The Affordable Care Act: Impact and Opportunities in the Health Care Industry

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The Coleman Fung Institute for Engineering Leadership, launched in January 2010, prepares engineers and scientists – from students to seasoned professionals – with the multidisciplinary skills to lead enterprises of all scales, in industry, government and the nonprofit sector.

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Abstract: The U.S. health care system is undergoing a major transition as a result of the Patient Protection and Affordable Care Act (often referred to as Obamacare). This new regulation brings universal access to health care to all Americans while attempting to improve quality and reduce costs. This means about 49 million previously uninsured people will enter the system in 2014, health service providers will see more demand, health care innovators will become more critical, and administrators and industry watchdogs will have to oversee the transition a new system. We expect the sweeping change will affect existing business models and create new models, models that quantify costs in the medical industry and innovations in both quality and cost improvement. This report focuses on select parts of the health care service provider industry (as this industry represents the bulk of the cost), evaluates trends, and identifies new opportunities for improving access, quality, cost and measurement.
Introduction

Health care costs in the U.S. have been increasing at alarming rates. In 1960, U.S. GDP was $521B and the health care costs amounted to 5.1 percent of GDP. Over the last 50 years, health expenditure costs have increased by about 1 percent of GDP every four years, and in 2010, reached 17.6 percent of GDP (Fig. 1), or $2472B of $14,044B GDP. In a 2010 CNBC interview, Warren Buffett said, “health care eats up 17 percent of U.S. GDP, at a time when many other countries pay only 9 or 10 percent of GDP but have more doctors, nurses and hospital beds per capita ... it’s like a tapeworm eating at our economic body.”

![Total Health Expenditure, % GDP](http://www.oecd.org/statistics/)

**Figure 1**: Total public and private health expenditure as % of GDP: US, UK, and France from 1960 to 2010

Of these costs, about 50 percent ($1.6T) is spent on hospitals and physicians or clinical services, with another $660B spent on dentists, home care and non-prescription medications.¹ Some common causes attributed to high health care expenditure include unnecessary emergency room visits ($4.5B/year)², the fee-for-service payment system, and administrative complexities between insurance companies and providers (Fig. 2). With higher costs per capita compared to other industrialized countries, one might expect that quality of care is higher in the U.S. However, this does not appear to be true by several measures (for example, mortality rate) and may be related to

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² Rand Corporation 2010
the lack of universal access. Overall, key issues with the U.S. health care system include metrics, quality, cost, and least often discussed, access\(^1\)\(^2\)\(^3\)\(^4\).

The Patient Protection and Affordable Care Act was signed into law on March 23, 2010 and is the most sweeping change to U.S. health care since the Medicare system was created in 1965. The new regulation is likely to have wide-ranging impacts. Starting in 2014, all Americans will be required to have health care coverage from their employer, new Health Insurance Exchanges / Marketplaces, Medicare, or Medicaid.

About 48.6M uninsured Americans will become eligible for insurance in 2014, and the influx will most likely strain service providers like physicians, allied health professionals, hospitals, outpatient facilities, and others. Of those uninsured, 47.9M are under 65 years old, with significant populations (6 to 13M) distributed in each census-defined age category, roughly divided into decades. 25.4 percent of the uninsured have annual incomes of less than $25,000, and 46.9 percent have annual incomes of less than $50,000\(^5\). As has happened in other industries, we expect technology will play a big role. Innovators such as health care IT, pharmaceutical companies, academic medicine, biotech and medical devices will become increasingly critical over time to stem the cost increases. The other players in health care are the administrators (employers, insurers, regulators, professional societies, etc.) but these are beyond the scope of this report.

We hypothesize that, in order to make Obamacare economically viable for all participants in the health care value chain while delivering quality care to patients, there will be an emphasis on improving the efficiency and effectiveness of the way in which health care is delivered. Cost, quality, access and methods of measuring these attributes will drive consolidation and integration in the health care industry.

1. Health Care Ecosystem

1.1 Current Health Care Categories

The general ecosystem of the medical industry can be broadly segmented into four major categories: biotechnology, health care equipment, pharmaceuticals and health care services (the Appendix at the end of this report provides a detailed breakdown). Some of the representative companies in each category are given in Figure 2. Another category, “general suppliers” which provides materials,

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\(^3\) Michael E. Porter, Erika A. Pabo and Thomas H. Lee. Redesigning Primary Care: A Strategic Vision To Improve Value By Organizing Around Patients’ Needs, Health Affairs March 2013 vol. 32 no. 3 516-525


supplies, components, systems, etc. may also be added. In addition the insurance industry, both private and governmental programs support health care delivery and access. Of these categories, health care services make up 75 percent of the total financial value of the ecosystem (about 20 percent of GDP).

Figure 2 also illustrates the current delivery and access paths of health care for the population. Those who are insured have full selection of health care choices. The uninsured currently obtain medical care through large hospitals without paying, and this has burdened hospitals with significant “bad debt.” With the Obamacare regulation, this debt should go down and allow hospital operators’ profits to increase.

![Figure 2: Current ecosystem of the medical industry and insurance options with the schematic representation of consumer access paths to health care services](image)

### 1.2 Ecosystem After Obamacare Regulation in 2014

Figure 3 illustrates the expected general ecosystem of the medical and insurance industries after the Obamacare regulation goes into effect in 2014. As shown, the whole insurance industry is expected to change. The Health Care Exchange or Marketplace will become the central conduit through which the public, including the previously uninsured, either selects or is assigned (in the case of state or federal programs) specific insurance options. The shift would cause the uninsured segment of the public to become “regular” users of the already costly and inefficient health care system. While this will have consequences in all segments of the ecosystem, we will only consider the projected consequences on the “health care services” category (red box in Figure 3) as this is the largest financial segment of the health care industry and will likely be impacted the most.
Figure 3: General ecosystem of the medical and insurance industries after Obamacare regulations are implemented in 2014. The access paths will be centralized with uninsured coming into the system in a more controlled manner.

1.3 Health Care Service Companies

As we have seen, many hospital operators are burdened with bad debt expenses that arise from the cost of caring for uninsured patients. The current health care ecosystem is driven to overcome these issues. For example, some firms expand in certain states like Florida, where there is a large elderly population and more reliable reimbursement from government programs such as Medicare or Medicaid. By design, health maintenance organizations (HMOs) are less impacted by bad debt expenses. Vertically integrated insurers have to deal with an apparent conflict of interest as they provide high quality care while having a financial incentive to withhold treatment as well as a vested interest in providing preventative care. Regardless of the conflict, the current health care system has created some very large HMOs. For example, United Health’s entry into the Dow30 demonstrates the success of large HMOs and the network effect of operating in many states.

Table A-1 lists some of the health care services companies representing hospital operators, health care plans/HMOs, and diagnostics labs.

Table A-1: Selected Medical Services Companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Annual Sales ($B)</th>
<th>Type of Business</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Health Systems Inc.</td>
<td>13.0</td>
<td>Hospital Operator</td>
<td>1</td>
</tr>
<tr>
<td>Health Management Associates</td>
<td>5.9</td>
<td>Hospital Operator</td>
<td>1</td>
</tr>
<tr>
<td>LifePoint Hospitals, Inc.</td>
<td>4.6</td>
<td>Hospital Operator</td>
<td>1</td>
</tr>
</tbody>
</table>
United Health Group Inc. 110.6 Health care Plans/HMO 1
Humana 39.1 Health care Plans/HMO 1
WellPoint Inc. 61.7 Health care Plans/HMO 1
Aetna Inc. 36.6 Health care Plans/HMO 1
Kaiser 47.9 Health care Plans/HMO Non-public 2
Quest Diagnostics 7.4 Diagnostics & Research / Lab tests 1
Laboratory Corp of America 5.7 Diagnostics & Research / Lab tests 1

Sources:
1 – MorningStar.com; 2 – xnet.kp.org/newscenter/aboutkp/fastfacts.html

The network effect is also present in the clinical lab testing industry, where Quest Diagnostics and Laboratory Corp of America dominate with their nationwide network of service centers. This duopoly competes with hospitals that are increasingly doing in-house lab work to reduce costs. As a result, these two companies have increased their capability in more advanced tests (such as genetic testing) to maintain growth. It remains to be seen how they can transition to the specialty model and maintain growth as their core business goes away.

2. Health Care Information Technology

Information Technology is currently at the heart of health care delivery processes. The iterative “health care loop” involves the following steps: monitoring (patient feels unwell, performs self-measurement, receives lab test results, etc.), data analysis or interpretation (physician makes sense of data), planning (patient visits physician to discuss options), and action (physician prescribes medicine or performs surgery, etc.). Each of these steps involves vast amounts of data and information processing and is ripe for technology advances. In the long run, the degree to which firms can make cost-effective technological improvements that make the health care loop more efficient will separate the winners from the losers. Central to all the steps in the health care loop is some form of electronic health care information system.

2.1 Electronic Health Care Information System

A comprehensive health information management system should integrate electronic health records with physician order entry, decision support, population and patient-panel management tools, appointments, registration, and billing systems. Kaiser’s HealthConnect, launched in 2003 by Epic Systems Corp., is a good example of this.

HealthConnect includes Electronic Health Record (EHR), which provides records of member encounters across clinical settings and includes laboratory, medication, and imaging data. EHR can

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be accessed in doctor’s exam room, which can help eliminate duplicate tests and enable physicians to handle multiple complaints more efficiently within one visit.

HealthConnect has a web portal interface that allows members to view preventive care reminders, schedule and cancel appointments, refill prescriptions and send secure electronic messages to their care team or pharmacist.

HealthConnect helps primary care teams deliver proven preventive therapies and support patient self-care and lifestyle changes. For example, in Kaiser, the information system allows primary care physicians to review the top 10 to 20 patients who fail to achieve the treatment goal, so that they can follow up for preventative treatment. The Kaiser system also handles follow-up care for patients discharged from hospital and those who frequently visit emergency departments.

The pharmacy alert system improves medication safety by reducing the relative risk of dispensing medications that interact adversely with the patient’s other medications.

Multiple entry options provide easy access to appropriate care, including call centers for primary care appointments, 24-hour nurse advice, after-hours urgent care, scheduled telephone visits, and electronic messaging with the care team. One example is a 2009 trial done by Kaiser and mobileStorm in which mobileStorm implemented an SMS-based patient appointment reminder solution for Kaiser. In one month’s trial, the solution saved $275K per clinic.

Audiovisual technology (such as webcams or smartphones) can replace in-house visits with e-visits. For example, patients can attach a digital photograph to electronic messages to help their physician determine the nature of their problem.

2.2 Technology S-Curve for Monitoring Health

Smartphone technology is creating breakthrough applications for medical diagnosis. There are already several smartphone applications and portable devices in the market through which patients can perform electrocardiograms (ECGs), heart imaging, blood glucose monitoring, etc. at home. An ECG traditionally costs $800 while the app costs $199. With 20 million ECG tests per year, the cost savings associated with the app could be substantial. This not only brings down the cost of the treatment, but also cuts down the number of doctor visits and provides more personalized monitoring of a patient’s situation. We may see the day when doctors will prescribe smartphone applications along with medicines. In the future, medical insurance providers may need to cover these medical diagnostic monitoring applications or small devices. The market for such devices may be small now, but as smartphones become ubiquitous and their testing capabilities increase, they could become a disruptive technology for many tests that are currently done by allied health professionals (health care technicians, etc.). This in turn may require re-training those working in the affected areas. Fig. 4 illustrates the technology S-curve for the smartphone app disruption.

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7 Dr Eric Topal, The Creative Destruction of Medicine: How The Digital Revolution Will Create Better Health Care 2013
3. Old and New Value Chains in Health Care Services

The current prevailing value chain in the insurance and health care services industry is one in which there are individual providers that are only loosely linked. The typical business model for providers is a fee-for-service model that naturally encourages more services and high-cost treatments. This model discourages overall cost savings through coordinated care, administrative services and use of “best practices” treatment. The new Obamacare regulation will create an influx of 49M newly insured patients, and we expect cost reduction will be a key driver necessary to accommodate the increased load. The Kaiser Permanente model of integrated health care and insurance has shown great promise as a means to address these flaws in the current system. Kaiser claims to have about 10 percent lower costs than other HMOs and about 16 percent lower cost than non-HMOs.

Moving to a set of systems that looks like Kaiser’s will not be possible in the short term, nor is it expected that everyone would immediately embrace its business model. However, we expect individual providers will consolidate in order to compete for the new market and drive down costs, thereby reducing administrative costs and leveraging coordinated care opportunities. Labs and other basic testing centers will then be brought in-house to form medium-sized medical centers that will eventually merge with hospital services (Fig. 4). Once these coordinated health care service centers
are created, we may see large HMOs or insurance companies purchase the medical centers to further lower their administrative costs and fully remove the fee-for-service business model. We expect that some examples of separate medical centers from insurance to remain to meet the market demand, as some patients will likely continue to distrust the integrated model.

Health care service providers who embrace consolidation and coordination of services will be the winners in the long run. Individual providers of basic services will not fare well in this environment. Only very specialized individual providers may survive due to their unique and infrequently needed services (such as transplants).

**Figure 4:** Expected consolidation of health care provider segments and possible mergers with insurance companies.

### 4. New Opportunities

In previous sections, we hypothesized that the pervasive trend in the medical industry would be consolidation: consolidation to improve overall access, to improve quality of care, and to reduce cost by improving efficiency. We also believe that measurable quantification of these attributes will become very critical to drive various improvements. As such, we believe that companies and industries that support consolidation to improve overall access, quality, cost and measurement will see increased opportunities. Some of specific opportunities are discussed below.
One of these opportunities involves improving basic health care access for patients with lower income and those living in rural areas. An appropriate business model may be mobile and ad hoc clinics, set up like ambulance services on a contract basis. Another business model may be providing the mobile clinic hardware with the service owned by an integrated health care provider (such as Kaiser). In this space, a potential winner may be Onsite Medical, an early entrant in this type of mobile clinic market.

In terms of improving the quality of care, the health care delivery system and its coordination can be improved by developing processes and systems that can enable proper matching of the patient needs and medical expertise. Potential winners include IBM (business process management systems) and McKinsey and Co., which are already in the business of consultation. Another model could be a new specialty-consulting firm staffed by hands-on experts in the field of health care delivery, doctors and nurses.

Cost reduction will continue to be a focal point of the medical industry. We believe that technology, in addition to strategic consolidations, will play a significant role in improving efficiencies and reducing health care costs. The key words here are integration and automation, including data (vital signs, test results, etc.) acquisition and communication between patients, doctors, testing labs, etc. Wireless communication systems and network (HW and SW), electronic data/record management and storing systems, applications that link new devices and systems, data sharing SW with secure protocols, etc. Some of the beneficiaries of such integration and automation opportunities may be IBM (HW and SW), NetApp (HW and SW), and companies that provide cloud services for data storage and access, like Amazon and Google.

All the key factors/metrics (access, quality and cost/efficiency) will need quantification to measure both the status and goals to drive further improvements. As such, we expect ample business opportunities in this endeavor. Winners in this space may include Gartner, Forrester Research, Inc., Yankee Group Research, Inc. and new startups.

5. Summary

In 2014, implementation of Obamacare regulation will create an influx of 49M newly insured people into a health care system that is already inefficient, costly, and not readily scalable. This is not economically sustainable for the U.S., where health care expenditure is already twice as high as other industrialized nations. We, therefore, expect that companies that can bring efficiency and cost control to the ecosystem while maintaining quality care will see significant opportunities for growth. We expect that providers will consolidate and integrate to achieve economies of scale and better coordination like Kaiser Permanente (insurance, hospitals, clinics, physicians, labs, diagnostics, and technology). In addition, we expect new business opportunities in improving the overall access, quality via coordination and cost, as well as performance measurements of these key factors of health care.
Biographies

**Saumyapadhyay Bandyopadhyay:** Saumyapadhyay is currently working at NetApp as a Senior Engineering Manager in the file systems (WAFL) development group. After earning a B.S. in Mathematics, Saumyapadhyay received a master’s degree in Computer Science. Saumyapadhyay started a career in India as an engineer and transitioned to management.

**Linda Braly:** Linda has worked in the semiconductor industry since completing her graduate studies in the UC Berkeley chemistry department. Linda has spent the majority of the last 13 years at Lam Research in the Etch Product Group in technology and operational roles. Her latest role is leading a program management team for product development. Her key competencies are in etch process and technology development, customer management and organizational development. What Linda enjoys most in a job is developing each member of the team to deliver at his or her maximum potential while accomplishing business goals and objectives.

**Aaron Eppler:** Aaron earned a doctoral degree in physical chemistry from UC Berkeley and joined Lam Research in 2000. He has been with Lam Research in the Etch Product Group in technology development and his key competencies are in technology development, customer engagement and organizational development.

**Delfina Eberly:** Delfina is the Director of Data Center Operations at Facebook. The Data Center Operations team is responsible for the installation and maintenance of server and network hardware; Compliance Management; Operations Integration Engineering and worldwide edge hardware development and support. These teams are integral to Facebook’s ability to quickly add new capacity to support millions of new people each month. Prior to working at Facebook, Delfina was Vice President and CIO at Critical Path, Inc. where she was responsible for the Hosted Email and Corporate IT organizations.

**Harry Li:** Harry is currently the manager of hardware engineering at Facebook. He leads a small team of hardware engineers, focusing on computing server design for Facebook infrastructure. Harry is also active member of Open Compute Project and has contributed two generations of server motherboard specifications to the community. He has been doing motherboard electrical design for over eight years, being a server system architect for two years and is has been moving into manager position over the last three months. Building the most cost-effective, high-efficiency and high-performance server system for scale computing is most interesting and exciting to him.

**Byung Sung (Leo) Kwak:** Leo is a Distinguished MTS at Applied Materials. He works in the Office of the Corporate CTO and leads an RD&E group to develop technologies for company’s future products and business. His professional career started at ORNL, working on electrochemical materials science and devices. Since then, he has been working in the energy storage and semiconductor industries. Prior to working at Applied Materials, Leo was a Principal MTS with LSI Logic. Leo holds a B.S. and an M.S. in chemical engineering from Columbia University and Caltech respectively, and a Ph.D. in physics from Georgia Tech.
Naresh Patel: Naresh is currently a Technical Director for Performance Engineering at NetApp Inc. in Sunnyvale, California, where he analyses and models the performance of caching and storage architectures. Prior to his 13 years at NetApp, he held leadership positions in research and development at Tandem Computers Inc. and Compaq Inc. (now part of Hewlett-Packard). During his tenure at Tandem he co-authored a book called *Performance Modeling* based on lectures given at Imperial College London where he also obtained his Ph.D. in Computing Science.

Appendix

The current health care system is a network of many entities. Fig. 5 shows a flowchart of some of the players and the interactions.

Figure.
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