Role of Health Information Technology in Implementing Disease Management Programs

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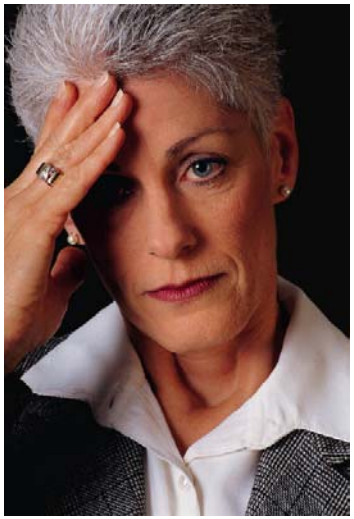
Agenda

- The employer's perspectives on DM
- Measuring DM outcomes – what's important?
- Proving that programs work -- measuring financial impact and return on investment (ROI)

U.S. Business Concerns About Healthcare

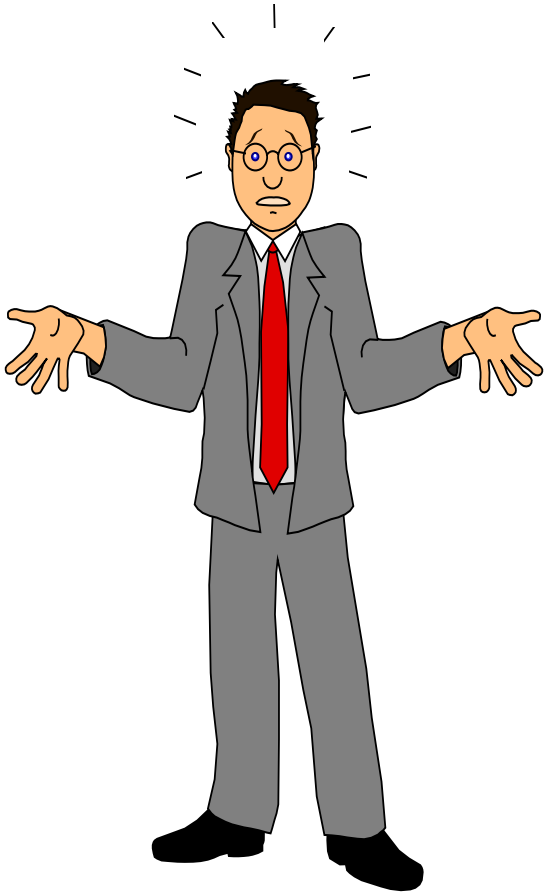
- The United States spent over $2.0 trillion in healthcare in 2005—$6,683 for every man, woman, and child.
- Employers pay over one-third of these costs.
- National health expenditure growth trends are expected to average about 7% per year through 2015.
- Health expenditures as percent of GDP:
  - 15.4 percent in 2002
  - 15.9 percent in 2003
  - 16.0 percent in 2004
  - 16.2 percent in 2005
  - 16.5 percent in 2006



Source: Borger et al., *Health Affairs*, 22 February 2006

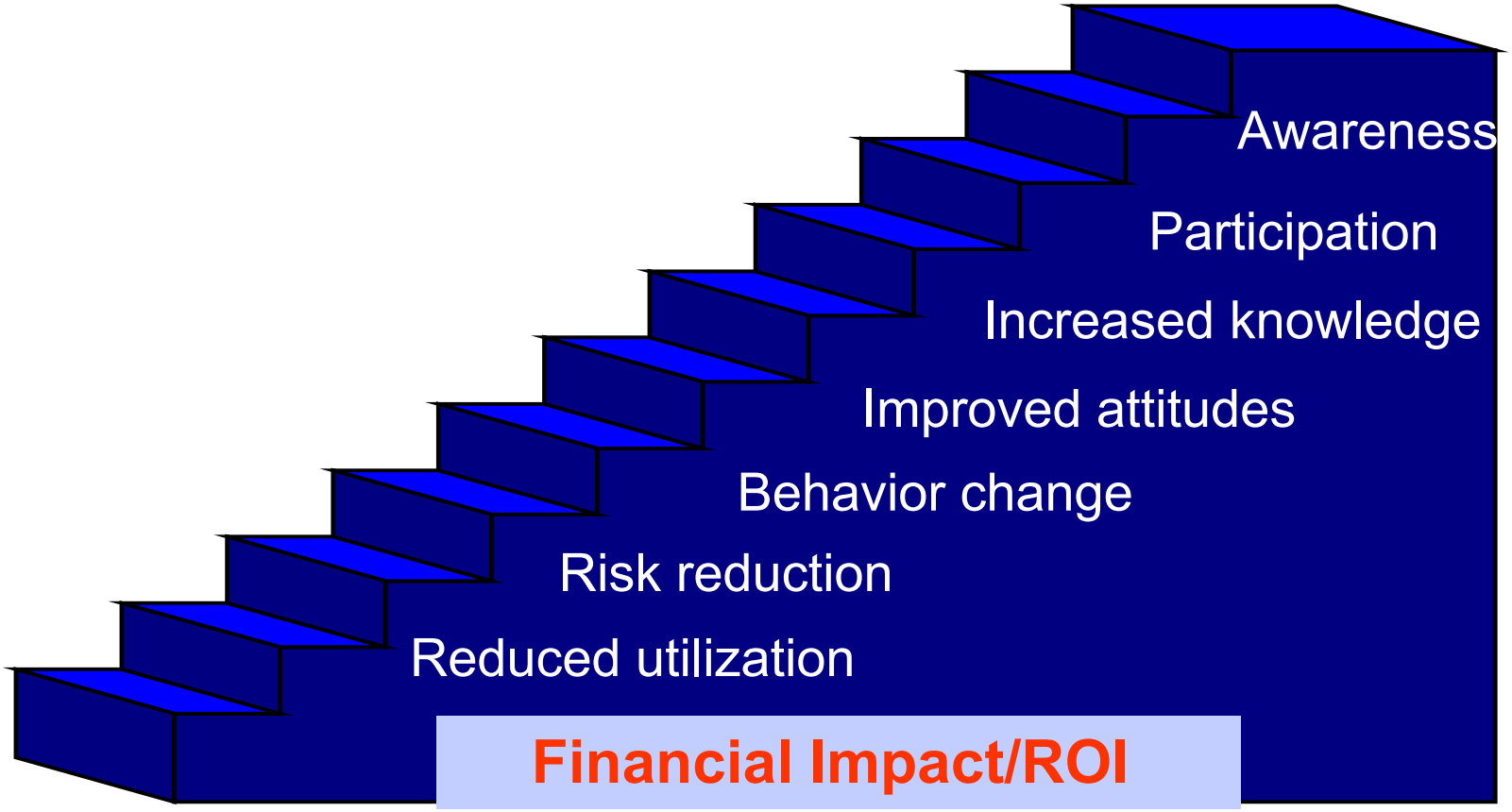
What To Do?

- Manage disease
- Manage disability and absence
- Manage health and demand
- Manage stress
- Strengthen employee assistance programs
- Re-engineer
- Reorganize
- Create incentives
- Cut pharmacy benefits



To evaluate DM programs' impact…

Understand the sequence of critical success factors:



Evaluating Disease Management Programs

Clinical Measures

- Adherence to evidence based medicine guidelines, e.g.:
  - Asthma – rate of inhaled corticosteroids
  - Diabetes –
    - PCP office visit rate
    - Ophthalmology office visit rate
    - Hgb A1C test rate
    - Urinalysis test rate
    - Triglyceride test rate
    - Total/HDL cholesterol test rate
  - Heart Failure (newly diagnosed patients)
    - Diuretic drug prescription
    - Ace inhibitor prescription
    - Echocardiography
    - Radionuclide ventriculography

Health and Functional Status Measures

- Biological measures (e.g., blood pressure, cholesterol levels, blood glucose, weight)
- Behavioral health measures (e.g., exercise, smoking, nutrition, alcohol consumption, stress management, depression)
- Disease specific measures (e.g., finger mobility for arthritis patients, nausea and vomiting for cancer patients, bodily pain for back patients)

Humanistic Measures

- Quality of life measures (SF-36)
  - Physical functioning
  - Role functioning
  - Bodily pain
  - General health
  - Vitality
  - Social functioning
  - Emotional well being
  - Change in health
- Patient satisfaction
- Provider satisfaction

Financial Measures

- Utilization and cost trends
  - Participants vs. non-participants
  - Pre vs. post intervention
- Cost savings estimates
  - Medical, Rx
  - Disability
  - Workers' compensation
  - On the job productivity
- Return on investment (ROI)

Research design

- Pre-experimental
- Quasi-experimental
- True experimental

Research design: Non-experimental (pre-experimental)

One group posttest only

$$X \quad 0_2$$

One group before and after (pre-test/posttest)

$$0_1 \quad X \quad 0_2$$

Research design: Non-experimental (pre-experimental)

Longitudinal or time series analysis

$O_1 \quad O_2 \quad O_3 \quad O_4 \quad X \quad O_5 \quad O_6 \quad O_7 \quad O_8$

Research designs: quasi-experimental

Pretest posttest with comparison group

0_1 X 0_2

0_1 0_2

Research design: Experimental

True experimental – Randomized Clinical Trial (RTC)

0_1 X 0_2

(R) ----------

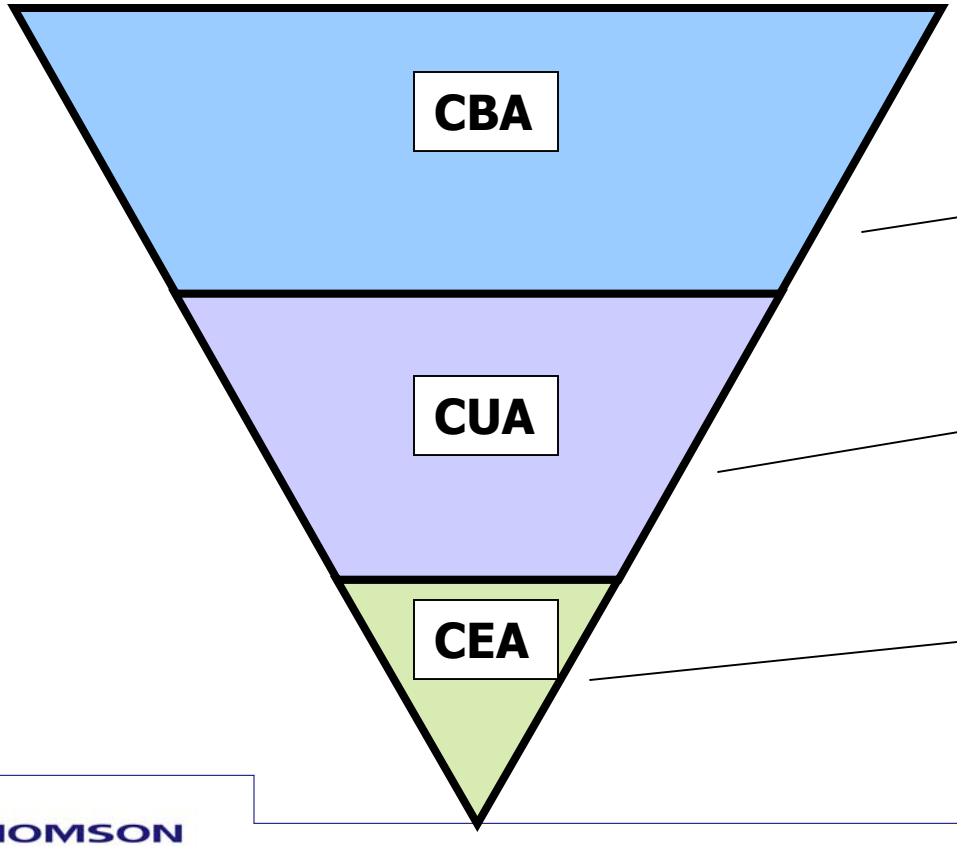
0_1 0_2

Economic Evaluation Methods

- Cost-Benefit Analysis
  - intervention outcomes expressed as monetary values (benefits)
  - money values assigned to intervention expenses (costs)
  - study results expressed as net present value (NPV) -- benefits minus costs or benefit/cost ratio – return on investment (ROI)
- Cost-Utility Analysis
  - outcomes expressed as qualitative health metric (e.g., QALYs)
  - values based on individual or community preferences.
  - study results: (net costs)/(quality-adjusted life year saved)
- Cost-Effectiveness Analysis
  - outcomes expressed in natural health units (e.g., per person achieving healthy weight, per smoker who quit smoking, per heart attacks avoided)
  - study results: (costs)/(unit of health gained)

Source: Green, Fellows, Woolery, The Economics of Health Promotion and Disease Prevention: Lessons from Tobacco Control

Choosing Among Evaluation Methods:



Use when :

Most or all benefits of major interest can be easily monetized

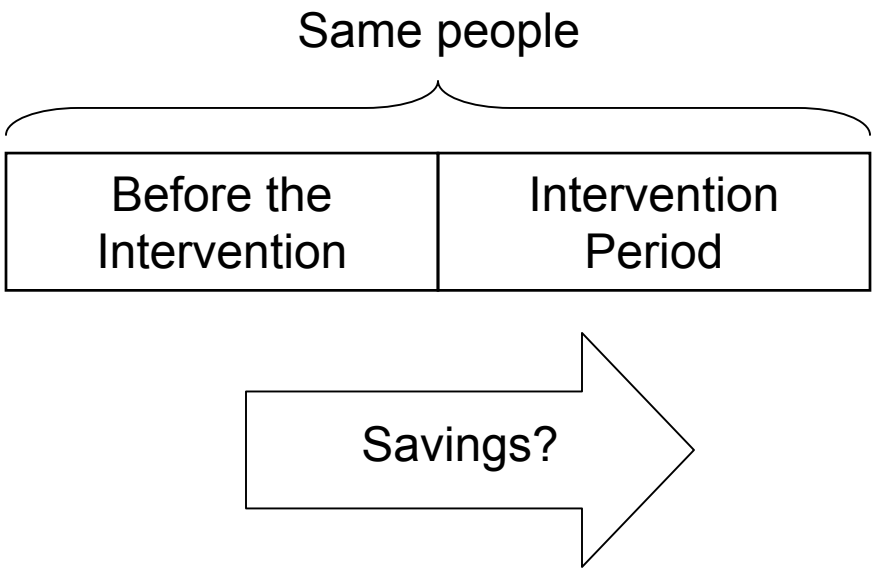
Benefits cannot be monetized

Benefits cannot be monetized

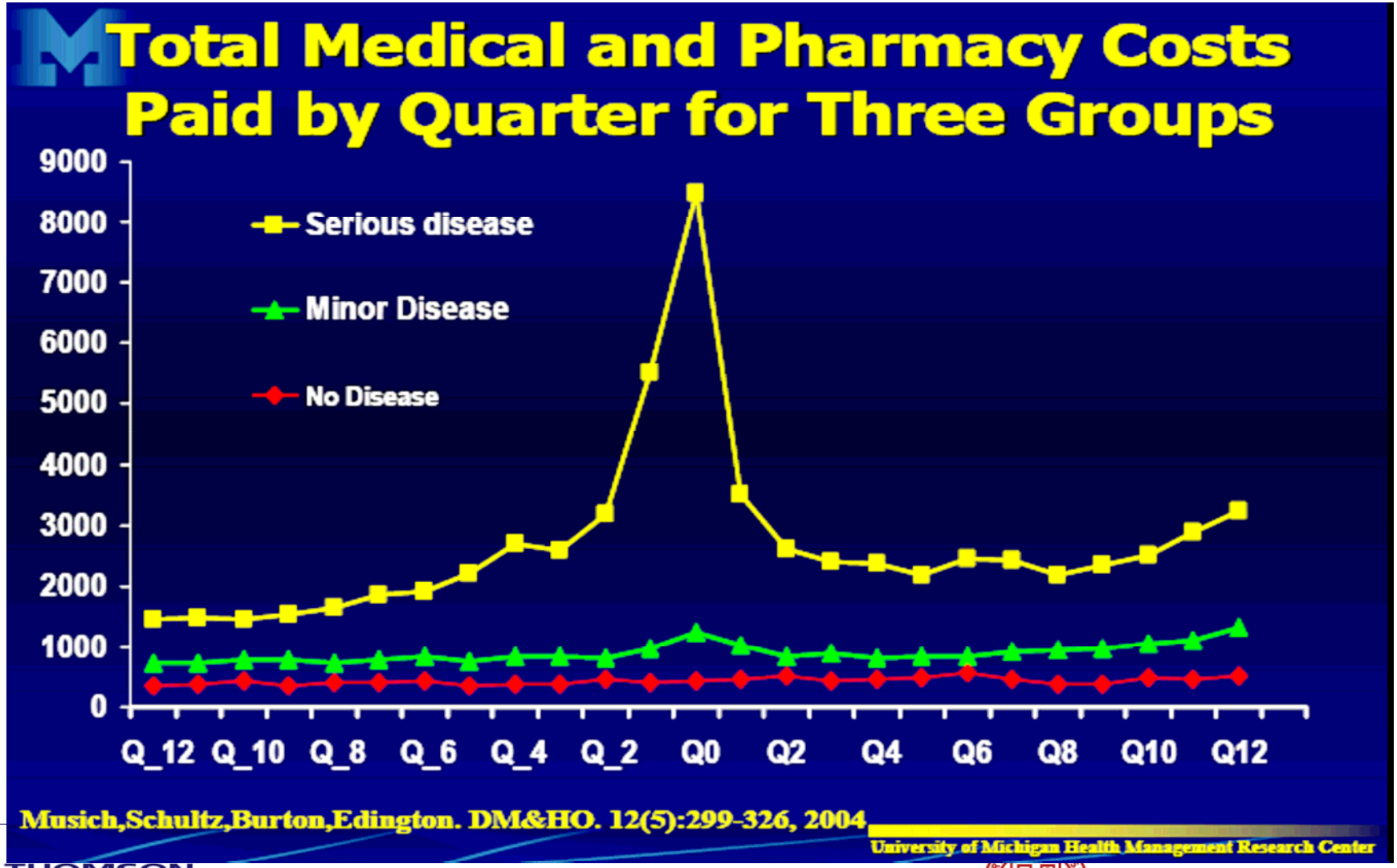
Source: Green, Fellows, Woolery, modified

Retrospective ROI Estimation: Pre-Experimental Design

- The most simple analysis may produce the wrong answers



But regression to the mean and selection bias may skew results

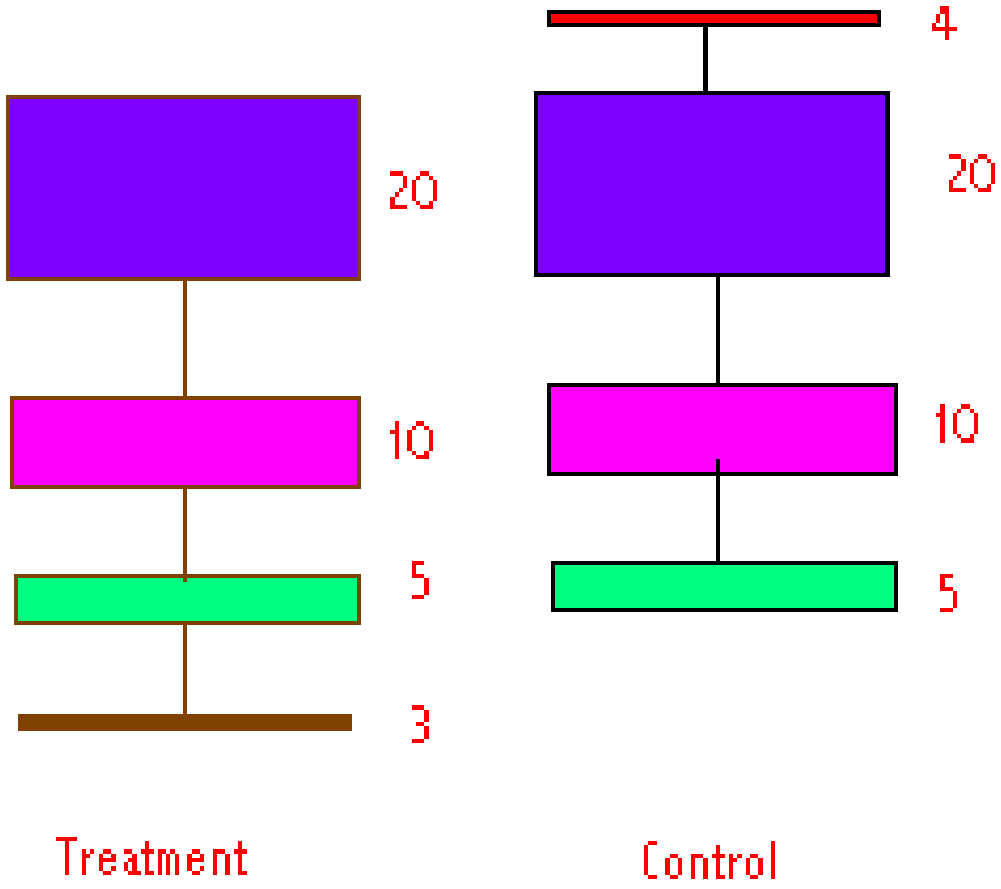

Total Medical and Pharmacy Costs Paid by Quarter for Three Groups
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Serious disease
Minor Disease
No Disease
Q_12 Q_10 Q_8 Q_6 Q_4 Q_2 Q0 Q2 Q4 Q6 Q8 Q10 Q12
Musich,Schultz,Burton,Edington. DM&HO. 12(5):299-326, 2004
University of Michigan Health Management Research Center

Retrospective ROI Estimation: Quasi-Experimental Design, A Better Approach

- Compare intervention and non intervention groups over time:
  - Groups must be demographically, clinically, and motivationally similar.
  - The more similar they are, the less likely regression to the mean and selection bias will be problematic – therefore, apply propensity score matching procedures to match treatment and comparison group subjects.
  - Generally, the longer individuals can be followed, the more accurate the savings estimate (and hence the ROI estimate) will be.

Before Intervention		**Intervention Period**	
Intervention Group Avg. $	–	Intervention Group Avg. $	
Then Subtract:			= Savings
Matched Comparison Group Avg. $	–	Matched Comparison Group Avg. $	

Stratification Method



Citibank, N.A.

Health Management Program Evaluation

- **Title:** Citibank Health Management Program (HMP)
- **Industry:** Banking/Finance
- **Target Population:** 47,838 active employees eligible for medical benefits
- **Description:** A comprehensive multi-component program that aims to help employees improve health behaviors, better manage chronic conditions, and reduce demand for unnecessary and inappropriate health services, and in turn, reduce prevalence of preventable diseases, and show significant cost savings and positive ROI.
- **Citations:**
  - Ozminkowski, R.J., Goetzel, R.Z., Smith, M.W., Cantor, R.I., Shaunghnessy, A., & Harrison, M. (2000). The Impact of the Citibank, N.A., Health Management Program on Changes in Employee Health Risks Over Time. JOEM, 42(5), 502-511.
  - Ozminkowski, R.J., Dunn, R.L., Goetzel, R.Z., Cantor, R.I., Murnane, J., & Harrison, M. (1999). A Return on Investment Evaluation of the Citibank, N.A., Health Management Program. AJHP, 44(1), 31-43.

Citibank High Risk Program Modules

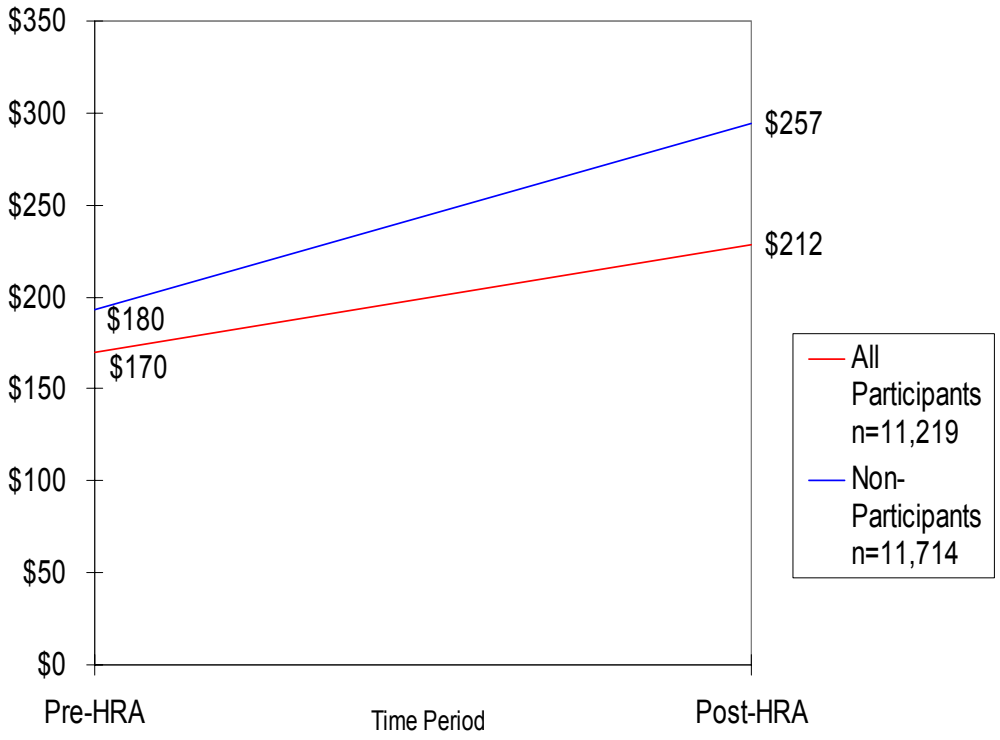
- Arthritis
- Back pain
- Smoking
- Diabetes
- Obesity
- High BP
- Heart conditions and other chronic conditions
- Combinations of risky behaviors

Program Participation

- All 47,838 active employees were eligible to participate.
- The participation rate was 54.3 percent.
- Participants received a $10 credit toward Citibank's Choices benefit plan enrollment for the following year.
- Approximately 3,000 employees participated in the high risk program each year it was offered.

Citibank: Medical Savings-Adjusted Mean Net Payments

Citibank Medical Population
Adjusted Mean Net Payments for the Pre- and Post-HRA periods



Total savings associated with program participation for 11,219 participants over an average of 23 months post-HRA is $8,901,413*

* Based on $34.03 savings and 23.31054 months post-HRA for 11,219 participants

Citibank Health Management Program ROI

- Program costs = $1.9 million*
- Program benefits = $8.9 million*
- Program savings = $7.0 million*

ROI = $4.7 in benefits for every $1 in costs

Notes:

- 1996 dollars @ 0 percent discount
- Slightly lower ROI estimates after discounting by either 3% or 5% per year.
- Results very similar to RCT conducted of same Healthtrac program, by Fries, et al.



A Review of the Literature: Return on Investment for Selected Disease Management Programs

Source: Goetzel, R.Z., Ozminkowski, R.J., Villagra, V.G., Duffy, J. Return on Investment (ROI) from Selected Disease Management Programs. Health Care Financing Review, Summer 2005, 26:4, 1-19.

Methods

- We reviewed 44 studies in the literature that provided enough information to comment on ROI
- Diabetes, asthma, CHF, depression and multiple risk studies were reviewed
- All had randomized, quasi-experimental, or controlled pre-post designs

ROI from Asthma Programs

Table 2: Summary of Disease Management ROI Analysis for Asthma

Study Design	Number		Avgerage Sample Size for Intervention	Average Evaluation Period (yrs)	Average Per Participant Cost and Savings		Average ROI
					Cost	Savings	Total Benefits / Costs
RCT (A)	2		34	1.0	$ 292.54	$ 1,067.74	3.65
RCT (B)	5		149	2.3	$ 525.10	$ (98.48)	-0.19
CBA	2		1471	1.1	$ -	$ 557.29	N/A
Pre-Post	3		144	0.8	$ 256.36	$ 1,390.64	5.42
Total	12	Average	449	1.3	$ 268.50	$ 729.30	2.72

Key:

RCT=Randomized Clinical Trials

CBA=Controlled, Before and After Study Design

ROI from Congestive Heart Failure Programs

Table 4: Summary of Disease Management ROI Analysis for Congestive Heart Failure

Study Design	Number		Average Sample Size for Intervention	Average Evaluation Period (yrs)	Average Per Participant Cost and Savings		Average ROI
					Cost	Savings	Total Benefits / Costs
RCT (A)	4		92	0.7	$ 464.50	$ 1,700.25	3.66
RCT (B)	1		49	1.5	Aust $ 190	Aust $ 5,500	Aust $ est 28.90
CBA	4		314	0.6	$ 1,018.00	$ 1,490.09	1.46
Pre-Post	3		226	0.6	$ 2,715.15	$ 8,461.75	3.12
Total	12	Average	170	0.9	$ 1,399.22	$ 3,884.03	2.78

Key:

RCT = Randomized Clinical Trials

CBA = Controlled, Before and After Study Design

Aust = Australian dollar estimate

ROI from Depression Studies

Table 7: Disease Management ROI Analysis for Depression Studies

Authors	Study Design	Sample Size		Evaluation Period (yrs)	Intervention Program Cost		Intervention Program Savings		ROI
		Intervention	Control		Total	Per Participant	Total	Per Participant	Total Benefits / Costs
Experimental Design									
Von Korff et al., 1998	RCT	169	163	1.0	$ 201,279	$ 1,191.00	$ (80,824.25)	$ (478.25)	(0.40)
Katon et al., 2002	RCT	95	92	2.3	$ -		$ 57,665.00	$ 607.00	-
Simon et al., 2000	RCT	188	180	0.5	$ 9,588	$ 51.00	$ (15,792.00)	$ (84.00)	(1.65)
Simon, Katon et al., 2001	RCT	110	109	0.5	$ 38,500	$ 350.00	$ (32,560.00)	$ (296.00)	(0.85)
Simon, Manning, et al., 2001	RCT	205	169	1.0	$ 1,137,545	$ 5,549.00	$ (336,200.00)	$ (1,640.00)	(0.30)
Simon et al., 2002	RCT	194	192	1.0	$ 49,664	$ 256.00	$ (13,968.00)	$ (72.00)	(0.28)
McCaffrey et al., 2001	RCT	440	498	0.5			$ (737,000.00)	$ (1,675.00)	-
Sherbourne et al. 2001	RCT	913	443	2.0			$ (414,502.00)	$ (454.00)	-
Average		289	231	1.1	$ 239,429	$ 1,479.40	$ (196,647.66)	$ (511.53)	(0.35)

Key:

RCT = Randomized Clinical Trials

CBA = Controlled, Before and After Study Design

ROI from Diabetes Programs

Table 6: Summary of Disease Management ROI Analysis for Diabetes

Study Design	Number		Average Sample Size for Intervention	Average Evaluation Period (yrs)	Average Per Participant Cost and Savings		Average ROI
					Cost	Savings	Total Benefits / Costs
RCT	4		608	2.1	$ 1,862.33	$ (1,013.25)	(0.54)
CBA - Sidorov, et al., 2002	1		3,118	2.0	$ 580.50	$ 1,294.32	2.23
CBA - Wagner, et al., 2001	1		732	5.0	$ -	$ 817.50	N/A
Pre-Post	2		3,585	0.9	$ -	$ 637.50	N/A
Total	8	Average	2,011	2.5	$ 610.71	$ 434.02	0.71

Key:

RCT = Randomized Clinical Trials

CBA = Controlled, Before and After Study Design

ROI from Studies of Multiple Risks

Table 10: Summary of Disease Management ROI Values for Studies of Multiple Risk

Study Design	Number		Average Sample Size for Intervention	Average Evaluation Period (yrs.)	Average Per Participant Cost and Savings		Average ROI
			Interv.		Cost	Savings	Total Benefits / Costs
RCT	2		96	2.0	N/A	$ 581.00	6.65
CBA	1		683	1.0	$ 135.00	$ 590.00	4.37
Pre-Post	1		188	1.3	$ 324.00	$ 3,520.68	10.87
Total	4	Average	322	1.4	$ 229.50	$ 1,563.89	6.81

Key:

RCT = Randomized Clinical Trials

CBA = Controlled, Before and After Study Design

Summary of Our Literature Review on DM ROI

- Return on Investment varied by condition
- CHF, asthma and multiple condition programs show promise
- Diabetes and depression programs may cost more than they save, at least in the short run
- Productivity impacts have not been well evaluated for DM programs
- Interventions and studies vary in quality

So, what is important to payers?

- Financial outcomes
  - Cost savings, return on investment (ROI) and net present value (NPV)
  - Where to find savings:
    - Medical costs
    - Absenteeism
    - Short term disability (STD)
    - Presenteeism
- Health outcomes
  - Adherence to evidence based medicine
  - Behavior change, risk reduction, health improvement
- Humanistic outcomes
  - Improvement in quality of life
  - Improved “functioning”