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Science is the result of honest, open inquiry to explain and predict how a system works.

Science

n a: the state of knowing: knowledge as distinguished from ignorance or misunderstanding.
Technology is a tool, not an end product

Technology

n a: (1) the application of knowledge to practical purposes in a particular field; (2) a method or tool for achieving a practical purpose
Science and technology create a new realm of possibilities that may result in progress.

Science and technology should solve problems, not create them.

Appropriateness is defined by the problem.

Scientific and technological change is relentless, unless suppressed by political power (e.g., stem cell research).
What are the lessons of history in medical science and technology?
What are the lessons of history in medical science and technology?

• American health care is inherently and remarkably flexible

• Changes can come fast, unexpectedly, and inconsistently

• No one is in long-run control of the health care delivery system

• Our health care system ultimately adapts successfully to scientific and technological advances
Americans can be counted on to do the right thing . . . after they have exhausted all the other possibilities.

WINSTON CHURCHILL
Conclusion: Because advances in science and technology are the #1 driver of change in American health care, R & D is the #1 foundation of progress in the medical care delivery
What trends are defining the future of medical science and technology?
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• Diseases historically seen as single entities are now recognized as different conditions with a range of biological instructions*

• The resulting paradigm shift in medical science is moving providers’ core business from acute care to disease management

• Team-based approaches will become the best-practices model because no single entity can solve all health care’s problems by itself!

*The foreseeable future of genomics in medical care is targeted diagnostic evaluations of existing or latent disease, not full-genome sequencing
**RADIOLOGY**

Breast Mass

Breast Mass

Breast Mass

**PATHOLOGY**

Carcinoma of Breast

Breast Cancer [100x]

Breast Cancer [100x]
All-American gene. This “visual genotype” for the breast cancer gene \textit{BRCAT} shows common variations in 90 people representing the U.S. population.

Source: Science, April 25, 2003
However, genomics differs from many other health care technologies because it can also be used to identify individuals who will experience little to no benefit from an intervention, either because they are at low risk of having an adverse outcome without intervention or because they will not respond to the intervention. Reducing the use of interventions that will have little to no benefit could have an important effect on the cost curve, particularly when the intervention is common or very costly.

One example is the use of gene expression profiling among women with breast cancer. A 21 gene expression panel correlates with the benefit of adjuvant chemotherapy among women with localized, estrogen receptor–positive breast cancer such that women with a low-risk score receive little to no benefit from chemotherapy. Several studies have demonstrated that use of the gene expression panel leads to lower rates of chemotherapy among women with low-risk scores. Furthermore, because the low-risk group is 2 to 3 times larger than the high-risk group, overall rates of adjuvant chemotherapy would decline by 15% to 20%. Assuming adjuvant chemotherapy incurs approximately $20,000 in health care costs per woman and 100,000 women are diagnosed with localized, estrogen receptor–positive breast cancer each year, the use of gene expression profiling in this setting has the potential to save $400 million each year.
What trends are defining the future of medical science and technology?

- Networked information and communications technologies are transforming business models and production processes
- Telemedicine is overcoming traditional barriers of time and place
- Informatics and analytics are allowing providers and payers to reduce costs of treating the most expensive patients
Dr. Jerry Jones uses two-way video at his home in Houston to consult with a patient across town. Dr. Jones is under contract to NuPhysicia, one of the new telemedicine companies.
Earlier this year, Mike Dionne signed up for Polka, a smart-phone application that lets him use his iPhone to keep tabs on the health of his elderly father, who lives 80 miles away. It tracks his dad's numerous doctors' appointments, his insulin and medication schedule and other health information.

Then in August, a new doctor examining Mr. Dionne's father detected an aneurysm, something the son was able to confirm from afar. Over the phone, Mr. Dionne consulted Polka, the application he and his siblings maintain on behalf of their father, and was able to tell the doctor when the aneurysm was first diagnosed, by which doctor and the last recorded size.
Technology that aims to keep congestive heart failure patients out of the hospital is gaining traction.

The idea is for heart patients to take readings like their weight, blood pressure and other key metrics using wireless and other technologies; the data are then transmitted to a case manager or medical care giver. That way health care givers can catch, and address, warning signs before the patient lands in the ER with shortness of breath or a heart attack. In the past, patients have found such technology difficult to use. But a number of managed-care companies are experimenting with electronic devices meant to make the process easier.

A big benefit is that it allows patients to stay in their homes, but the systems can’t catch everything, and patients shouldn’t be lulled into a false sense of security by the technology.

WellPoint Inc.’s Anthem unit in California is piloting a wireless scale and blood-pressure cuff that communicates in real time with nurses on alert for fluctuations that can signal heart failure, or when the heart can no longer pump enough blood to the body’s organs. Humana Inc. in January will launch a program to track heart patients’ vital signs wirelessly and link them up via video to chat with nurses if appropriate.
Coming Next: Using an App as Prescribed

By JOSHUA BRUSTEIN

Before long, your doctor may be telling you to download two apps and call her in the morning.

Smartphone apps already fill the roles of television remotes, bike speedometers and flashlights. Soon they may also act as medical devices, helping patients monitor their heart rate or manage their diabetes, and be paid for by insurance.

The idea of medically prescribed apps excites some people in the health care industry, who see them as a starting point for even more sophisticated applications that might otherwise never be built. But first, a range of issues — around vetting, paying for and monitoring the proper use of such apps — needs to be worked out.

“It is intuitive to people, the idea of a prescription,” said Lee H. Perlman, managing director of Happtique, a subsidiary of the business arm of the Greater New York Hospital Association. Happtique is creating a system to allow doctors to prescribe apps, and Mr. Perlman suggested that a change in the way people think about medicine might be required: “We’re basically saying that pills can also be information, that pills can also be connectivity.”

Simple apps that track users’ personal fitness goals have already gained wide traction. Now medical professionals and entrepreneurs want to use similar approaches to dealing with chronic ailments like diabetes or heart disease.

If smartphone-based systems can reduce the amount of other medical care that patients need, the potential benefit to the health care system would be enormous; the total cost of treating diabetes alone in 2007 was $174 billion, according to the most recent statistics from the Centers for Disease Control and Prevention.

But unlike a 99-cent game, apps dealing directly with medical care cannot be introduced to the public with bugs that will be fixed later. The industry is still grappling with how to ensure quality and safety.
Coming soon to your home? In an ambient intelligent home, sensors collect information about the environment and the residents.
10% of all Medicare beneficiaries accounted for 64% of the cost.
6.6% of hospitalized patients died, incurring 23% of total hospital costs.
What problems need to be solved by medical science and technology?
What problems need to be solved by medical science and technology?

• Third-parties are reaching the limits of their ability and willingness to spend more on health care

• Responsibility for payment is being significantly shifted to patients

• Patients will not have disposable income to meet their new financial obligations

• The health sector of the American economy will stop growing
End of growth in health spending...
We haven’t the money, so we’ve got to think.

LORD RUTHERFORD
“It is time for medicine to reinvent itself—for researchers and clinicians to form a strategic partnership and to embrace the goal of exponentially increasing medicine’s value. Physicians need to become part of the solution in the US health care system. The system’s problems should not be addressed by politicians, who are virtually powerless to effect meaningful change in health care until physicians fix the way care is delivered.”
Reform laws cannot be ignored, but they are very unlikely to provide a solely sufficient blueprint for survival in an uncertain future. Success for nearly all stakeholders will depend on pursuit of creative, data-driven strategies that transform the supply and demand for health care -- something much more than overhauling reimbursement.
Honoré Daumier, 1858
What are the opportunities for medical science and technology?

• Improving efficiency (eliminating waste)

• Ensuring effectiveness (eliminating unexplained variation)

• Doing health care right -- all the time, as inexpensively as possible
“Marketing is not only much broader than selling, it is not a specialized activity at all. It encompasses the entire business. It is the whole business seen from the point of view of the final result, that is, from the customer's point of view. Concern and responsibility for marketing must therefore permeate all areas of the enterprise.”

Peter Drucker

Ask customers what they want...then explore the realm of possibilities for creating and making it!
A Solid Foundation:

http://innovatenortheastflorida.com/status-reports/health-and-life-sciences/

Welcome!

On this website you will find information about Northeast Florida’s economic development initiative, Innovate Northeast Florida.

The purpose of Innovate Northeast Florida is to identify the target industries and sub-clusters that will stimulate future economic growth and create an action plan for growing those industries in our region.

More than 2,800 residents contributed ideas that shaped the Innovate Northeast Florida strategy. With the strategy now in place, leaders from across the seven-county region are working together to implement the plan’s recommendations.

Our goal? To work in-step as a region to catalyze job growth and talent development for Northeast Florida’s future.

JAX USA Partnership
Northeast Florida Regional Council
What are top economic development opportunities to transform health care?

Medical/Life Sciences: Basic Research and Informatics

• Biological and pharmaceutical studies (biomarkers, targets, epigenetics, adjuvant therapies, disease evolution, pathology-specific molecular diagnostics)

• Comparative effectiveness research (clinical interventions, input substitution, delivery models)

• Integrated electronic record systems (including automated data inputs from medical devices)

• Data-mining software with analytics (fraud, inappropriate care, hot-spotting, forecasting)

• Clinical decision support tools (multifunction devices, apps)
What are top economic development opportunities to transform health care?

Supply and Demand Innovation

• Systems engineering for efficiency and effectiveness (formal performance improvement methods)

• Alternative care delivery sites (ambulatory centers, retail stores, home)

• Bundled payment contracts between providers and payers

• Destination health care packages and sales networks

• Services to facilitate consumers’ adoption of fiscal and physical responsibility (education, personal sites, social networks)

• Next-generation health promotion and disease prevention
What are top economic development opportunities to transform health care?

Leveraging Unique Capabilities of JAX/USA

- Multi-stakeholder partnerships/infrastructures to shift from acute care to disease management & volume to value

- Special stories featuring the region’s successes, comparative advantages, collaborations, and passion to fix the way health care is delivered

- Taking someone from another line of health care business to lunch next week...

- Having fun with creative problem-solving to move health care beyond the limits of national reform!
DISCUSSION

René Magritte - “La Clairvoyance”
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