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Introduction

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Richard Singerman, PhD, is Chief Innovation Officer for TrustNetMD and Adjunct Assistant Professor, Johns Hopkins School of Medicine, Division of Health Sciences Informatics. His applied research is on clinician and consumer engagement, translational research acceleration and health system innovation (including measuring innovation value). His current initiative involves US Department of Health and Human Services (HHS) funded research of Johns Hopkins School of Medicine, Johns Hopkins Bloomberg School of Public Health and TrustNetMD on Novel Methods of Communicating Evidence Based Medicine to Community Health Workers.
Greenway Health Webinar on Patient Engagement
Beyond Apps and Portals
July 28, 2015


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• "Possibly the greatest failure of the current health care system is that it clearly doesn't engage a large part of the population."
  – D. Tapscott and A. Williams, Macrowikinomics, 2010

• "Readiness for change is one of the biggest problems we face."
  – P. Tang, MD, Chief Medical Information Officer, Palo Alto Medical Foundation, Health IT Policy Committee Hearings, 2009

• "Government may have recently set a platform for Healthcare change, but let us not expect Government to make the change for us."
Learning Objectives

• Describe **Organizational Learning Framework** in which to understand interactions (sparking participation and engagement) between clinicians, consumers and the health system at large in pursuing **CMS Triple Aim of Quality, Community Health and Value**

• Explain how this framework is used for understanding the "social capital" that underlies clinician-clinician and clinician-consumer social networks and associated limits to performance of US healthcare

• Compare the relative value for healthcare of "expert” and "crowd" knowledge

• Describe alternative informatics-based methods for eliciting and using crowd knowledge

• Place those alternatives in a continuum between "nudge" (passively get the right things done) and "noodge" (actively get the right things done), from an information system's perspective

• Explain how those alternatives (and the continuum) may affect the value for healthcare of expert and crowd knowledge
Agenda

I. Setting the Context: What's Wrong, What are we Shooting For, and Who is in the Game – Vision for Learning Health System

II. Overcoming Health Team USA's Limits to Performance: A Model for Understanding the Consumer-Clinician and Clinician-Clinician Social Capital Underlying Consumer-Clinician and Clinician-Clinician Social Networks

III. Coping with Consumer and Clinician Healthcare Information Overload and Expectation Overload: Nudging and Noodging as Vehicles for Navigating Healthcare Complexity

IV. 7 Minute Video Demo of Current HHS Research on Novel Methods of Communicating Evidence Based Practices and Local Community Services and Associated Emerging Nonprofit for Community Health Engagement

V. Appendix I: Accelerating Translational Research

VI. Appendix II: Implementation Science Research Opportunities

VII. Appendix III: Quantifying Crowd Based Decision Making -- Rand Expert Lens Hybrid of Crowdsourcing and Consensus Building

VIII. References
What’s Not Working With US Healthcare

• Kills 747 a day
• **Frequent cases of underuse and overuse**
• Costs double other nations
• Leading source personal bankruptcy
• Economic and racial disparity related outcomes
• ...
But When It Works, It’s Quite Good for Individuals and the United States as a Whole

- When the cure is known, accessible and properly delivered – Rituxan for cancer of white blood cells!
- Med Device, Pharma, and Biotech contribute significantly to biomedical discovery and the U.S. economy
- Hospitals can provide great care of individuals. They are the place we usually have our kids
- Hospitals are one of the largest employers in the community and bring in federal funds
- So who wants to argue when great results happen – well, Steve Brill in Time cover story when we pay what may be too much for the results we get

[References: Brill, 2013]
Where are we Headed: **CMS Triple Aim is Healthcare That Works!**
Consumers, clinicians and the Health System at large each have goals around Quality, Community Health and Value. Each has an Innovation Engine to reach these goals.
The Innovation Engine for consumers, clinicians and the Health System as a whole has 6 key components: Scanning, Sharing, Incubating, Partnering, Measuring and Aligning Innovations.
In the Learning Health System, knowledge intensive assets are converted into Quality, Community and Value target outputs. In particular, the Innovation Engine is fueled by People, Process, Technology and Relationship Capital in addition to Fiscal Capital.

[Singerman, 2010]
Value and Knowledge Capital Assets

- People Capital
  - Collective Skills
  - Communities of Practice (CMO, COO, Coding)
- Relationship Capital
- Process & Technology Capital
  - Learning Capacity (eg Lean & Six Sigma)
  - Best Practices (eg Lean & Six Sigma)
  - Leverageable Clinical Data
- Acquisition and Distribution of Knowledge at Point of Care
  - Hospital, Physician Mind share
  - Brand as Innovation Leader for Purchasers & Suppliers
  - Customer Satisfaction (eg patient centric EHR)
  - Collective Skills

Leverageable Clinical Data

Best Practices (eg Lean & Six Sigma)

Learning Capacity (eg Lean & Six Sigma)

Communities of Practice (CMO, COO, Coding)
Triangle Offense: Health Team USA Accelerating Path to Triple Aim! Consumers, Clinicians & Health System Mutually Learn

[Senge, 2006; Singerman, 2010 and 2014]
Big Issues with Health Team USA

• Yin-yang relationship between individuals and organizations -- between consumers and Health System, and between clinicians and Health System

• Not all playing on the same page: Quality, Community Health and Value mean different things to Consumers, Clinicians and Health System at large

• The performance, or value, in a network depends on the strength of the connections. Need to strengthen the fundamental, and yet fraying, consumer-clinician relationship

[Aizenman, 2013]
Big Issues with Health Team USA

- If part of the health team is tuned for high tech, and what another part of the health team needs is high touch, we are not going to be delivering high performance and high value healthcare.
- This is an “economic” impedance mismatch.
- Patients in need of high touch instead of high tech are getting “overserved”

[Christensen, 2003]
Health Team USA and **Shared Decision Making** Communication, Deliberation, and Decision Making

- One or more **clinicians share** with the patient information about relevant testing or treatment options, including the severity and probability of potential harms and benefits and alternatives of these options given the specific nature of the patient’s situation.
- The **patient explores and shares** with the clinician(s) his or her preferences regarding these harms, benefits, and potential outcomes.
- Through an **interactive process of reflection and discussion**, the clinician(s) and patient reach a mutual decision about the subsequent treatment or testing plan.

[Institute of Medicine, 2014]
Survey Results on Shared Decision Making

- People desire a patient-centered experience
  - 8 in 10 people want their clinician to listen to them
  - 8 in 10 people want to hear the full truth about their diagnosis
  - 7 in 10 people want to understand the risks of treatments

- There is a gap between patients’ desire for engagement in healthcare decisions and what they say is actually happening in clinics and hospitals across the country
  - 8 in 10 people want their health care provider to listen to them, but just 6 in 10 say it actually happens
  - Fewer than half of people say their clinician asks about their goals and concerns for their health and health care

- People who are more engaged uniformly report a better experience—specifically, greater satisfaction with their clinician
  - Patients whose clinicians listen to them, elicit goals and concerns, and explain all of the options, among other things, are three to five times more satisfied with their clinicians

[Institute of Medicine, 2014]
Bridging the Gap Between Consumer and Clinician
To Achieve Potential of Next Generation Breakthroughs
Grow our People Capital’s Capacity to Innovate

Know what--rules & facts
Know why--system understanding
Know how--compete effectively
Care why--interrelate
Perceive why
Bridging the Gap Between Consumer and Clinician
Leverage Human Capital to Drive Transformation
Foster Culture of Innovation via Knowledge Sharing

- Raise Industry Reputation
- Adapt from Learning’s—Spiral Upward
- Promote the Benefits
- Measure the Benefits
- Manage Pilots (going after a few high value projects)
- Develop Tools & Methods
- Generate Awareness
Paradigms for Knowledge Creation and Consumption

• Knowledge Creators
• Knowledge Brokers
• Knowledge Consumers
Knowledge Swimming up Stream

Person Asking (Knowledge Consumer)

• Must have important task
• Grounding in what he’s asking about
• Mostly common language and purpose with person being asked
• Feel no penalty for asking

Person Answering (Knowledge Creator)

• Have experience to understand the question
• Feel question is important enough to spend time on
• Mostly common language and purpose with person asking
• Feel no penalty for answering; reward even better
Using Experts vs. Crowds
Depends on the Problem we want to Solve

- Crowds can be quite good for nonspecialized information
- Visual Reference from ScenarioThinking.org and Forrester Research and on what experts are good at versus what crowds are good at:


[Suroweicki, 2004; ScenarioThinking.org, 2010]
Problem to Solve: **Consumer’s Plates are Full**

**Patient Engagement Behavior Framework**

- Find Safe Decent Care
- Communicate with Health Professionals
- Organize for Healthcare
- Pay for Healthcare
- Make Good Treatment Decisions
- Participate in Treatment
- Promote Health
- Get Preventative Healthcare
- Plan for End of Life
- Seek Health Knowledge
- Additionally: Participate in research enterprise

[Gruman, 2010; Gallacher 2013]
So how do we help consumers out? Nudge -- Choice Architecture

- **Nudge** implies a gentle push. Imagine a hockey puck going down the ice
- Benign Big Brother "setting the best possible defaults"
- “Busy people trying coping in a complex world in which they cannot think deeply about every choice”
- "Social influences come in two basic categories:
  - information and peer pressure"
Expert-Based Nudge

• Mandated calorie listing in NYC
• Crossing the street in London and see the big painted "Look this Way" (so that the wrong sided tourists don’t get hit)
• Different fittings for anesthesia gases to prevent errors
• Think carefully about defaults
• Nudge example of Organ Donation: Where default is not morally acceptable (e.g. offering opt-out option for organ donation when registering for driver’s license). So have the default be "mandated choice." So you must make a selection before being allowed to finish this software enabled car registration process

[Thaler, 2009]
Knowledge Exchange (Kx)
Crowed-Based Approach to Navigating Complexity

• Kx is designed to harness the power of conversations in a community of healthcare professionals

• Conversations become part of an information strategy along with hard informational assets such as databases, reports, articles, and research publications

• By capturing grassroots dialog, organizational and professional silos are transcended, empowering the community to deliver quality solutions quickly and cost effectively

• Proprietary design methods allow us to analyze the social fabric of a community: How consensus was reached, who was involved, what resources did they use, what impact and implications can be derived?
Crowd-Based Nudge: Novel PCORI Methods
Knowledge Exchange Replacing Focus Group

• The PCORI (Patient Centered Outcomes Research Institute) program assumes that the act of engaging patients in what they want to learn from research ultimately impacts how much similar patients use the results of that research (and/or current state of knowledge) in their personal healthcare quality, community health, and value.

• Participation in research creates a mind frame for enhanced personal Triple Aim -- a healthy nudge

• Example on next page applied to research priorities for diabetes and pregnancy
Problem to Solve: Clinicians Plates are Full
Noodge
Contemplate a Noodge Choice Architecture

• Noodging is a Yiddish term for borderline pestering. However this pestering in an organizational context moves into the realm of acceptable organizational behavior as organizations appoint individuals to spur on others to achieve objectives

• Organizational “change agents” or “innovation champions” are given "permission to noodge”

• ACOs (Accountable Care Organizations) will have quality targets for maximizing incentive payments

• Clinicians will have Patient Engagement Measures

[Singerman, 2010]
Expert-Based Noodge: ABIM "Choosing Wisely"
25 Major Medical Societies Identifying "Overused" Medical Tests and Procedures

- American Board of Internal Medicine (ABIM) notes that "as much as 30 percent of care delivered is duplicative or unnecessary and may not improve health"
- Campaign “to help physicians and patients engage in conversations about the overuse of tests and procedures and support physician efforts to help patients make smart and effective care choices"
- Each participating specialty "has created lists of 'Things Physicians and Patients Should Question' that provide specific, evidence-based recommendations physicians and patients should discuss to help make wise decisions about the most appropriate care based on their individual situation"
- Clinical Decision Support currently signals drug-drug alerts but doesn't show physicians nonindicated tests or those of marginal benefit

[Longworth, 2013]
• The challenge is that consumers read materials and come in with a preconceived notion of what should be done. The challenge is that more is not always better, so how should a physician say "no"

• Discussion leads to engagement which leads to decisions

• What gets talked about gets measured

• What gets measured gets done

• Vascular Society has long history of registries spurring physician-physician conversations and then physician-patient conversations

• When physicians go to employee's workplace, “Choosing Wisely” can have higher impact than in the exam room (where the patient's mind is cluttered and his pants are down)

[Frolich, 2013; Gear, 2013]
Crowd-Based Noodge and Online Reputation

• Online reputation (e.g. in an online Community of Practice) can serve as a noodge. The more one participates (through asking and answering questions) and the more others in the community value that participation (through voting), the more reputation points one can obtain.

• http://www.radiologyqualityexchange.org/questions?sort=votes
Measuring Value of Knowledge Sharing

• **Process Measures**
  – Number and Profile of Participants (who is participating)
  – # Topics
  – # Responses
  – Important and helpful community resources (voted up)
  – Important question responses (voted up)
  – Relevance (e.g. service line insights tied to research breakthroughs)

• **Outcome Measures**
  – Physician satisfaction, attraction and retention (i.e. culture measure)
  – Administration buy in and satisfaction (i.e. culture measure)
  – Time to market for new services and/or spread of innovations
  – Time to “adoption” for key initiatives (Safety, Quality, Accountable Care, “Health IT Meaningful Use”, Translational Research)
  – Ultimately clinical outcome measures associated with adoption!
How do we know it really works?

Kx Measures
*Are people using Kx to discuss important topics*

- How is Kx Used?
- Who is using it?
- Satisfaction
- Admin buy-in
- Rate of adoption
- Quality of dialog
- Effect of adoption

Clinical Measures
*Is Kx improving patient care?*

- Guidelines followed?
- Protocols followed?
- Is data entered?
- Is behavior changed?
- Improved clinical measures
- Drop in errors
- Effect on costs
Kx Technology & Design Stack

Knowledge Exchange Technology & Design Stack

- Collaboration
- Quality
- Unifying Logic
- Trust
- Proof

User Interface
- Full-text Query Engine
- Tags Taxonomy
- Ontology
- Business rules and Workflow Engine

Applications
- XML Schema
- Data interchange SQL, SOAP, RDF
- Secure Storage

Software needs to supply this

Clinicians and Public Health oriented users need this

Infrastructure
- Culture Behavior
- Security

February 19, 2013
Questions + Users + Tags + Answers + Votes Create a Growing Collective Wisdom within the Kx

How do we prepare for evidence based medicine?

3 Answers

I would start by looking at Medicare's PQRI page. (www.cms.hhs.gov/PQRI) The information can seem overwhelming, but here's the reason I suggest it, and I will suggest a strategy for combing through the information.

PQRI is built on evidence based medicine for each of the measures. Each measure was developed by experts to measure (and then encourage) clinical practices. The first three measures in the list relate to diabetes and the patient's HDL, HgbA1C, and BP. (Or LDL, I can't remember off hand) There are now measures for all specialties.

Why report? Right now, physicians receive a bonus on Medicare payments for reporting, but the bonus...
LANDSCAPE: SOCIAL MEDIA HAS A BROAD TERM CONTEXT

Assessment: Fragmented Market, Gorilla Free: None of the established players appears to have:
- Carved out a clear best practices initiative around social media and quality and safety
-Introduced advanced technology (open source) resources for processes improvement, data integration and mobility
- Build intelligence by mining the collaboration between healthcare providers

TrustnetMD’s Value Proposition is Unique: Laser focused on healthcare, specifically quality and safety. We are a citizen of the healthcare community as well as technology experts. We have the means to become the trusted site for healthcare improvement.
7 Minute Live Demo of Current Research
US Department of Health and Human Services
Agency for Research and Quality (Grant # R24 H5022073)
Novel Methods of Communicating Evidence Based Practices and
Local Community Services
Emerging Nonprofit for Community Health Engagement

• On the following YouTube Demo, start at time 4:40 for a 7 minute tour! Start at the beginning for the full strategic context and care worker centric approach

http://www.youtube.com/watch?v=y8DHudm5Xq0&feature=em-share_video_user

[Singerman, March 2015; Lehmann, 2015]
We All Can Participate in Nudging and Noodging Towards a Learning Healthcare System -- Healthcare That Works!

[Senge, 2006; Singerman, 2010 and 2014]
Appendix I
Accelerating Translational Medicine
Closing the Feedback Loop

Collaboration Connects Communities Across Disciplines

Interaction at All Levels Drives Success of Each Component

[Singerman, May 2015; Lehmann, 2015]
Appendix I (cont.)
Points along Translational Medicine Value Chain for Improved Communication via Social Learning

- Research: Facilitating discussion around Electronic Lab Notebook data
- Clinical trials: Facilitating standardization across multi-site trials
- Development of clinical practice guidelines: facilitating expert panel discussion and soliciting front line clinician input
- Dissemination and adoption of clinical guidelines: facilitating the applicability and use of guidelines
- Tracking outcomes that occurred due to clinicians following those guidelines
- Tracking direct patient input leveraging research entity’s affiliated cancer patient populations and their personalized patient protocol experiences
  - Palliative care and relief of suffering must be monitored through patient/family reported data (per Institute of Medicine, 2009, A Rapid Learning System for Cancer)
- Researchers using the above to generate the next set of hypotheses -- in part by using a common set of "tags" (recall that all issues or questions in the social media get "tagged") for above concepts to more readily find connections across domains of expertise!!!
Appendix II
Implementation Science Research Opportunities

• How can social media be an effective tool of Implementation Science (for both initial innovation adoption as well as sustaining the benefit)
• How can one access the "wisdom of crowds" for clinical guideline development and adoption
• What is the best way to approach interdisciplinary collaboration versus collaboration in homogeneous communities (e.g. between ICUs in multiple hospitals versus collaboration between ICU, Emergency Department and Operating Room in a single hospital)
• Do medical specialty language terms (ontologies) used as tags serve as a vehicle for bridging silos in Translational Research (see next slide)
• What are optimal ways for organizations to adopt this social media for benefit? Should it be clinical cause oriented or launched broadly as a “ListServ on Steroids” to see what sticks
• What are optimal ways to tie social media into existing organizational assets such as Content and Talent Management Systems (TMS)
Appendix III
Rand Expert Lens Hybrid of Crowds and Experts
Delphi Without Requiring Consensus

• Choosing Best Film: Think The Academy vs. Netflix
• Generate film list
• Make a group of Judges, "the crowd" (Judge 1 to Judge M).
• To reduce "noise" in results may have a minimal requirement for participation as a judge ("exclusion criterion") that indicates a minimal knowledge such as "How much money does it take to create a big Hollywood movie?"
• Each judge votes independently in this round. And there is perhaps an opportunity to add additional films. (This initial independence of voting is important for allowing an initial broad set of opinions from a crowd that has a diverse background. This way we don't introduce herd mentality or have some people not participate because they see who else is participating)

[Surowicki, 2004; Dalal, 2011]
Appendix III (cont.) Rand Expert Lens
Quantifying Consensus Among the Crowd

- The votes are assembled into a Ranking Matrix for Round I, $R_{ij}$, (with $M$ judges of $N$ films)

<table>
<thead>
<tr>
<th></th>
<th>Film 1</th>
<th>Film 2</th>
<th>Film 3</th>
<th>Film 4</th>
<th>Film N</th>
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</thead>
<tbody>
<tr>
<td>Judge 1</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Judge 2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>5</td>
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<tr>
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<td>1</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Judge M</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

- Define measure of consensus (proportional to Kendall's W):
- Total of judge's scores for jth Film is $R_j = \text{SUM}(R_{i,j})$
- Mean total score, $R_{\text{mean}} = M(N+1)/2$
- Consensus = \text{SUM} ( SQUARE(R_j - R_{\text{mean}}) / SQUARE(R_{\text{mean}}) )
- Social network discussion, new vote, new consensus
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Questions?