Disruptive Innovations in Medicine

A View From Someone Who Studies Diseases of the Brain
There are two classes of people who tell us what is going to happen in the future:

Those who don’t know, and those who don’t know they don’t know

- John Kenneth Galbraith
Invention and Innovation

- Invention is largely intellectual
- Innovation comes when their problem to be solved is emotionally charged
Risk missing less complex, more convenient and affordable innovations designed for simpler, less demanding needs

Usually outstrips customer’s ability to utilize the new features
- Overshoots the needs of less demanding customers

Capabilities can become disabilities for disruptive innovation
Disruptive Innovation

- Technologically simplistic but functionally appropriate
- Unattractive or ignored by industry leaders
- Ability to minimize organizational and regulatory barriers
- Do not require existing customers to change but expands to meet needs of new ones
- Capability of less costly, less skilled staff to perform work formerly done by expensive, less-accessible specialists
“The significant problems we face today cannot be solved at the same level of thinking we were at when we created them” - A Einstein

- Most new Sustaining technologies improve performance
- Disruptive technologies often result in worse performance but some fringe advantages
  - cheaper, smaller, simpler and often more convenient
Innovation is Messy

Antithetical for Organizations To Be Disorganized
The innovator makes enemies of all those who prospered under the old order, and only lukewarm support is forthcoming from those who would prosper under the new.

-Niccolo Machiavelli
A Brain Pathologist’s View
**Prediction**

- Invariant memories
  - Invariant memories are sequences of events (observations/experiences)
  - Use to make predictions
- Prediction is the application of invariant memory sequences to new situations
- Therefore our prediction ability is based on our experience
Imagination

- Senses become inputs
- Predictions become inputs
  - you follow the consequences of your predictions
  - “If this happens, then this happens and so on!”
- Allows us to understand the consequences of our actions before we do them
- Close your eyes and you will “see” what you imagine
Is What You Imagined An Innovation?

- Relative advantages over what currently exists
- Compatibility with existing values and behaviors
- Lacks complexity
- Produces results that are obvious to all
Is The US Health Care System Ripe For Innovation?

- $ 2.2 Trillion Dollars (17% GDP)
- Safety and Quality Issues
- Health Care Worker Shortages
- 40 million + uninsured
- Claim to have the world’s best health care system but lack the quality outcome metrics to back it up
Present Attempts To Innovate in Health Care

- Decrease available healthcare
  - Managed care
- Get more cost and value out of the system
  - Quality measures, downsizing, cost cutting, productivity improvements and technology solutions
- Increase reimbursement (zero sum)
- Never events (mistakes)
Why Haven’t These “Innovations” Been Successful?

- Intelligence, time, effort, energy and money have been spent.
- There has not been a disruptive approach.
Use Your Imagination

- I will seek and find you
- I shall take you to bed and have my way with you
- I will make you ache, shake & sweat until you moan & groan.
- I will make you beg for mercy, beg for me to stop
- I will exhaust you to the point that you will be relieved when I'm finished with you.
- And, when I am finished, you will be weak for days.
Love,
The Flu
Is Disruptive Innovation A Cure For Our Health Care System’s Flu?
Innovation in Our Bloated, Inefficient Health Care System
Response to the Disruptive Viewpoint

DILBERT, I'D LIKE YOU TO MEET THE HUMORLESS BLOB I HIRED.

BLOB IS OUR NEW CREATIVE DIRECTOR. HIS JOB IS TO FOSTER INNOVATION.

I HAVE SOME IDEAS.

WHOA, LOOSE CANNON.
Redefining Health Care

- Value is at the Patient/Health Care Professional Interface

Faced with an unruly patient, Doctor Spock applies his Vulcan child pinch.
Needed Approach

- Solution will come from outside and under
- Coordinate and remove barriers that prevent simple innovations from developing to meet more complex needs
- Use of Imagination
Legend of the Gordian Knot

- 333 B.C. Alexander the Great invaded Asia Minor and came to a town called Gordian.
- Ox cart tied to a pole by a King 100 years before.
- Legend that first person to untie the complex knot would become the King of Asia.
- Rather than deliberating on the problem, Alexander took his sword, cut the knot in two and then went on to conquer Asia.
Barriers

- Funding
- Policy
- Technology
- Regulators
Regulation pours concrete around the status quo.
"I found the secret to happiness, but the FDA won’t let me release it."
Where are the Innovations?

- Markets
- Processes
- Products
Examples

- Adaptive Prosthetics • Arthroscopic Surgery • Artificial Intelligence • Artificial Tissue • Biomimetics • Complementary Medicine • Data Mining • Digital Hospital • Digital Labs • Disease Simulations • Electronic Medical Records • Endoscopic Surgery • Enterprise Healthcare • E-Prescriptions • Evidence-Based Medicine • Gene Therapy • Genetic Profiling • Genomic Profiling • Home Pregnancy Tests • Implanted Devices • Inhaled Therapy • Intelligent Healthcare Agents • Life Extension • Medical Informatics • Medical Robotics • Medical Savings Accounts • Medical Tourism • Memory Augmentation
More Examples

- Medical Informatics • Modeling and Visualization • Nanomedicine • Networked Bioensors • Neural Control • Non-Invasive Surgery • Organ Assistance • Organ Substitution • Personal Medical Devices • Personalized Therapeutics • Pervasive Networking • Portable Ultrasound • Remote Patient Monitoring • RFID • Self-Care • Self-Testing • Stem Cells • Telemedicine • Telemetry • Wearable Monitors • Web-Based Medical Information • Wellness Monitoring • XML Medical Formats
Schizophrenia of the Future
Overshot the Needs of the Chronically Ill

- Intervention needs are
  - Frequent
  - Simple
  - Rules based
    - Diabetic or anticoagulant management
- Physicians often actively oppose other healthcare providers that might challenge them by providing more basic, convenient services
Is Dr. Google in the House?

Is this going to be another "According To Google" answer?

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Convenient and Accessible
Green Medicine
Environmental Stewardship

- Reduce
- Reuse
- Recycle
“Heart and Lung Songs”
What Might Work?

- Target undemanding applications where patients will be delighted to have simpler, more accessible care.
- Allow patients to access treatment formerly only available in inconvenient and centralized settings.
- Start simple and small.
Thank You