
<td>Fair or poor</td>
</tr>
<tr>
<td>Physical Activity</td>
<td>Less than one time/week</td>
</tr>
<tr>
<td>Safety Belt Usage</td>
<td>Using safety belt less than 100% of time</td>
</tr>
<tr>
<td>Smoking</td>
<td>Current smoker</td>
</tr>
<tr>
<td>Stress</td>
<td>High</td>
</tr>
</tbody>
</table>

**OVERALL RISK LEVELS**

- **Low Risk**           0 to 2 high risks
- **Medium Risk**        3 to 4 high risks
- **High Risk**          5 or more high risks
Lifestyle Scale for Individuals or for any Population

Premature Death/Disability → Chronic Signs & Symptoms → Feeling OK → High-Level Wellness/Maximum Performance

Feeling OK

Edington. Corporate Fitness and Recreation. 2:44, 1983
Risk Transitions
Time 1 – Time 2

- **High Risk (>4 risks)**
  - Time 1: 4,691 (10.8%)
  - Time 2: 2,373 (50.6%)

- **Medium Risk (3 - 4 risks)**
  - Time 1: 10,670 (24.6%)
  - Time 2: 5,226 (12.1%)
  - Mean of three years between measures: 1640 (35.0%)

- **Low Risk (0 - 2 risks)**
  - Time 1: 27,951 (64.5%)
  - Time 2: 26,591 (61.4%)
  - Mean of three years between measures: 4,163 (39.0%)

Mean of three years between measures

Modified from Edington, AJHP. 15(5):341-349, 2001
Cost Transitions

Time 1 – Time 2

High Cost ($5000+)

Medium Cost ($1000-$4999)

Low Cost (<$1000)

N=356,275 Non-Medicare Trad/PPO

Modified from Edington, AJHP. 15(5):341-349, 2001
**Medical/Drug Cost Comparison by Risk Status**

- **Illness Days >6/yr***: $1,129 (Low Risk) – $5,145 (High Risk)
- **Existing Medical Problem***: $1,303 (Low Risk) – $3,434 (High Risk)
- **Use Medication/Drugs***: $1,234 (Low Risk) – $2,557 (High Risk)
- **High BP (SBP >139, DBP >89)***: $1,228 (Low Risk) – $2,416 (High Risk)
- **Physical Health (fair or poor)***: $1,318 (Low Risk) – $1,816 (High Risk)
- **Physical Activity <1x/week***: $1,277 (Low Risk) – $1,756 (High Risk)
- **20% or more overweight***: $1,144 (Low Risk) – $1,750 (High Risk)
- **Stress (high)***: $1,310 (Low Risk) – $1,607 (High Risk)
- **Health Age***: $1,416 (Low Risk) – $1,593 (High Risk)
- **Life partly or not satisfied***: $1,374 (Low Risk) – $1,592 (High Risk)
- **Job partly or not satisfied***: $1,415 (Low Risk) – $1,460 (High Risk)
- **Cholesterol>239***: $1,421 (Low Risk) – $1,418 (High Risk)
- **Current Smoker***: $1,434 (Low Risk) – $1,336 (High Risk)
- **Safety Belt Usage <100%***: $1,473 (Low Risk) – $1,278 (High Risk)
- **Alcohol Drinks >14 weekly***: $1,428 (Low Risk) – $1,157 (High Risk)
- **Zero Risks***: $691 (Low Risk)

*p<.05.

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Estimated Loss of Productivity by Risk Status

- Use Relaxation Medication**: 18% Low Risk, 27% High Risk
- Life Dissatisfaction**: 20% Low Risk, 25% High Risk
- High Stress**: 20% Low Risk, 24% High Risk
- Safety belt Usage <90%**: 21% Low Risk, 24% High Risk
- Job Dissatisfaction**: 21% Low Risk, 24% High Risk
- Current Smokers**: 21% Low Risk, 24% High Risk
- Poor Physical Health**: 21% Low Risk, 23% High Risk
- Physical Activity <1x/wk**: 21% Low Risk, 23% High Risk
- BMI>=30.0**: 21% Low Risk, 23% High Risk
- High BP* 22% Low Risk, 23% High Risk
- Alcohol Drinks >14/wk 21% Low Risk, 23% High Risk
- High Cholesterol 20% Low Risk, 24% High Risk
- Zero Risks: 12% Low Risk, 20% High Risk

*p<.05, **p<.01

Costs Associated with Risks
Medical Paid Amount x Age x Risk

Self-Reported Diabetes Associated with Levels of Body Mass Index

Musich, Lu, McDonald, Champagne, Edington. AJHP. 18(3): 264-268, 2004
Annual medical/pharmacy costs by weight groups

Median of medical cost ($)

- Underweight: $3,184
- Normal: $2,225
- Overweight: $2,388
- Obesity I: $2,801
- Obesity II: $3,182
- Extreme Obesity: $3,753

Relative Costs of Poor Health: Total Value of Health

Direct Costs:
- Medical & Pharmacy

Indirect Costs:
- Presenteeism
- LTD
- STD
- Absenteeism
- Worker’s Compensation
- Time-Away-from-Work

Edington, Burton. A Practical Approach to Occupational and Environmental Medicine (McCunney). 140-152. 2003
### Percentage of Employees with a Disability Claim by Risk Status*

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>WC Claims</td>
<td></td>
<td>25.4%</td>
<td>30.2%</td>
<td>30.2%</td>
<td>38.0%</td>
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<tr>
<td>STD Claims</td>
<td></td>
<td>23.4%</td>
<td>30.8%</td>
<td>29.6%</td>
<td>46.7%</td>
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<tr>
<td>Absence Record</td>
<td></td>
<td>49.9%</td>
<td>63.1%</td>
<td>41.0%</td>
<td>69.7%</td>
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<tr>
<td>Disability Claim</td>
<td></td>
<td>61.3%</td>
<td>72.5%</td>
<td>64.4%</td>
<td>81.7%</td>
</tr>
</tbody>
</table>

*Over three years 1998-2000

Wright, Beard, Edington.  JOEM. 44(12):1126-1134, 2002
Health Risks and Behaviors X hours Lost

- Current Smokers
- Physical Activities (<1/wk)
- Seatbelt Usage (<90%)
- Encountered Violent Events
- Distress
- High Blood Pressure
- Cholesterol
- BMI at risk
- 0-1 Risk Factors
- 2 Risk Factors
- 3+ Risk Factors

Excess Medical Costs due to Excess Risks

Excess Disability Costs due to Excess Risks

36% of Absence, STD, Worker’s Comp

Excess Costs
Base Cost

Low Risk (0-2 Risks) N=685
HRA Non-Participant N=4,649
Medium Risk (3-4 Risks) N=520
High Risk (5+ Risks) N=366

$491
$666
$783
$1,248

$1,000
$1,500

$500

$0

Wright, Beard, Edington. JOEM. 44(12):1126-1134, 2002
Excess On-The-Job Loss due to Excess Risks

- Low Risk (0-2 Risks) N=17,947: 14.7%
- Medium Risk (3-4 Risks) N=6,959: 6.2%
- High Risk (5+ Risks) N=3,469: 12.2%

## Association of Risk Levels with Several Corporate Cost Measures

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Low-Risk (N=671)</th>
<th>Medium-Risk (N=504)</th>
<th>High-Risk (N=396)</th>
<th>Excess Cost Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term Disability</td>
<td>$120</td>
<td>$216</td>
<td>$333</td>
<td>41%</td>
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<tr>
<td>Worker’s Compensation</td>
<td>$228</td>
<td>$244</td>
<td>$496</td>
<td>24%</td>
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<tr>
<td>Absence</td>
<td>$245</td>
<td>$341</td>
<td>$527</td>
<td>29%</td>
</tr>
<tr>
<td>Medical &amp; Pharmacy</td>
<td>$1,158</td>
<td>$1,487</td>
<td>$3,696</td>
<td>38%</td>
</tr>
<tr>
<td>Total</td>
<td>$1,751</td>
<td>$2,288</td>
<td>$5,052</td>
<td>36%</td>
</tr>
</tbody>
</table>

Wright, Beard, Edington. JOEM. 44(12):1126-1134, 2002
Level 2

Business Case for Health Management

Costs follow Risks
Distribution: Age, Costs, & Risk Status

% of Population and Costs (All Covered Lives) % Low Risk

N=1.2M individuals in total population.
N=300K in risk population
### Wellness Score and Costs over 3 Years

**N=27,799**  
*Wellness Score 81.1*  
*Mean Cost $5,150*

#### 1996

- **9,452 (34%)**  
  - wellness score: 71.8  
  - mean cost: $7,728

#### 1997

- **6,285**  
  - wellness score: 71.4  
  - mean cost: $8,801

- **3,167**  
  - wellness score: 82.8  
  - mean cost: $5,675

#### 1998

- **15,537**  
  - wellness score: 87.0  
  - mean cost: $3,691

- **13,795**  
  - wellness score: 87.6  
  - mean cost: $3,704

- **9,555**  
  - wellness score: 74.8  
  - mean cost: $6,812

- **1,742**  
  - wellness score: 76.0  
  - mean cost: $6,893

- **1,504**  
  - wellness score: 84.1  
  - mean cost: $6,728

- **1,306**  
  - wellness score: 74.3  
  - mean cost: $9,078

- **1,131**  
  - wellness score: 74.8  
  - mean cost: $6,812

- **2,036**  
  - wellness score: 83.9  
  - mean cost: $4,899

- **1,466**  
  - wellness score: 82.6  
  - mean cost: $6,564

- **1,742**  
  - wellness score: 76.0  
  - mean cost: $6,893

- **1,504**  
  - wellness score: 84.1  
  - mean cost: $6,728

- **1,306**  
  - wellness score: 74.3  
  - mean cost: $9,078

- **2,036**  
  - wellness score: 83.9  
  - mean cost: $4,899

- **1,466**  
  - wellness score: 82.6  
  - mean cost: $6,564
Change in Medical Claims to Change in Health Risk Levels

1996-1997 Risk Status

Low Risk (0-2 risks)
N=716
$1,397
22.9%*

Medium Risk (3-4 risks)
N=433
$2,178
25.2%

High Risk (5+ risks)
N=196
$4,279
32.7%

2001-2002 Risk Status

Low Risk
$2513
20.2%
N=616

Med Risk
$4049
35.8%
N=92

High Risk
$7158
37.5%
N=8

Low Risk
$2742
21.6%
N=264

Med Risk
$3552
28.2%
N=124

High Risk
$6357
44.4%
N=45

Low Risk
$3198
28.5%
N=56

Med Risk
$3975
28.0%
N=82

High Risk
$5752
41.4%
N=58

*Percent with cost at or above top 25% claims costs

N=1,345; Male Hourly Active Employees; Costs in 98 & 02.
Change in Costs follow Change in Risks

Overall: Cost per risk reduced: $215; Cost per risk avoided: $304
Actives: Cost per risk reduced: $231; Cost per risk avoided: $320
Retirees<65: Cost per risk reduced: $192; Cost per risk avoided: $621
Retirees>65: Cost per risk reduced: $214; Cost per risk avoided: $264

Change in Productivity Loss follows Change in Risks

-6.0% -5.0% -4.0% -3.0% -2.0% -1.0% 0.0% 1.0% 2.0%

Burton, Chen, Schultz, Edington Submitted JOEM
Changes in Costs Following Smoking Cessation

Musich, Faruzzi, Lu, McDonald, Hirschland, Edington. AJHP 18(2): 133-142, 2003
Level 3
Health Management as a Serious Business Strategy
Proof of Concept
Risk Transitions

Time 1 – Time 2

High Risk
(>4 risks)

Medium Risk
(3 - 4 risks)

Low Risk
(0 - 2 risks)

2,373 (50.6%)

4,691 (10.8%)

5,226 (12.1%)

892 (3.2%)

10,670 (24.6%)

4,546 (42.6%)

11,495 (26.5%)

1640 (35.0%)

5,309 (19.0%)

4,163 (39.0%)

27,951 (64.5%)

21,750 (77.8%)

26,591 (61.4%)

678 (14.4%)

Modified from Edington, AJHP. 15(5):341-349, 2001
Cost Transitions

**Time 1 – Time 2**

- **High Cost ($5000+)**
  - 37,701 (55.7%)
  - 67,680 (19.0%)
- **Medium Cost ($1000-$4999)**
  - 26,288 (20.6%)
  - 73,427 (20.6%)
- **Low Cost (<$1000)**
  - 6,936 (10.2%)
  - 160,951 (45.2%)

**N=356,275 Non-Medicare Trad/PPO**

Modified from Edington, AJHP. 15(5):341-349, 2001
Proof of Concept
(Necessary and Sufficient)

1. Improve Health Status
2. Reduce Healthcare Cost
3. Reduce Productivity Loss
4. Improve Overall Trends for all Outcomes

Business Case is pretty good but not yet perfect. We need Champion Companies!!!!
Yearly, Cumulative, Multiple HRA Participation: Foote Hospital Employees*

Year

2002 2003 2004 2005

Yearly Participation

Cumulative Participation

Two or more HRAs

Three or more HRAs

Four or more HRAs

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

2002 2003 2004 2005

Yearly Participation

Cumulative Participation

Two or more HRAs

Three or more HRAs

Four or more HRAs

*Employed 2002-2005  N=1,992

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Risk Transitions

Year 1 — Year 5

High Risk (5+ risks)
- 32.7% (87)

Low Risk (0-2 risks)
- 84.2% (1062)

Medium Risk (3-4 risks)
- 33.0% (202)
- 40.2% (107)
- 13.8% (174)
- 56.9% (349)

Musich, Faruzzi, Lu, Chen, McDonald, Hirschland, Edington. JOEM. 45(6): 393-399. 2003
Risk Transitions
Foote
2002 – 2003

High Risk
(>4 risks)
133 (19.3%)

Medium Risk
(3 - 4 risks)
198 (28.8%)

Low Risk
(0 - 2 risks)
357 (51.9%)

46 (34.6%)
68 (9.9%)
430 (62.5%)

6 (1.7%)
27 (20.3%)
310 (86.8%)

190 (27.6%)
60 (45.1%)
93 (47.0%)

89 (44.9%)
41 (11.5%)

41 (11.5%)
93 (47.0%)

University of Michigan Health Management Research Center
Change in Costs follow Change in Risks

Overall: Cost per risk reduced: $215; Cost per risk avoided: $304
Actives: Cost per risk reduced: $231; Cost per risk avoided: $320
Retirees<65: Cost per risk reduced: $192; Cost per risk avoided: $621
Retirees>65: Cost per risk reduced: $214; Cost per risk avoided: $264

Change in Presenteeism follows Change in Risks

Burton, Chen, Schultz, Edington JOEM. In-Press 2006
Medical and Drug Cost (Paid)*

*per employee, Improved=374, Non-Improv=103
HRA in 2002 and 2004
Improved=Same or lowered risks
*Medical and Drug, not adjusted for inflation

Slopes differ
P=0.0132

Impr slope=$117/yr
Nimpr slope=$614/yr
Cost Savings Associated with Program Involvement from 1985 to 1995

- Zero or One HRA (N=804): Annual Increase = 12.6%
- Two or More HRAs (N=522): Annual Increase = 4.2%
The average annual increase in absence days (1995 – 2000):
- Participants: 2.4
- Non-Participants: 3.6

Schultz, Musich, McDonald, Hirschland, Edington. JOEM 44(8):776-780, 2002

\[
\begin{align*}
\text{Work Day} & \times \frac{1.2 \text{ Work Days}}{\text{Participant Year}} \times 2,596 \text{ participants} = \frac{623,040}{\text{Year}}
\end{align*}
\]
Overall Costs by Participation: Total Employees Covered for Any Year*

*Paid amounts. Absent and Workers’ Comp hours were converted into dollars according to employees’ status and hour rates for the respective year. The analysis excludes the outliers (annual costs over $200,000 in any given year.)
Financial Services: Medical Costs

Paid

$1,400
$1,450
$1,500
$1,550
$1,600
$1,650
$1,700
$1,750
$1,800
$1,850
$1,900

Year
2000
2001
2002
2003

*Slope = $150/yr
00-01 = $255
01-02 = $118
02-03 = $82

*per employee
Health System Medical and Drug Cost (Paid)*

*Slope = $305/yr
01-02=+$360
02-03=+$300
03-04=+$260

*per employee, N=1053 claim eligible 2001-2004

*Medical and drug not adjusted for inflation
Level 4

Implementation of a Serious Business Strategy
Three Key Business Beliefs

1. Individuals Can Maintain Low-Risk Health Status even as they Age

2. A Health Plan and an Employer can Help its Members Maintain Low-Risk Health Status

3. The Major Economic Benefit is in Paying Attention to Individuals with Low-Risk Health Status
Where are the Opportunities for Population Health Management?

- Serious disease
- Minor Disease
- No Disease

Health Promotion Opportunity

Medical and Drug Costs only

Medical & Care Management Opportunity

Disease Management Opportunity
Implementation: Health Management as a Serious Corporate Strategy

A. Driven from the top through leadership performance objectives and healthy work environment objectives

B. Driven by employee participation in health risk assessments to identify areas that are critical to decreasing vitality in the family and at work. Resources made available in low-risk maintenance and risk reduction opportunities, with incentives

C. Measurement of key indicators
   A. 80% participation over any three-year period
   B. 70% low-risk
Health Management as a Serious Business Strategy: Four Levels of Interventions

Worksite Environment
- Values and Beliefs
- Workplace Policies
- Benefit Design

Population
- Website
- Health Policies
- Special Promotions
- Employee Assistance
- Risk Reduction Activities
- Low-Risk Maintenance
- Know Your Numbers
- Physical Activity
- Nutrition Awareness
- Medical Facility

Individual
- (Stratification by Individual)
- Coaching Sessions
- Low-Risk Maintenance
- Disease Management
- High-Risk Reduction
- Health Advocate
- Triage to Resources

Health Risk Appraisals
- Incentives
- Measurement
Create an Integrated and Sustainable Approach

Health Advocate
- Provide Direction
- Get the Care You Need
- Coaching & Outreach

Health Plan Design
Environmental Design

Disease Management
- High Acuity (identified high cost disease)
- Low Acuity (identified lower cost disease; lifestyle behavior focus)

Case Management

Absence Management
- STD, LTD
- Workers’ Compensation
- Scattered Absence

Behavioral Health
- Work/Family
- Work Life Plus

Health Portal
- Stay healthy
- Health information
- Make informed choices

Health Risk Assessment
- Assess and track health behaviors
- Maintain health
- Address health risks

Fitness Centers
- Low risk maintenance
- High risk reduction

Wellness Programs
- Active expansion
- Retiree communications/awareness program

On-site Medical
- Diabetes education pilot
- Injury and medical management

Long Term Strategy—Short Term Solutions

University of Michigan Health Management Research Center
## Likelihood of Association with Other Risks

<table>
<thead>
<tr>
<th>Health Measure</th>
<th>% in Overall High Risk Category (N=16,879)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived health</td>
<td>68%</td>
</tr>
<tr>
<td>Life Satisfaction</td>
<td>52%</td>
</tr>
<tr>
<td>Stress</td>
<td>50%</td>
</tr>
<tr>
<td>Diastolic blood pressure</td>
<td>48%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>45%</td>
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<tr>
<td>Systolic blood pressure</td>
<td>43%</td>
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<tr>
<td>Physical activity</td>
<td>41%</td>
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<tr>
<td>Safety belt</td>
<td>40%</td>
</tr>
<tr>
<td>Smoking</td>
<td>38%</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>36%</td>
</tr>
<tr>
<td>HDL</td>
<td>34%</td>
</tr>
<tr>
<td>BMI</td>
<td>30%</td>
</tr>
</tbody>
</table>

Percentages show those at high risk for a particular health measure who have at least four other health risks.

Population = 16,879

LifeSteps active screened participants

# Cluster Analysis

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<tbody>
<tr>
<td>Smoking</td>
<td>31%</td>
<td>0%</td>
<td>16%</td>
<td>27%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>10%</td>
<td>0%</td>
<td>3%</td>
<td>5%</td>
</tr>
<tr>
<td>Physical activity</td>
<td>28%</td>
<td>0%</td>
<td>19%</td>
<td>26%</td>
</tr>
<tr>
<td>Safety belt usage</td>
<td>36%</td>
<td>0%</td>
<td>22%</td>
<td>31%</td>
</tr>
<tr>
<td>Body mass index</td>
<td>27%</td>
<td>25%</td>
<td>38%</td>
<td>27%</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>9%</td>
<td>0%</td>
<td>81%</td>
<td>23%</td>
</tr>
<tr>
<td>Diastolic blood pressure</td>
<td>5%</td>
<td>0%</td>
<td>61%</td>
<td>20%</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>19%</td>
<td>19%</td>
<td>27%</td>
<td>22%</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>34%</td>
<td>10%</td>
<td>33%</td>
<td>24%</td>
</tr>
<tr>
<td>Self-perceived health</td>
<td>13%</td>
<td>0%</td>
<td>9%</td>
<td>28%</td>
</tr>
<tr>
<td>Life satisfaction</td>
<td>4%</td>
<td>0%</td>
<td>2%</td>
<td>73%</td>
</tr>
<tr>
<td>Stress</td>
<td>9%</td>
<td>0%</td>
<td>2%</td>
<td>76%</td>
</tr>
<tr>
<td>Illness days</td>
<td>21%</td>
<td>0%</td>
<td>12%</td>
<td>26%</td>
</tr>
</tbody>
</table>

## Overall Risks

<table>
<thead>
<tr>
<th></th>
<th>Low risk (0-2 risks)</th>
<th>Medium risk (3-4 risks)</th>
<th>High risk (5+ risks)</th>
<th>Average Number of risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low risk (0-2 risks)</td>
<td>50.2%</td>
<td>35.7%</td>
<td>14.1%</td>
<td>2.8</td>
</tr>
<tr>
<td>Medium risk (3-4 risks)</td>
<td>97.6%</td>
<td>2.4%</td>
<td>0%</td>
<td>0.6</td>
</tr>
<tr>
<td>High risk (5+ risks)</td>
<td>26.5%</td>
<td>48.9%</td>
<td>24.7%</td>
<td>3.6</td>
</tr>
<tr>
<td>Average Number of risks</td>
<td>18.9%</td>
<td>35.9%</td>
<td>45.2%</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Development and Consequences of Metabolic Syndrome

Risks:
- Obesity
- Hypertension
- Insulin Resistance
- Glucose Intolerance
- Dyslipidemia
- Physical Inactivity

Pre-Metabolic Syndrome

Metabolic Syndrome

Heart Disease

Diabetes

Retinopathy
Neuropathy
Nephropathy

Costs to Individual:
- Quality of Life
- Morbidity
- Mortality

Costs to Employers:
- Health care costs
- Productivity costs

Where do you want to intervene in the process?
Stratification In the Health Promotion Opportunity

- Serious disease
- Minor Disease
- No Disease

Health Promotion Opportunity
Assignments by
- Cluster Analysis
- Trend Management
- Investment
- Rank Order

Individualized Cycle for Benefits

Data Sources
- Medical
- Pharmacy
- Absent Days
- STD
- Worker’s Comp
- Presenteeism
- HRAs

Benefit Design
- High, Medium and Low Deductibles
- Wellness and Illness Resources
Predictability to be at High Cost

- Low intervention (71%)
- High intervention (29%)

Se = Sensitivity
Sp = Specificity

Time:
- base
- t1
- t2
- t3
- t4
- t5
- t6

Se (Sensitivity):
- Low intervention: 0.75, 0.83, 0.79, 0.64, 0.57, 0.54, 0.52
- High intervention: 0.75, 0.83, 0.79, 0.64, 0.57, 0.54, 0.52

Sp (Specificity):
- Low intervention: 0.10, 0.07, 0.08, 0.14, 0.18, 0.18, 0.19
- High intervention: 0.90, 0.93, 0.92, 0.86, 0.86, 0.86, 0.86
Observed Program Attrition Rates

Identified: 23.5%
Attempted Contact: 15.3%
Contacted: 12.0%
Participated: 5.8%
Remain 6 months: 2.6%
Remain 12 months: 1.7%

Percent reduction in next bar: 35%
Observed Program Attrition Rates - Patients with Acute Episodes

- Contacted: 4.3% (56% reduction)
- Participated: 1.9% (63% reduction)
- Remain 6 months: 0.7% (62% reduction)
- Remain 12 months: 0.3%

Lynch, Chen, Edington. JOEM. In-press. Summer 2006

Percent of total population
Risk Transitions
Foote
2002 – 2003

High Risk
(>4 risks)

133 (19.3%)

68 (9.9%)

46 (34.6%)

Medium Risk
(3 - 4 risks)

198 (28.8%)

190 (27.6%)

60 (45.1%)

41 (11.5%)

89 (44.9%)

16 (8.1%)

6 (1.7%)

27 (20.3%)

93 (47.0%)

Low Risk
(0 - 2 risks)

357 (51.9%)

430 (62.5%)

310 (86.8%)
Health Management as a Serious Human Resource and Economic Strategy

1. **Risk and Disease Identification**: Know your target population

2. **Success Scorecard**:
   a. Participation: 80%
   b. Population at Low Risk: 70+% 

3. **Effective strategies**: Total Population Management
   a. **Environmental**: Policies, Procedures, Benefits Aligned
   b. **Individual**: Low-Risk Maintenance, Risk Reduction, Triage
   c. **Population**: Engagement
   d. **Other**: Incentives and Measurement

4. **General concept for outcome measures**: Benefits follow #3

5. **Outcome measures**: Effective Programs Equal Benefits

**Overall Strategy**: Manage the Person, not the risk or the disease.
Level 5
What Works
Integrated/Sustainable Solution
Level 6

Next Generation

Environment, Leadership, Individual, Population Interventions
Thank you for your attention.
Please contact us if you have any questions.

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