



# The Challenge of Disease/Health Management: What Really Works? What's the Right Metric?

June 29, 2011

Presented by:  
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# Agenda

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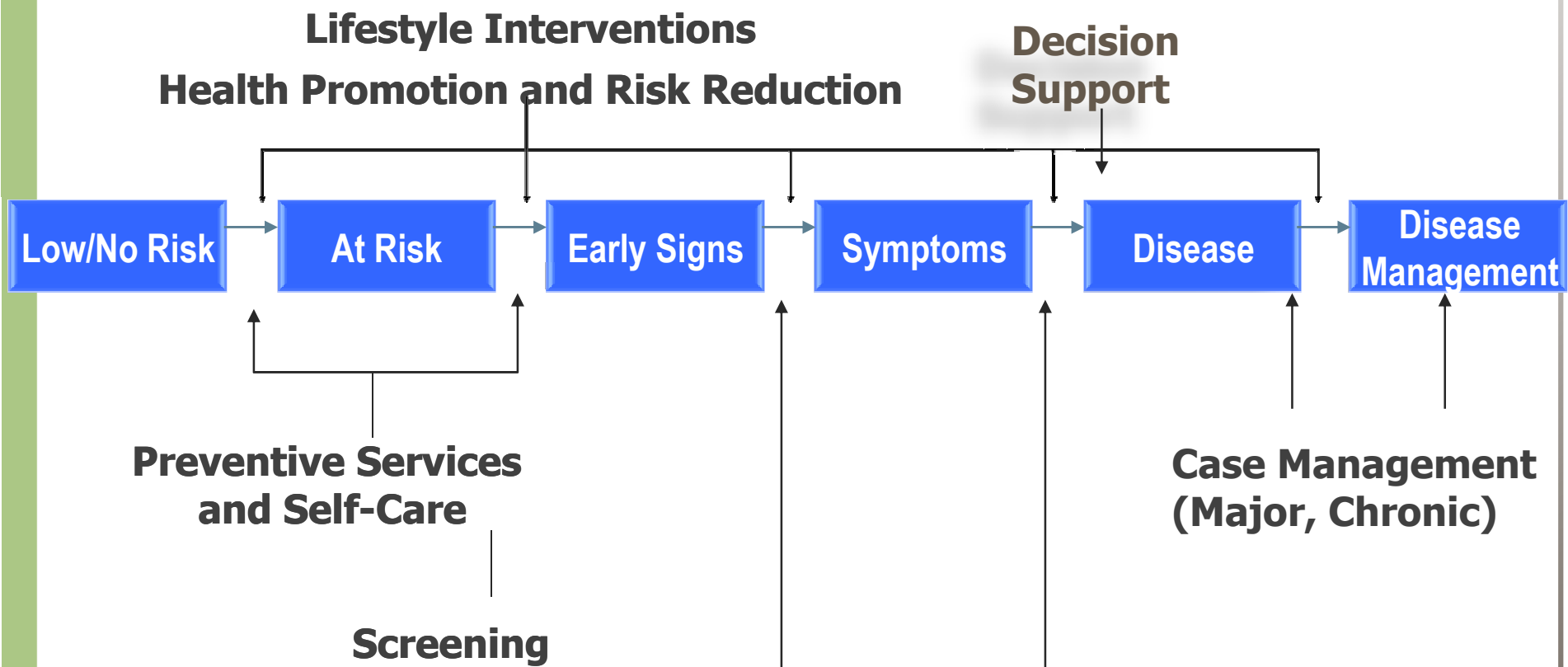
- I. Health Management Opportunities
- II. Measurement and Evaluation Strategies
- III. Data-Driven Program Management
- IV. Measuring Health and Cost Program Outcomes

# Business Needs: The Role of Health Management Programming

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- **The story remains unchanged:**
  - Healthcare costs are rising and cost-shifting is at its practical limits
  - Like Americans in general, workforces are aging, as are the incidence of chronic conditions
  - Obesity and diabetes rates continue to increase
  
- **Businesses are being urged by consultants** and vendors to try various approaches to wellness and disease management:
  - Plan design innovations
    - Surcharges leveraged for selected behaviors (e.g., smoking)
  - Disease management programs
  - Disability program management
  - Wellness programs
  
- But there is **little solid empirical basis** upon which to make plan design, program design, vendor management or ROI decisions

# Opportunities for Health Management



Musich, Burton, Edington. *Disease Management and Health Outcomes* 1999; 5:153-166

# Why Measurement and Evaluation?

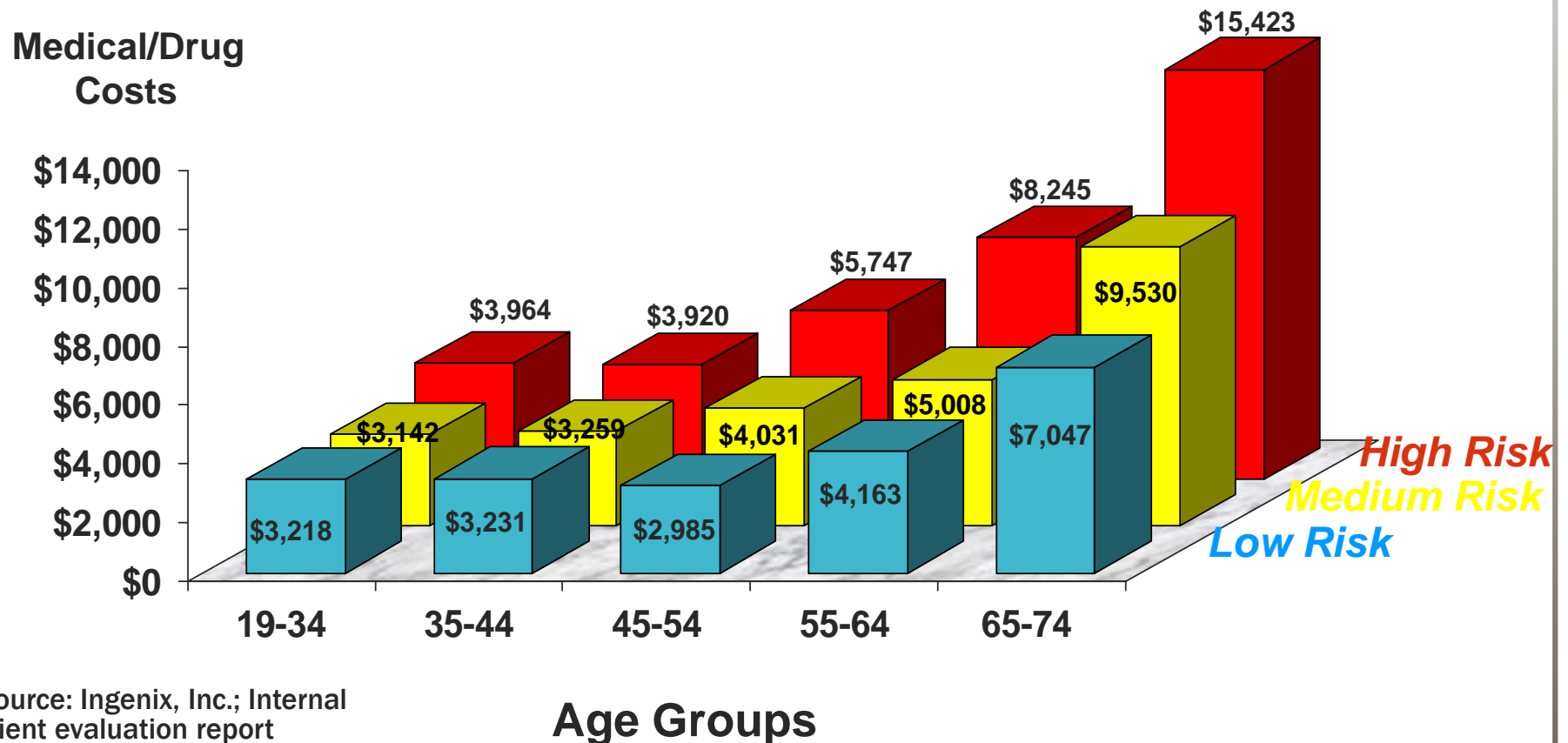
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- Measurement and evaluation promotes efficient and effective program design and management
  
- Effective measurement and evaluation allows program managers to track program impact, health and cost outcomes, such as:
  - **Wellness and prevention**
    - Evaluation of engagement level: participation rates
    - Measurement of risk changes
    - Determination of what works
  - **Disease management**
    - Engagement levels: enrollment of identified, length of program, number of calls
    - Measurement of health changes
  - **Establishment best practices and industry benchmarks**
  - **Return on investment**
  - **Data-driven health management program design**

## Why Use Health Risks?

# As Risks Increase, So Do Costs

- Within each age group, as risks increase medical/drug costs increase



Source: Ingenix, Inc.; Internal client evaluation report

**The Key is to Manage Risks**



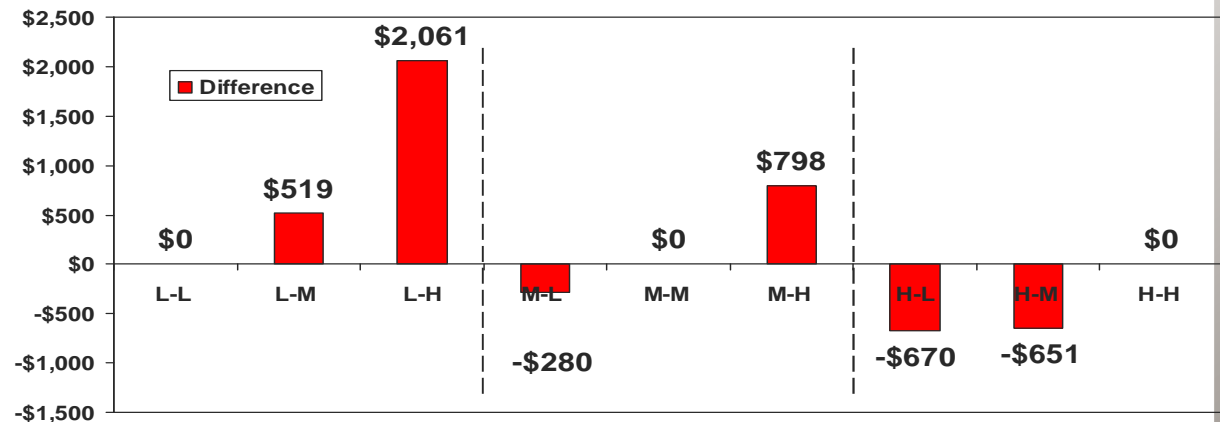


# Changes in Costs Follow Changes in Risk Status

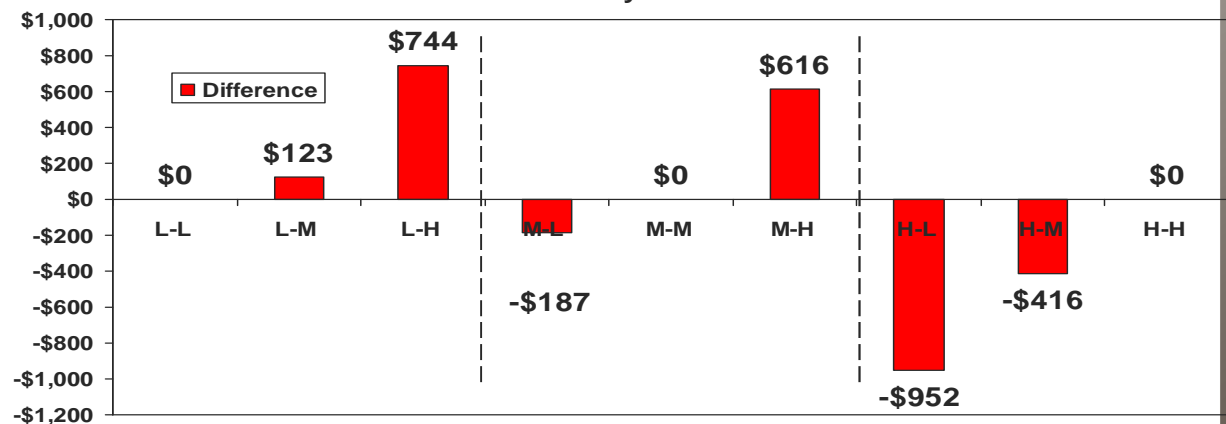
## Medical and Disability Costs

- Changes in medical and disability costs follow changes in the health risk status
  - As risks increase, costs increase
  - As risks decrease costs decrease
- Changes in costs can be demonstrated within one year of *risk change*
  - Note: this does not mean within 1 year of the start of a program at an employer

Changes in Costs With Changes in Risks  
Medical Costs



Changes in Costs With Changes in Risks  
Disability Costs



Source: Ingenix, Inc.; internal client evaluation report

**What's Needed?**

**Creating Healthy Workers  
Building Healthy Worksites**



# Core Health Promotion/Prevention Services

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- Health Risk Assessment (HRA), biometric screenings and tailored reports
  
- High risk reduction and low risk maintenance programs
  - Lifestyle counseling – telephonic and/or online
  - Member communications – newsletters, website and/or info line
  - On-site classes and/or referrals to community classes
  - Access to on-site fitness centers and/or off-site gym reimbursement
  
- Gender and age-appropriate preventive services are promoted and covered in benefit design (e.g. mammography, colonoscopy)
  
- Offered along side other programs (e.g. EAP, disease management, return to work programs etc.)

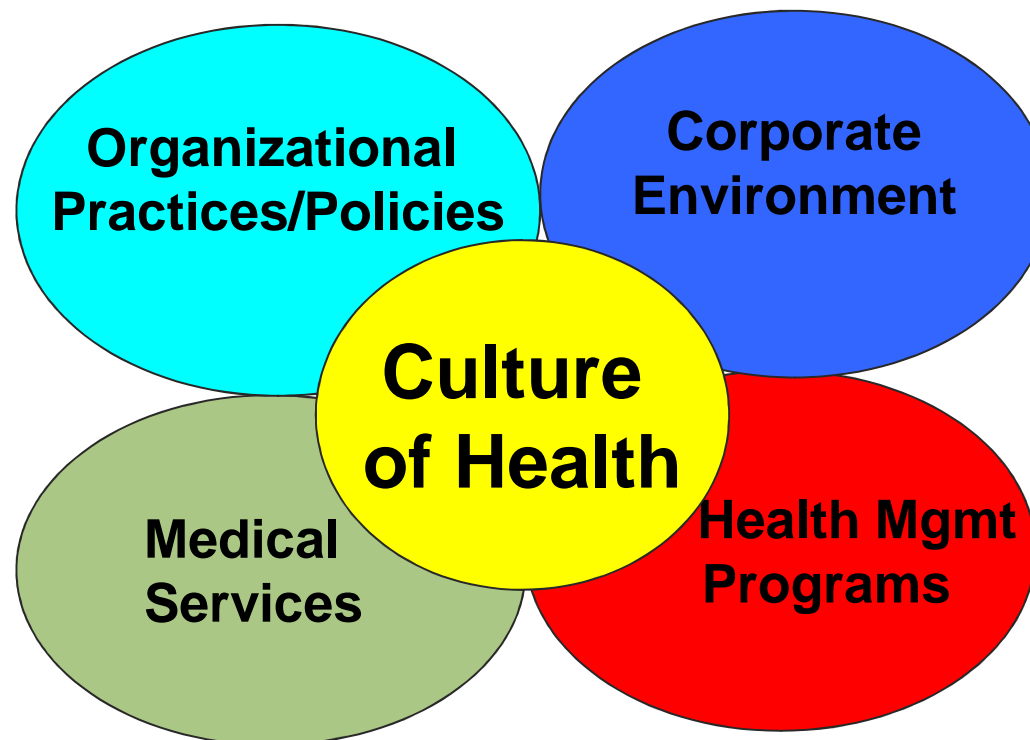
# Ten Characteristics of Leading Programs

- |  |   |
|--|---|
| <ol style="list-style-type: none"><li>1. Comprehensive program design</li><li>2. Management support</li><li>3. Integrated incentives</li><li>4. Comprehensive communications</li><li>5. Dedicated onsite staff</li></ol> | <ol style="list-style-type: none"><li>6. Multiple program modalities</li><li>7. Health awareness program</li><li>8. Biometric health screenings</li><li>9. Vendor integration</li><li>10. Measurement and evaluation strategies</li></ol> |
|--|---|

*Adapted from Terry et al. JOEM. 2008;50:633-641*

# Creating a Culture of Health

- Multidimensional approaches
- Integration of services
- More than health management programs
- Communications strategies
- Concern for the work environment of the employee



Source: Musich et al. ACSM's Worksite Health Handbook

# Designing Measurement and Evaluation: Multiple Signs of Success

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- Participation rates
- Demographics of participants and non-participants
  - Who participates?
  - How often are they reached? With what?
  - Who are we missing?
- Health outcomes: changes in individual health risks and health status over time (could be several months)
- Cost trends: moderated cost trends associated with participation (this will follow the health outcomes)
- Return on investment
  - ROI may be positive if participation and touches per participant are high.
  - Positive ROI will follow risk changes, health outcome changes, and cost changes. It may take years for this to occur.

# Designing Measurement and Evaluation: Two Types of Analyses

- Approach includes two types of analyses aimed at the same general goal:
  - **Descriptive** – this type of analysis looks at overarching comparisons of outcomes between groups. Useful to assess general directional effects. Also relevant early in the process of evaluations. Essential for data-driven program management decision-making. Analyses include:
    - Participation
    - Health outcomes
    - Unadjusted cost outcomes
    - We are evolving these to include basis statistical testing
  - **More rigorous statistical/multivariate approaches** – these analyses are best for isolating the effects of particular programs or program features by “controlling for” other variables that might be associated with the outcome including:
    - Selection bias into a program (e.g., does it attract more motivated people?)
    - Effects that might not be associated with the program itself (i.e. age, gender, location, plan type, baseline health status, baseline risk levels, etc.)

# Participation



# Population and Program Demographics

## Participant vs. Non-Participants

- Nothing happens without participation (and not much will happen unless participation is high and intense)
- Consistently high participation rates over time are essential to good program design and effectiveness
- Essential to understand who is attracted to the program versus those who are missed
- Program impact often disappears within 2 years without sustained participation rates

**Table. Summary Experience for Wellness Program Participants/Non-Participants**

Demographic	Participants			Non-Participants		
	Period 1	Period 2	Period 3	Period 1	Period 2	Period 3
# of individuals						
Response rate						
% Male						
Average Age						
Med/Drug Paid						

# Participant Demographics

## HRA Participants: Tracking Characteristics Over Time

- The following is from one company's program experience over 5 years
- HRA was offered every year with changes in incentive design each year
- Program participation ranged from 59% to 83% over the time period

HRA Participants

Demographics	HRA Participants				
	2005	2006	2007	2008	2009
Medical Enrollees (N)	27,025	24,770	21,314	15,166	15,981
% Male	53.8%	53.8%	54.2%	51.8%	53.0%
Avg Age	40.9	41.6	42.1	42.2	42.9
<b>HRA Participation Rate</b>	<b>83%</b>	<b>78%</b>	<b>78%</b>	<b>59%</b>	<b>71%</b>
Average Number of Risks	2.5	2.4	2.4	2.2	2.2
<b>Cost Outcomes</b>					
Avg Medical Paid Per Enrollee	\$3,241	\$3,389	\$3,422	\$3,517	\$3,704
Avg Drug Paid Per Enrollee	\$1,050	\$1,459	\$1,543	\$1,613	\$1,694
Avg Med+Drug Per Enrollee	\$4,290	\$4,847	\$4,965	\$5,130	\$5,398
STD Paid Per Enrollee	\$1,281	\$1,303	\$1,309	\$1,110	\$1,114

# Health Outcomes

# Health Status by Year

## Top Risks and Overall Health Status

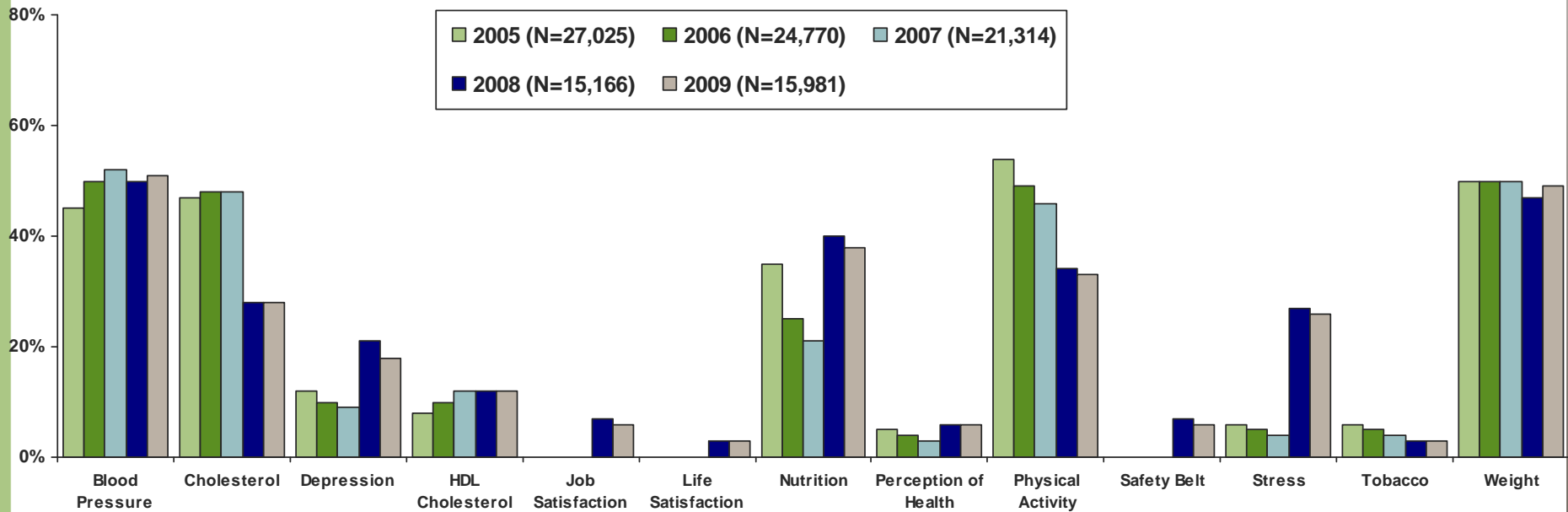
- Program design should be aligned with demographics, characteristics of the workforce and most pressing health risks and overall health status
- Focus of program design should include BOTH risk reduction and low risk maintenance programming
- Program design should be flexible over time as the health needs and/or characteristics of the population change

Top risks	Overall Health Status
<ul style="list-style-type: none"> <li>▪ Employees               <ul style="list-style-type: none"> <li>- Weight 76%</li> <li>- Blood pressure 59%</li> <li>- Cholesterol 31%</li> </ul> </li> <li>▪ Spouses               <ul style="list-style-type: none"> <li>- Weight 56%</li> <li>- Blood pressure 39%</li> <li>- Physical activity 25%</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Employees               <ul style="list-style-type: none"> <li>- Low risk 26%</li> <li>- Medium risk 58%</li> <li>- High risk 16%</li> </ul> </li> <li>▪ Spouses               <ul style="list-style-type: none"> <li>- Low risk 51%</li> <li>- Medium risk 43%</li> <li>- High risk 6%</li> </ul> </li> </ul>

# Individual Health Risks for 2005-2009 Employees

- Tracking population health risk status over time provides details for what areas of the program might be performing best
- Individual health risks that are the focus of a program design should show signs of change
- Areas that previously were not a focus may indicate future needs

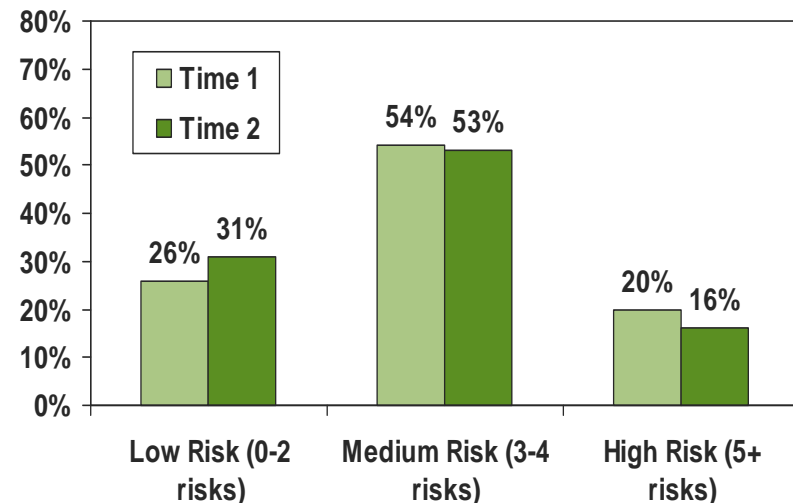
Individual Risks for Active Employees 2005-2009



# Changes in Health Status Over Time

- Change in risk status over time is a second major sign of success for a program
- Percentage point changes should reflect an increase of those at low risk and a decrease in those at high risk
  - Net changes are a results of some people increasing risks, some people decreasing risks and others staying the same
  - Goal of a program should be to maximize those remaining at low risk and minimize those staying at high risk

Risk Change for Employees

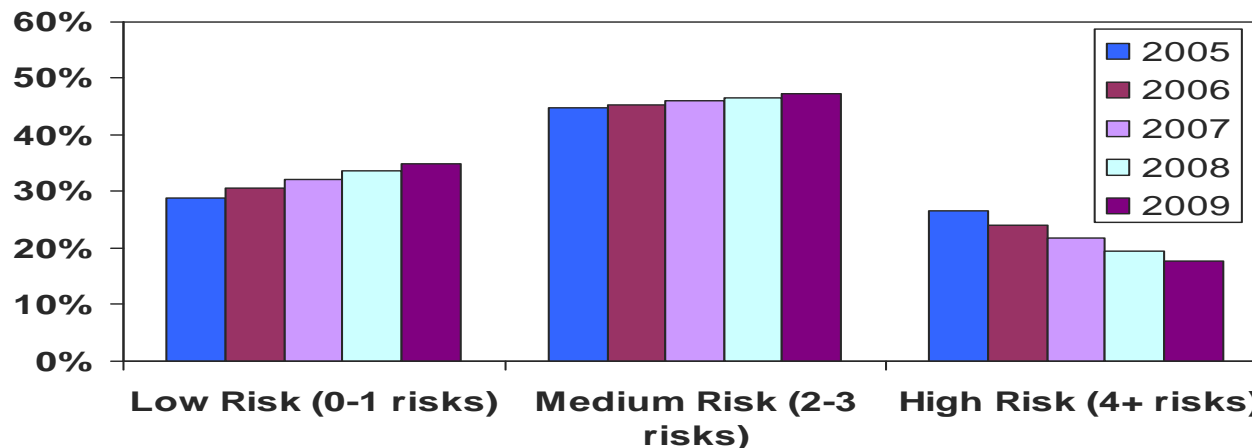


# Patterns in Risk Change

## Population-Level HRA Participants: One Company's Experience

- Adjusted percentages of those with 4 or more health risks significantly decreased, while percentages of those at medium and low risk significantly increased over five years of program experience
  - Percentages within each risk category were adjusted for demographics (age and gender), location, health plan selection, co-morbidities and participation in other health management programs
  - While the risk changes were relatively small, decreases in high risk and increases in low risk are contrary to expected risk trends for a population aging over a five year time period

**Pattern of Risk Change Over Time  
(Regression Adjusted)**



# Linking of Health Risks to Costs

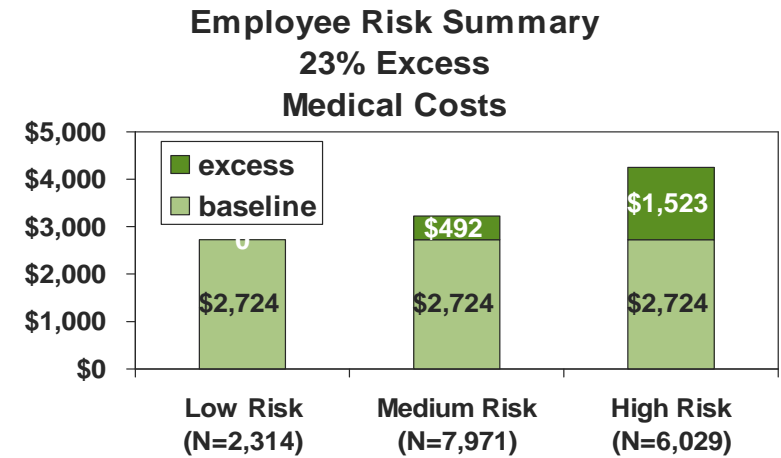


# Excess Costs Associated With Excess Risks

- Excess costs are defined as those costs associated with medium and high risk individuals over and above the costs associated with low risk status
- The relationship of medical and productivity measures with risks is similar
- The calculation provides a theoretical estimate of potential cost savings assuming every medium and high risk person is reduced to low risk: need to consider this likelihood

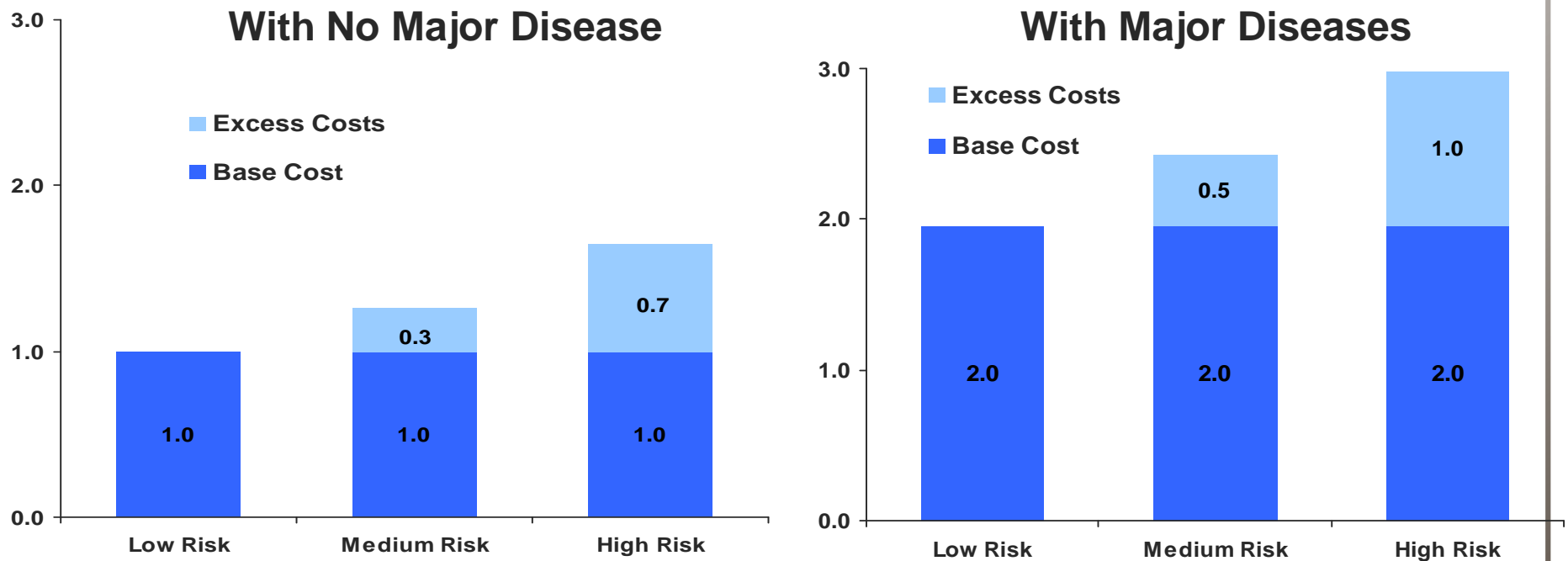
Calculation:

$$(\$492 * 7,971 + \$1,523 * 6,029) / (\$2,724 * 2,314 + \$3,216 * 7,971 + \$4,247 * 6,029) = \$13.1M / \$57.5M = 22.8\%$$



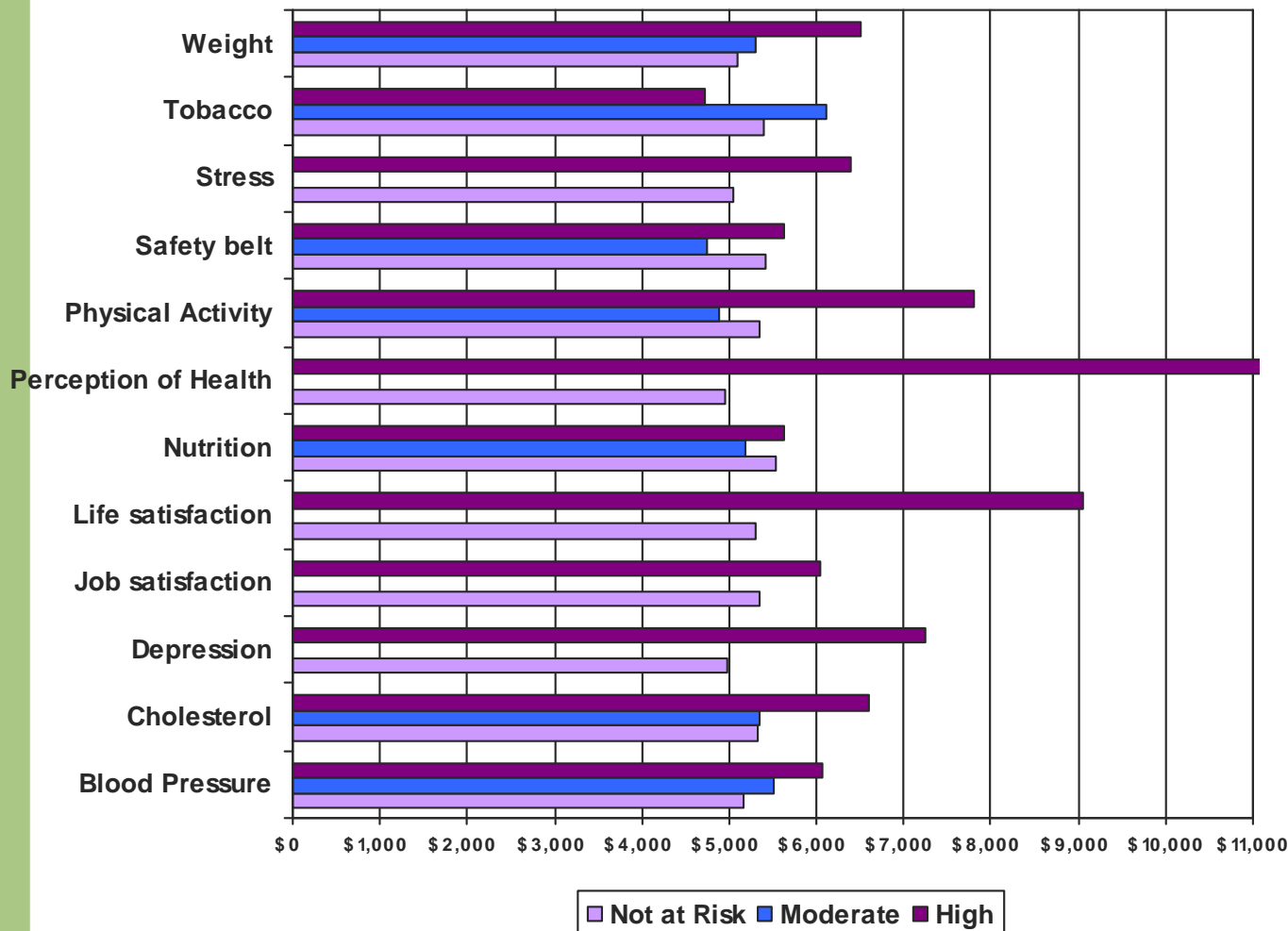
# Excess Health Risks Contribute to Higher Medical Costs With or Without Existing Disease

- Major diseases included cancer, diabetes, heart disease, bronchitis/emphysema, and previous stroke
- Population included active and retired employees of a major manufacturing corporation
- Excess costs for those with no major disease were calculated at 9%; whereas, those with major disease showed 19% excess costs



# Costs Associated with Individual Health Risks

## Employees, Medical + Drug Costs



- Some individual health risks were more highly related to higher costs than others (e.g. weight, blood pressure)
- Costs generally increased with increasing risk severity
- Costly risks included: health perception, weight, stress, physical activity, life satisfaction, depression, cholesterol and blood pressure
- Missing bars are due to lack of data points

# Return on Investment/ Cost-Benefit Analysis

# What Can We Expect?

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- Three ways to inform expectations about ROI:
  - Review the peer-reviewed literature
  - Build or adopt a valid forecasting model
  - Talk to vendors
- Peer-reviewed literature is skeptical on ROI from disease management
  - ROI depends on condition and focus of the program
  - Also depends on which outcomes are considered (medical, productivity)
- Peer-reviewed literature is a bit more optimistic on ROIs from wellness programs
- ROI is higher when focus is over long period of time
  - ROI estimates are lower (but probably more accurate) when rigorous designs and statistical methods are used in the evaluations
- Be skeptical of ROI claims; demand solid evidence

Sources: Aldana 2001; CBO, 2004; Chapman, 2003, 2005; Goetzel et al., 2005, Mattke et al. 2007; Ozminkowski et al, 2006

## What Can We Expect? (cont.)

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- Discussions with vendors are best when cast in terms of:
  - A strong theory behind what they do
  - High quality evidence (i.e., peer-reviewed studies) of effectiveness, cost / productivity savings, and the links between these
  - A consistent method for collecting information about outcomes of interest
    - For example, adopt a forecasting model that can be applied to each vendor, using exactly the same criteria
  - Delayed contract signatures until unbiased, third-party advice is obtained about what good performance means, and how to measure that, regarding:
    - Engagement/participation
    - Health outcomes
    - Utilization / expenditures / productivity outcomes, etc.
    - Reporting and evaluation processes (monthly / quarterly / annual / end of program)

# When Can We Expect a Positive ROI?

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- Most likely not in year 1
- Maybe starting in year 2 (if lucky)
- More likely starting in years 3 or 4
- Wellness and disease management programs should be viewed as long-term investments
  - It will take a year at least for participants and vendors to understand each other
  - Utilization changes will commence after that
  - Other outcomes may take a bit longer to achieve
  - There is no such thing as a quick fix

Sources: *Heaney and Goetzel, 1998; Goetzel and Ozminkowski, 2008*

# ROI Methods Summary

- **Step One: Define Program Participation Models**

Program participation models were defined according to **number of successive years of participation** in each specific program: 1 year, 2 year or 3 year.

- **Step Two: Adjust for Case-Mix-Differences**

**Descriptive and multivariate modeling** techniques were used to adjust for case mix differences between those who participated in the programs and those who did not. Once these differences are removed or minimized, the changes in exponders between the participants and nonparticipants are likely attributable to the program.

- **Step Three: Measure Savings**

**Calculate average medical or medical and productivity costs** for 12 months before the program and for as many post-program months as possible. Compare participants to non-participants to compute the impact of program participation.

Savings estimates were based on **differences in trends** over time in expenditures for program participants vs. non-participants.

- **Step Four: Value**

Apply **cost-benefit calculations** to report net savings or losses associated with each program, using the ROI metrics defined earlier.

**Addresses Important ROI Estimation Issues**

- Regression to the mean
- Statistically valid sample size
- Pre- and post-intervention costs captured at participant level



# ROI Methods: Updated and Actionable

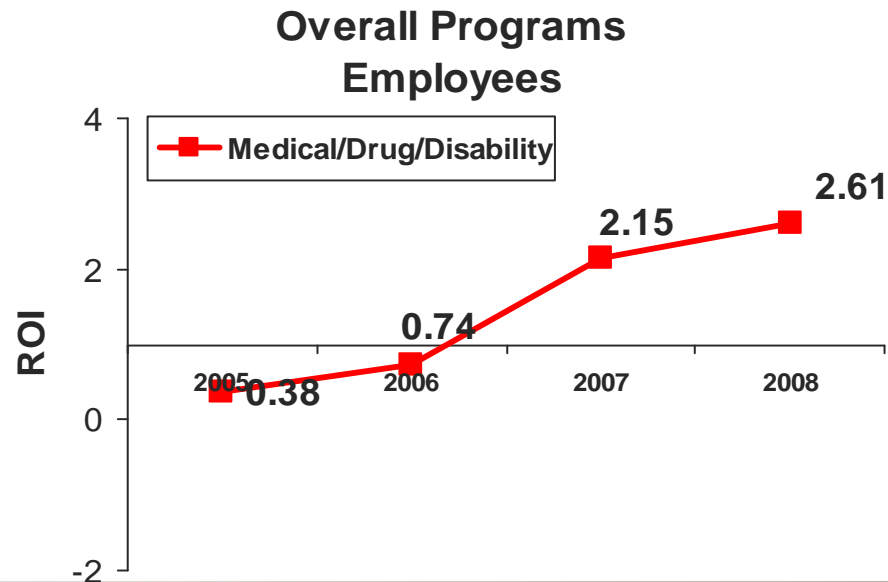
- More recent ROI methods provide better information for actionable strategies by considering the impact of successive years of program participation

Advanced	Traditional
<ul style="list-style-type: none"> <li>Program participants are grouped by <b>successive years</b> of program participation: 1-year, 2-years, 3-years, 4-years or 5-years</li> </ul>	<ul style="list-style-type: none"> <li>Program participants are grouped by <b>calendar year</b> regardless of the number of years of program participation</li> </ul>
<ul style="list-style-type: none"> <li>A <b>dynamic view</b> of savings or losses is presented, to measure the impact of continued participation in one or more programs.</li> </ul>	<ul style="list-style-type: none"> <li><b>Static views</b> of annual results are presented, with no relationship to previous or future years</li> </ul>
<ul style="list-style-type: none"> <li>Costs savings and ROI results <b>guide actionable strategies</b> in program and incentive designs: encouraging participation in the successful programs to maximize financial returns</li> </ul>	<ul style="list-style-type: none"> <li>Annual view represents cost savings summary by year, but <b>does not facilitate planning for future years.</b></li> </ul>

# Traditional Cost-Benefit Analysis

## For All Programs Together, With Medical/Drug and Disability

- These data provide an example of a traditional cost-benefit analysis for a comprehensive health management program
- Financial modeling was used to estimate an overall cost-benefit for employees including all programs: wellness, HRA, LM and DM
- The graph below shows savings in medical, drug and disability expenditures for all programs combined
- The ROI continued to increase from 0.38 in the first year to 2.61 in 2008



# Advanced Cost-Benefit Analysis

## PMPM Cost Savings and ROIs by Program Duration

- In this **multi-year program evaluation**, the following observations were demonstrated:
- **Cost savings/ROIs varied** by program and by number of successive years of participation
  - > **HRAs** generated positive savings in years one, two and three
  - > **Wellness programs** lost money initially but then yielded positive results within three years
  - > **LM participants** with two or more years of participation was associated with savings
  - > **DM participants** did not save money in any years
- **Programs designs should utilize these trends to maximize ROIs by considering the impact of short term and long term participation**

ROI by Program Duration

Program (Years of Participation)	% Distribution	ROI Ratios
HRA 1 year	42%	4.25
HRA 2 year	18%	0.32
HRA 3 year	16%	1.13
HRA 4 year	7%	-1.73
HRA 5 year	18%	-0.11
DM 1 year	77%	-0.73
DM 2+ year	23%	-1.19
LM 1 year	93%	-0.15
LM 2+ year	7%	3.05
Wellness 1 year	61%	-1.37
Wellness 2 year	22%	-0.06
Wellness 3 year	7%	7.44
Wellness 4+ year	9%	6.40

# Improving Results of DM Programs: Targeting Program Recruitment

# Making the Most of Disease Management Programs

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- Some DM participants achieve positive savings and positive ROIs
- To facilitate DM program design, we need to understand the characteristics of those participants who:
  - Will be more likely to participate
  - Will achieve a positive ROI (exceeding 1.0)
- Prediction models (logistic regression) can identify those significant characteristics associated with participation or profitability
- Possible characteristics include age group, gender, location, health plan selection, ER/Inpatient status, presence of comorbidities (e.g., CAD or diabetes) and length of participation

# DM Participation and Profitability Profiles

## Predicting Higher Participation or Greater Profitability

### DM Participation and Profitability

Characteristics	Predicted Direction of Participation	Predicted Direction of Profitability
Below 35 (ref: Age 55-64)	↓	
35 - 44 (ref: Age 55-64)	↓	
Northeast (ref: Midwest)	↓	↓
West (ref: Midwest)	↓	
HMO/EPO (ref: indemnity)		↑
PPO (ref: indemnity)	↑	
Index year = 2009 (ref: index year = 2008)	↑	
Program participation > 1 year (ref: <1 year program participation)		↓
CCI >= 2 (ref: CCI=0)		↑
Having Inpatient Admission or ER Visit (ref: No ER or Inpatient)	↓	↑
LM Participation (ref: No LM Participation)	↑	
Comorbidities: CAD (ref: No CAD)		↑
Comorbidities: Diabetes (ref: No Diabetes)	↑	
Comorbidities: Back Pain (ref: No Back Pain)	↑	↑
Comorbidities: Depression (ref: No Depression)	↓	↑

#### Color Key:

Predictors that influenced the decision to participate

Predictors of making a profit

Common predictors that influenced the decision to participate & making a profit

# Ten Factors Correlated With Better Results

1. Solid needs assessment process
2. Evidence-based and current
3. Comprehensive – health management with focus on environmental and individual issues
4. Multiple delivery modalities and lots of social support processes
5. Integration with other HPM programs
6. Easy access and high participation in any aspect of program
7. Senior-level support and participation
8. Sustainability – 3+ years of program tenure
9. Widely acknowledged as among the best
10. Rigorous evaluation methods
  - Demonstrated health improvements
  - Demonstrated cost / productivity savings

Sources: Goetzel et al., 2007; Goetzel and Ozminkowski, 2008

# Activities Required to Answer ROI Questions

## Study Design

- Document the business goals and/or problems to be solved
- Convert these to testable hypotheses
- Define the types of data needed to evaluate the hypotheses
- Identify populations or groups to be included in the intervention
- Obtain agreement and commitment from all stakeholders
- Select appropriate resources, e.g.,
  - *Your benefits, HR, wellness, other staff*
  - *Your vendor(s)*
  - *New vendors*
- Design the evaluation

## Intervention / Research Methods

- Select and develop measures that you want to influence via wellness or obesity management, e.g.
  - *health status, gaps in treatment, health outcomes, health risks, patient & member satisfaction, loyalty, etc.*
- Generate a plan to recruit participants
- Write a detailed plan to analyze their experience and the experience of others
- Recruit participants
- Manage intervention staff and vendors
- Coordinate with research partners

## Analytics & Reporting

- Extract, transform, load primary data sources
- Assess data quality and fix problems
- Create analytic data sets
- Select appropriate statistical tests and metrics to test hypotheses
- Conduct descriptive and multivariate analyses
- Review and verify all analytic results
- Report engagement, participation, and utilization, and track key outcomes monthly or quarterly
- Report overall impact in desired intervals (annually or at end of intervention)

## Dissemination

- Present and discuss study findings with all stakeholders
- Decide how to disseminate findings:
  - *To senior management*
  - *To other employees*
  - *Peer-reviewed journal articles*
  - *Book chapters*
  - *Online materials*
  - *Monographs*
  - *Conference presentations*
  - *Articles for trade publications*
- Execute the dissemination strategy



# Conclusions

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- Use measurement and evaluation strategies to inform program design
- Match interventions to the people who can benefit the most
- Document program impact, what works and opportunities for continuous improvement
- Align program design to corporate goals and environment
- Provide health management options supported by evidence based research, quantitative and qualitative outcomes
- Adopt a long-term horizon in expectations for ROI results
- Accept that ROI is a two-way street
  - Vendors need help from employers or health plan to engage participants
  - Active management from vendors and their clients will be required
- Harness existing data across the health continuum to drive program management decisions and to provide health and cost outcomes

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## About the Authors

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