The Clinical and Economic Aspects of Health Management at PPG
Cost Effectiveness

- Economy
- Efficiency
- Effectiveness

- Cost
- Physical Inputs
- Physical Outputs
- Outcomes

Cost-effectiveness
Economy

Investment

Physical
Inputs

Physical
Outputs

Outcomes

Efficiency

“Change Box”

Programs

Population
Risk

Measures
sources

Mgmt
Survey

Implem.
Scores

10 Keys™ - HRA
population based
risk profile

H. Care cost

H. Care Use

Productivity

Burden
of Disease

Effectiveness

Integrated Cost

Cost-effectiveness
Cost-effectiveness

- **Economy**
  - Investment
  - Physical Inputs

- **Efficiency**
  - "Change Box"
  - Population Risk
  - Programs

- **Effectiveness**
  - Physical Outputs
  - Outcomes
  - Burden of Disease

- **Metrics**
  - Measure sources
    - Mgmt Survey
    - Implem Scores
    - Population risk profile
    - Med +Rx Claims
    - Disability records
    - Productivity Scores

- **Evaluation**
  - 4 scores
  - 14 scores
  - 10 Keys
  - Rates of Office visits, ER visits, Admissions, Net pay per patient, per episode, etc.
  - Cost due to medical treatment, disability, lost productivity, salary replacement, etc.

**Integrated Cost**

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10 Keys™ - HRA population based risk profile
**Economy**
- Investment
- Physical Inputs

**Efficiency**
- Programs
  - Population Risk
  - "Change Box"

**Effectiveness**
- Physical Outputs
  - H. Care cost
  - H. Care Use
  - Productivity
- Outcomes
  - Burden of Disease

**Population Risk**
- 10 Keys™ - HRA population based risk profile
- Med + Rx Claims
- Disability records
- Productivity Scores

**Cost**
- Integrated Cost
- Cost due to medical treatment, disability, lost productivity, salary replacement, etc.

**Metrics**
- Measure sources
  - Mgmt Survey
  - Implem . Scores
  - 10 Keys™
  - Rates of Office visits, ER visits, Admissions, Net pay per patient, per episode, etc.

**Evaluation**
- Integrated Cost
- Cost-effectiveness
DA provides a clear framework for analyzing decisions that involve significant uncertainties (risk).

In today's world risks can include anything from political and legal risks, to unknowns associated with market acceptance, weather, foreign exchange rates, commodity prices, and .... (why not) wellness and health outcomes.
Creating a basic model of the business problem

Determining how to best represent uncertainties

Creating an exhaustive set of choices

Performing quantitative analysis to determine the optimal decision
W2O: Wellness to Outcomes

 Diagram showing relationships between various health factors and outcomes.

- Wellness Mgmt. High/Low
- Blood Pres. % Know
- Cholesterol % Know
- % Stress SSOS Neg
- Physical Activity Environ
- Pre-Diabetes Risk Pool
- % BMI 25+
- Nutrition promo Environ
- % Low No RISK
- % AGE 50+
- Depression % SCREENED
- Hypertension Episodes / 1000
- Diabetes Visits / 1000
- Diabetes Episodes / 1000
- Diabetes Visits /1000 ER
- Work Comp. Med + Wage Payment
- Coronary, A.D. Visits /1000
- Office Med A
- Coronary, A.D. ADMITS/1000
- Acute A
W2O: Wellness to Outcomes

1

[Diagram with arrows and categories]

[Bar chart with categories and percentages]

%
W2O: Wellness to Outcomes

2

“10 Keys” to Healthy Aging

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University of Pittsburgh
Sorted Parameter Estimates

| Term                   | Estimate | Std Error | t Ratio | Prob>|t| |
|------------------------|----------|-----------|---------|----------------|
| % Low Risk             | -158.2534| 46.74753  | -3.39   | 0.0025         |
| Nutritional Environment| -52.91356| 20.28908  | -2.61   | 0.0157         |
| % Aged 50+             | 111.49604| 45.05718  | 2.47    | 0.0211         |

RSquare 0.65331
RSquare Adj 0.608089
Root Mean Square Error 24.65265
Mean of Response 120.7826
Observations (or Sum Wgts) 27

Prediction Profiler
Hypertension Episodes rates

Hypertension Episodes of Care /1000 Active Members in Nutrition- Physical Activity High score vs. Control work-sites

p 0.003 Between Groups; p 0.001 Within Years

Nutrition + Physical Activity high score sites N.13

Control sites N. 80
RSquare 0.665526 
RSquare Adj 0.652662
Root Mean Square Error 14.82222
Mean of Response 54.99786
Observations (or Sum Wgts) 28

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Correlation</th>
<th>Signif. Prob</th>
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<tbody>
<tr>
<td>AFT-HPN-Episodes Per 1000</td>
<td>121.94</td>
<td>39.1284</td>
<td>0.815798</td>
<td>&lt;.0001</td>
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<tr>
<td>DM Epi Per 1000 ACTIVE</td>
<td>54.99</td>
<td>25.1499</td>
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</table>

| Term                          | Estimate | Std Error | t Ratio | Prob>|t| |
|-------------------------------|----------|-----------|---------|-----|
| Intercept                     | -8.9437| 9.3207    | -0.96  | 0.3461|
| AFT-HPN-Episodes Per 1000     | 0.5243| 0.0729 | 7.19    | <.0001|
### Diabetes Episodes rates (example)

| Term                  | Estimate  | Std Error | t Ratio | Prob>|t| |
|-----------------------|-----------|-----------|---------|-----|-----|
| Physical Activity % no risk | -122.7227 | 52.38092  | -2.34   | 0.0274 |
| % Aged 50+            | 77.20665  | 33.31348  | 2.32    | 0.0289 |

- **RSquare**: 0.400318
- **RSquare Adj**: 0.352344
- **Root Mean Square Error**: 20.23994
- **Mean of Response**: 54.99786
- **Observations (or Sum Wgts)**: 28
Coronary Artery Disease - Episodes rates

Coronary Artery Episodes of care /1000 Active members

p 0.01 within years; p 0.02 between groups

- Nutrition + Physical Activity high score sites N.13
- Control sites N. 80
Coronary Artery Disease/ER visits rates

Emergency Room Visits rates, Active employees by Exposed vs. Control worksites
ANOVA p 0.0056

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<thead>
<tr>
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<th>2004</th>
<th>2005</th>
<th>2006</th>
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<th>2008</th>
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<td>EXPOSED Nutrition Phys. Activity</td>
<td>0.82</td>
<td>0.71</td>
<td>0.71</td>
<td>1.20</td>
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<td>CONTROL Nutrition Phys. Activity</td>
<td>1.43</td>
<td>1.44</td>
<td>1.44</td>
<td>2.06</td>
<td>2.37</td>
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Coronary Artery Disease/Admission rates

Coronary Artery Disease Hospital Admission Rates, in Active employees by Exposed v. Control worksites
(ANOVA p 0.001)

<table>
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<td>2004</td>
<td>2.45</td>
<td>4.96</td>
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<td>2005</td>
<td>2.30</td>
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<td>2006</td>
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<td>2007</td>
<td>1.96</td>
<td>3.49</td>
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<td>3.71</td>
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<tr>
<td>2008</td>
<td>1.94</td>
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Medical Office Visits rates, Actives by exposed v. Control worksites

ANOVA p < 0.0001

<table>
<thead>
<tr>
<th>Visits/1000 Office Med</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
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</thead>
<tbody>
<tr>
<td>EXPOSED Nutrition Phys. Activity</td>
<td>30.37</td>
<td>25.82</td>
<td>31.01</td>
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<td>CONTROL Nutrition Phys. Activity</td>
<td>46.11</td>
<td>43.29</td>
<td>42.75</td>
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<td>44.36</td>
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Worksite Health promotion
Several dimensions

- Multi-factorial effects for any outcome, f.i.
  - Multiple risk factors contributing to Coronary Artery Disease
- Co-Existing but distinct population outcomes, f.i.
  - Hypertension, Diabetes, Coronary Artery Disease, Workers Compensation....
- Heterogeneity of populations
  - Several worksites, regions
- Diversity of simultaneous programs
  - Variance in implementation maturity and intensity
Evidence Based Wellness

Scalable System Change

System of Focus for the early adopters (defined by Aim)

(Tests to adapt changes, then implementation)
Adopter Categories

- Innovators: 2.5%
- Early Adopters: 13.5%
- Early Majority: 34%
- Late Majority: 34%
- Laggards: 16%

from E. Rogers, 1995
Delaware: Wellness Performance "Quad" (example)

**Net Care Cost Inflation rate**

<table>
<thead>
<tr>
<th>Year</th>
<th>Benchmark</th>
<th>Delaware</th>
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<tr>
<td>2005</td>
<td>10</td>
<td>5</td>
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<tr>
<td>2006</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>2007</td>
<td>15</td>
<td>10</td>
</tr>
</tbody>
</table>

Delaware: 10 Keys to Health Process indicators

1. K1B Pressure
2. K2 Not Smoke
3. K3 Cancer Screen
4. K4 Flu shots
5. K5 Glucose test
6. K6 Cholesterol
7. K7 Exercise
8. K8 Low Risk
9. K9 Social Contact
10. K10 Depression

**Delaware: Health Risk Indicators**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Graphs</th>
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<tbody>
<tr>
<td>HRA Participation</td>
<td><img src="image" alt="Graph" /></td>
</tr>
<tr>
<td>No/Low Risk</td>
<td><img src="image" alt="Graph" /></td>
</tr>
<tr>
<td>Know your Numbers</td>
<td><img src="image" alt="Graph" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management Topic</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>Problem/Opportunity</td>
<td>Green</td>
</tr>
<tr>
<td>Focus/priorities</td>
<td>Yellow</td>
</tr>
<tr>
<td>ID of population needs</td>
<td>Green</td>
</tr>
<tr>
<td>Programs coordination</td>
<td>Yellow</td>
</tr>
<tr>
<td>Plan Evaluation</td>
<td>Green</td>
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