BEHAVIORAL ECONOMICS
AND HEALTH DELIVERY

Matilda White Riley Lecture OBSSR 20th
Anniversary NIH
June 23, 2015

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Penn NIA Roybal P30 Center in Behavioral Economics and Health

Department of Health Care Management

Perelman School of Medicine, University of Pennsylvania
Richard Suzman 1943-2015
Moving provider payment from fee for service for volume towards health improvement.

- HHS Secretary Burwell Announcement Jan 26, 2015
  - 30% of Medicare payments tied to alternative payment models (ACOs or bundles) by 2016, 50% by 2018

- In alternative payment models, providers are accountable for the quality and cost of care for the people and populations they serve, moving away from the old way of doing things, which amounted to, “the more you do, the more you get paid.”
We spend more than any other country but rank poorly on measures of health status

<table>
<thead>
<tr>
<th>COUNTRY RANKINGS</th>
<th>AUS</th>
<th>CAN</th>
<th>FRA</th>
<th>GER</th>
<th>NETH</th>
<th>NZ</th>
<th>NOR</th>
<th>SWE</th>
<th>SWIZ</th>
<th>UK</th>
<th>US</th>
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<tr>
<td><strong>OVERALL RANKING (2013)</strong></td>
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<td>Quality Care</td>
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<td>Effective Care</td>
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<td>Coordinated Care</td>
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<td>Patient-Centered Care</td>
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<td>Access</td>
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<tr>
<td>Cost-Related Problem</td>
<td>9</td>
<td>5</td>
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<td>11</td>
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<tr>
<td>Timeliness of Care</td>
<td>6</td>
<td>11</td>
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<td>Efficiency</td>
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<td>Equity</td>
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<td>6</td>
<td>1</td>
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<td>2</td>
<td>11</td>
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<tr>
<td>Healthy Lives</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td>7</td>
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<td>6</td>
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<td>11</td>
</tr>
<tr>
<td><strong>Health Expenditures/Capita, 2011</strong></td>
<td><strong>$3,800</strong></td>
<td><strong>$4,522</strong></td>
<td><strong>$4,118</strong></td>
<td><strong>$4,495</strong></td>
<td><strong>$5,099</strong></td>
<td><strong>$3,182</strong></td>
<td><strong>$5,669</strong></td>
<td><strong>$3,925</strong></td>
<td><strong>$5,643</strong></td>
<td><strong>$3,405</strong></td>
<td><strong>$8,508</strong></td>
</tr>
</tbody>
</table>

Notes: * Includes ties. ** Expenditures shown in US PPP (purchasing power parity); Australian $ data are from 2010.
Individual behavior is a key driver of health and health costs

- 71% of US population is overweight or obese

- Smoking is the leading cause of preventable mortality - 438,000 deaths per year

- 75% of ~$3 trillion in health care spending is tied to obesity, type 2 DM, CAD, and cancer

The science of motivation has evolved

**Standard Economics**

- If people know what to do, they will do it.
- **Education is what matters**
- People are perfectly rational expected value maximizers
- **Size of reward is what matters**

**Behavioral Economics**

- People are predictably irrational.
- Decisions affected by present bias, loss framing, emotions, social context, inertia
- **Incentive delivery and design and choice environment are critical**
Incorporating Common Decision Errors Can Improve Program Design

<table>
<thead>
<tr>
<th>Decision Error</th>
<th>Example Solution</th>
</tr>
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<tbody>
<tr>
<td>Present-biased preferences (myopia)</td>
<td>Make rewards for beneficial behavior frequent and immediate</td>
</tr>
<tr>
<td>Framing and segregating rewards</td>
<td>$100 reward likely more effective than $100 discount on premium</td>
</tr>
<tr>
<td>Overweighting small probabilities</td>
<td>Provide probabilistic rewards (e.g., lottery) for self-interested behavior</td>
</tr>
<tr>
<td>Regret aversion</td>
<td>Tell people they would have won had they been adherent</td>
</tr>
<tr>
<td>Loss aversion</td>
<td>Put rewards at risk if behavior doesn’t change</td>
</tr>
<tr>
<td>Status quo bias</td>
<td>Modify path of least resistance</td>
</tr>
</tbody>
</table>

Default bias $\rightarrow$ ‘Opt out’ policies result in much higher rates for organ donation

**Level of effective consent**

- Denmark: 4.3%
- Netherlands: 27.5%
- United Kingdom: 17.2%
- Germany: 12.0%
- Austria: 100.0%
- Belgium: 98.0%
- France: 99.9%
- Hungary: 100.0%
- Poland: 99.5%
- Portugal: 99.6%
- Sweden: 85.9%

Source: Johnson and Goldstein, Science, 2003
Defaults make a big difference in what people choose – even when stakes are high.

Percent of patients choosing a comfort-oriented goal of care

- Comfort Default: 77%
- Standard AD: 61%
- Life Extension Default: 43%

p = <0.01

Rates of generic prescribing heavily influenced by changes in defaults

Patel M, Volpp KG. 2015 in preparation for submission
Active Choice as a good approach when applying an opt out default isn’t an option
100% more members enrolled in auto-refill using Enhanced Active Choice

**OPT-IN**

“Press 1 if you would like to be transferred to a Customer Care Representative now.”

or

“Press 2 if you are not interested.”

**ENHANCED ACTIVE CHOICE**

“Press 1 if you prefer to refill your prescriptions by yourself each time.”

or

“Press 2 if you would prefer us to do it for you automatically.”

<table>
<thead>
<tr>
<th></th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
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</thead>
<tbody>
<tr>
<td><strong>PHYSICIAN OFFICE SERVICES</strong></td>
<td></td>
<td></td>
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<tr>
<td>PCP Office Visits</td>
<td>$15 copay</td>
<td>50% after deductible</td>
<td>$25 copay, deductible</td>
</tr>
<tr>
<td>Specialist Office Visit</td>
<td>$30 copay</td>
<td>50% after deductible</td>
<td>$25 copay, deductible</td>
</tr>
<tr>
<td>Other Services</td>
<td>$40 copay</td>
<td>50% after deductible</td>
<td>$40 copay, deductible</td>
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<tr>
<td>Diagnostic Lab/Xray</td>
<td>$100% after deductible</td>
<td>50% after deductible</td>
<td>$100% after deductible</td>
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<tr>
<td>Allergy Testing</td>
<td>$100% after deductible</td>
<td>50% after deductible</td>
<td>$100% after deductible</td>
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<tr>
<td>Allergy Serum</td>
<td>50% up to $1500, then 100%</td>
<td>50% up to $1500, then 100%</td>
<td>50% up to $1500, then 100%</td>
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<tr>
<td>Allergy Injections</td>
<td>100% after $5 copay</td>
<td>50% after deductible</td>
<td>50% after deductible</td>
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<tr>
<td><strong>PREVENTIVE SERVICES</strong></td>
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<tr>
<td>Routine Child Care (through age 17)</td>
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<tr>
<td>- Immunizations</td>
<td>100%</td>
<td>50% after deductible</td>
<td>100%</td>
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<tr>
<td>- Exam</td>
<td>100% after copay</td>
<td>50% after deductible</td>
<td>100% after copay</td>
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<tr>
<td>Routine Adult Care (age 18 and older)</td>
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<tr>
<td>- Annual Exam</td>
<td>100% after copay</td>
<td>50% after deductible</td>
<td>100% after copay</td>
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<tr>
<td>- First Mammogram of the year (up to $300)</td>
<td>100%</td>
<td>50% after deductible</td>
<td>100%</td>
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<tr>
<td>- Routine Pap Smears (1 per plan year)</td>
<td>100%</td>
<td>50% after deductible</td>
<td>100%</td>
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<tr>
<td>- Prostate Antigen Testing (1 per plan year)</td>
<td>100%</td>
<td>50% after deductible</td>
<td>100%</td>
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<tr>
<td>- Routine Colonoscopy</td>
<td>100%</td>
<td>50% after deductible</td>
<td>100%</td>
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<tr>
<td><strong>IMMEDIATE CARE</strong></td>
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<tr>
<td>Urgent Care</td>
<td>100% after $50 copay</td>
<td>100% after $50 copay</td>
<td>100% after deductible (Level 1)</td>
</tr>
<tr>
<td>Emergency Care</td>
<td>100% after $100 copay and deductible</td>
<td>100% after $100 copay and deductible (Level 1)</td>
<td>100% after deductible (Level 1)</td>
</tr>
<tr>
<td>Non-Emergency Care at ER</td>
<td>Not covered</td>
<td>Not covered</td>
<td>Not covered</td>
</tr>
<tr>
<td>Emergency Ambulance</td>
<td>80%</td>
<td>80%</td>
<td>80%</td>
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</tbody>
</table>

*Emergency care at out-of-network facilities is covered at 80% in the EPOPlus Plan.

**Convenience care like Minute Clinic may require either a PCP or specialist office visit copay. Copayments vary by provider.

(Continued on following page)
A lot of standard economics goes into plan design

- Plan designs are way too complicated
- Patients typically don’t understand coinsurance, deductibles
- Only 11% of patients can accurately estimate cost of care
- We worked with one of the major plans to decide a new ‘simple plan’

Humana Simplicity

At Humana, we don’t think a medical plan has to be hard to understand—or afford. That’s why we developed Humana Simplicity. It offers your clients outstanding medical coverage at a price that’s affordable to them.

Humana Simplicity is different from other medical plans. When a member uses their plan for in-network healthcare services, they pay a copayment for that service—there’s no deductible. This straightforward plan design makes it easier to administer, and easier for employees to understand their benefits and payment responsibilities. Which means employees will be more likely to utilize their medical plan effectively.

Key Benefits:

- Robust plans, and various networks options
- No in-network deductibles or coinsurance
- All copayments count toward maximum out-of-pocket expenses. Once the out-of-pocket maximum has been reached, the plan will pay 100 percent of the eligible charges under the written terms of the policy.
- Preventive care services are covered at 100 percent for in-network providers
- Cost for co-payments in the network is significantly lower
• Incentive Design: Unbundled rewards

• 878 General Electric employees, assigned to usual care (access to cessation counseling) or usual care + incentives worth $750

➢ GE implemented program based on this for 152,000 US employees in 2010

Support: CDC R01 DP000100-01, RO1 DP001168-01

Effectiveness = Acceptance x Efficacy

• Important question vis a vis use of precommitment/deposit contracts to improve health

• To be effective, interventions need to be:
  1. Acceptable to targeted smokers
  2. Efficacious among those who accept the intervention

Support: NCI R01CA159932, NIA RC2AG036592, and CVS Health

Halpern SD, Asch DA, Volpp KG. BMJ 2012; 344: e522
Rewards are better than deposits for populations

- 2,538 employees of CVS
- 5-arm Randomized controlled trial
  1. Information about smoking cessation programs
  2. Individual or group rewards of up to $800 for confirmed quit at 6 mos.
  3. Individual or group deposit contract of $150 returned + $650 for confirmed quit at 6 mos.

Halpern, et al. NEJM 2015
Deposits are better than rewards for individuals

- 90% were willing to enter a reward program
  - *17.1% of those quit*

- Only 13.7% were willing to put their own money down.
  - *52.3% of those quit*

- All else equal, for people willing to put money down, the quit rate will be 13.2% higher with deposits than rewards.

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Halpern, et al. NEJM 2015
Launched nationwide June 1, 2015

How does the program work?
If you’re a tobacco user who wants to quit, here’s how to get started.

Step 1
Log on to https://700GoodReasons.CVS.com. Your progress and confidential data will be tracked and stored here.

Step 2
Make a $50 commitment to quit tobacco use. Agree to participate in the program by signing an authorization form and making a $50 commitment. Why? Research shows that people who invest their own money into a smoking cessation program are more likely to quit for good.

Step 3
Undergo tobacco screenings. To track your progress, you’ll undergo tobacco screenings at the start of the program, and again at 6 months and 12 months. You can complete the tests at MinuteClinic® or a Guest Diagnostics Patient Services Center. Visit https://700GoodReasons.CVS.com for full details on the tobacco-screening process.

Step 4
Use resources to help you quit. We encourage you to use any and all tobacco cessation methods and resources that work best for you, including the CVS Health resources listed to the right.

Step 5
Earn $700. If you test tobacco-free at 6 months, you’ll earn $200. If you’re tobacco-free at 12 months, you’ll earn $500, and your initial $50 commitment will be paid back to you. That’s a grand total of $700! All program payments are coordinated directly through the CVS Health payroll system.

Wellness resources to help you quit
Take advantage of CVS Health resources.

We know there are many ways to quit, and every journey is unique. Regardless of the quit method you choose, rest assured that a number of CVS Health wellness resources are available to help make your journey a successful one.

WebMD Wellness Portal
Connect with a number of supportive health resources, assessments and trackers.

Healthy Living Community
Sound off on myLife’s tobacco-free discussion boards and find motivation from colleagues who are on this journey with you.

MinuteClinic Start to Stop® Program
Work 1-on-1 with a trained nurse practitioner to develop a personalized smoking cessation plan.

Telephonic Health Coaching with WebMD
Coaches help with all areas of wellness, including smoking cessation.

American Cancer Society® Quit For Life Program®
Dial 844-265-4291 to connect with a live, toll-free quit hotline operated by the American Cancer Society Quit For Life Program.

Scan to watch inspiring videos about the 700 Good Reasons program.
Lotteries and deposit contracts are both effective in achieving initial weight loss.

Mean weight loss by condition after 16 weeks

<table>
<thead>
<tr>
<th>Condition</th>
<th>Weight Loss (Pounds)</th>
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<tbody>
<tr>
<td>Control</td>
<td>3.9</td>
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<tr>
<td>Regret Contest</td>
<td>13.1</td>
</tr>
<tr>
<td>Deposit contract</td>
<td>14.0</td>
</tr>
</tbody>
</table>

About 50% reached goal in intervention arms compared to 10% in control group.

Volpp, KG, Troxel AB, Norton, Fassbender, Loewenstein JAMA 2008;300:2631-2637
Funding by NIA, NICHD, USDA, Hewlett Foundation
Social incentives are a high impact, cost effective way of improving glycemic control

**Incentive Type**
- Peer mentoring
  - Outcomes-based, financial incentive

**Overview**
- 6 month randomize control trial
  - Control – usual care
  - Peer mentor – talk at least weekly
  - Incentives - $100 to drop one point; $200 to drop two points or achieve HbA1c of 6.5%

**Impact**
- >1 point drop in HbA1c levels

**Mean change in HbA1c**
- Usual Care: -0.01
- Traditional Incentive: -0.46
- Peer Mentor: -1.08

**Annals of Internal Medicine**


**Funded by NIA as Roybal Center pilot**
Don’t just adjust premiums!

Consider applying:
- Present bias (frequent feedback)
- Mental accounting (unbundle rewards)
- Loss framing or precommitment contracts
- Probabilistic rewards
- Social incentives

Source: Volpp KG, Asch DA, Galvin R, Loewenstein G. NEJM. 2011 365: 388-390,
The 5,000 hour problem (and opportunity)

- 3-4 hours/year: Time a typical patient with chronic disease may spend with a doctor
- 5,000+ hours: Waking hours elsewhere
- As much as 40% premature mortality in US due to behavior
- Advances in wireless technologies create new opportunities for physicians to influence patient behavior and more efficiently care for populations

Successful population health management will require engagement of high-risk patients in improving health behaviors

Source: Asch DA, Muller R, Volpp KG. 2012. NEJM
Creating an ecosystem to address the 5,000 hours problem. . .

Data Capture
Participant “passively” takes medication, uses scale, pedometer etc.

Data Transmission
Device automatically transmits information to server

Rewards Communication
Program captures behavior and provides feedback to participant

Funds Fulfillment
Funds electronically transferred to participant

Penn Way to Health funded by National Institute of Aging RC2 AG036592-01 (Asch and Volpp PIs)
What is required for scale?

- Scale is impossible without technology
- Technology is useless if it doesn’t modify behavior
- Many of the high-risk patients for whom this would make economic sense are not engaged

An understanding of behavior + Technology = Scalable behavior change

Asch DA, Muller RW, Volpp KG. Automated hovering in health care. NEJM 2012
Way to Health integration

Penn Way to Health funded by National Institute of Aging  RC2 AG036592-01 (Asch and Volpp PIs)
The technology is necessary but not sufficient. . .

**Monthly Adherence Rate**

- **Control**
- **Low Incentive**
- **High Incentive**

**Mean change in HbA1c 3 months**

- **Control**
- **Low Incentive**
- **High Incentive**

Funded by National Institute of Aging RC2 AG036592-01 (Asch and Volpp PIs)

Sen A, Sewell T, Bellamy S, Asch DA, Volpp KG
2014 JGIM Patel, Asch, Volpp JAMA 2015
CMMI – “Automated Hovering to Improved Medication Adherence After Heart Attack”

Compound intervention with goal of achieving the triple aim

1. Wireless pill bottles for meds
2. Daily lottery incentives
3. Social incentive - Friend or family member get automated alerts
4. Engagement advisor (much lower personnel ratios)

Made possible by collaboration with Aetna, Humana, IBC, Horizon BCBS, HealthFirst, CMS

Work in partnership with Asch DA (Co-PI), Troxel AB, Terwiesch C, Mehta S, Kolansky D, Drachman B. Funding Support from CMMI 1-CIC-MS-331009
1503 participants from 45 states and DC
Glowcap Adherence (among ~85% setup)

Intervention group

MI FREEE study for comparison

Weeks since Glowcap setup

# Pats = 845

Data through 12/31/2014
Data for New Models of Chronic Care Delivery. . .

- Smoking cessation (CVS Health employees) - NCI
- Obesity - Group incentives, deposit contracts, premium adjustments vs. lotteries (CHOP, Horizon, UPHS employees; Weight Watchers) – NIA, Horizon BCBS, UPHS, Weight Watchers
- Potential medical home 2.0 initiatives:
  - Glycemic control through remote monitoring; peer mentoring; walking programs; CPAP use (UPHS) – NIA, NIDDK
- Medication adherence
  - Habit formation for medication adherence (CVS Health, UPHS, UPS, Home Depot, Aetna) - NIA
  - Process vs Outcomes Incentives – CVS Health, Marriott - NHLBI
  - Automated hovering post-AMI (UPHS, Aetna, Humana, Horizon BCBS, Independence BCBS, HealthFirst) – CMMI
  - Patient vs. Provider incentives for high-risk cardiac patients (UPHS, Geisinger, Harvard Vanguard Medical Associates) - NIA
Moving towards the future

**2014**
- Reactive, visit-based model
- Health care financing based predominantly on FFS
- Providers with little data to guide decision making
- Limited telemonitoring consists of giving patients devices and hoping they’ll use them

**2016+**
- Proactive, non-visit-based model
- Health financing based on bearing risk for populations
- Automated feedback to patients and providers on behaviors
- Behavioral economic strategies to drive higher engagement
Thank you!

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