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## Uber's Message for Health Care

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Unreliable service, inconvenience, uncomfortable surroundings, and high prices make customers unhappy, and given the opportunity, they will go elsewhere. Uber, Silicon Valley's response to the shortcomings of urban taxi and limousine services, has managed to upend an established industry by offering an appealing alternative. Uber's technology-enabled incursion into a highly regulated market suggests that if consumers gain enough from a new solution, it can overcome powerfully entrenched economic and political interests. Is U.S. health care ripe for disruption by a medical Uber?

Taxi service was vulnerable to disruption because poor (some would say archaic) service had been established as the norm, in part because it was difficult for higher-quality alternatives to fill the gap. The taxi industry would seem to exhibit the key characteristics of a highly competitive market. It has many sellers, each of which is too small relative to the overall market to affect prices by withholding or expanding its own supply of rides. But in most cities, taxis and limousine services have operated as regulated monopolies for decades. Most jurisdictions, claiming to be shielding suppliers from ruinous

competition that would drive prices below the costs of doing business and protecting consumers from unsafe equipment and untrained drivers, have restricted licenses to specific vehicle owners. Such regulation has limited the supply of cabs (thereby increasing the price above true costs of providing rides, leading to excess profits that economists call "monopoly rents") while requiring the industry to meet prescribed standards.

Since 2009, when it was founded to develop technology to help would-be riders find transportation, Uber has become a rider-driver matching service. Crucially, the drivers did not have to be established, full-time limo or taxi drivers. The company has grown rapidly, spreading to more than 150 U.S. cities and 58 countries, with an estimated valuation of \$62.5 billion.<sup>1-3</sup> This growth came at the expense of Uber's traditional competitors, eroding the earnings of many people who drove taxis and limousines in the regulated part of the sector and driving down the monetary value of their licenses. In Toronto, the average selling price of a "cab plate" fell from \$360,000 in September 2012 to \$153,867 a year later and \$118,235 in 2014.<sup>4</sup> The concurrent increase

in Uber's valuation is a measure of the transfer of monopoly rents to Uber from license holders all over the world.

With so much at stake, license owners and their drivers have fought back, putting enormous political pressure on government officials who had previously protected their monopoly rents. Although Uber has lost some battles, it has won many others and has shown that it will aggressively defend its ability to operate in cities worldwide.

Health care delivery may seem far less vulnerable to disruptive change than taxi services. Any would-be health care disrupter confronts a web of regulations, contractual obligations, interlocking financial interests, and providers' political influence — hospitals are often a congressional district's largest employers. Market power and outright monopoly, often reinforced by insurer and hospital consolidation, licensing, and other regulations, characterize health care provision in many parts of the country and can discourage the entry of new competitors. Furthermore, an alternative service would face a relative price disadvantage if it didn't qualify for health insurance coverage. Strategies for delivering lower-cost alternatives by using non-

**Examples of Venture-Funded Innovative Health Care Companies.\***

Company (Yr Founded, Latest Valuation)	Core Business	Purported Innovation	Disrupted Competitors	Added Value
Theranos (2003, \$9 billion)	Novel laboratory diagnostic test technology using very small amounts of blood	Low-cost laboratory-test processing Patients can order their own laboratory tests and receive results	Traditional laboratories including those in hospitals that provide important revenue stream Physicians who currently control access to tests and results	Patient control of decision making and information
ZocDoc (2013, \$1.8 billion)	Online medical care scheduling	Search engine for finding physicians best suited for patient's perceived problem and schedule Patients can book appointments online without intermediary	Traditional referral mechanisms and networks (e.g., doctors and their assistants)	More efficient booking process Increased patient control
Intarcia Therapeutics (1995, \$1.8 billion)	Novel subcutaneous systems for drug administration that allow continuous slow delivery over long period	Allows once- or twice-yearly administration of medications Improves adherence with prescribed dosing	Pill manufacturers Physicians and other health care professionals who provide adherence education to patients	Improved effectiveness of pharmaceutical products Easy to rule out poor adherence as cause of treatment failure in practice or research
Oscar Health Insurance (2013, \$1.7 billion)	Health insurance	Redesigned health insurance to improve consumer experience Offers free remote advice for health problems through doctor on call Provides transparent medical pricing information before visit	Traditional health insurers	Provides "health insurance that won't make your head explode"
Proteus Digital Health (2001, \$1.1 billion)	Technology to inform patients and physicians about health-related behaviors, especially medication adherence	Ingestible sensor embedded in pills to measure oral administration adherence Combines ingestible, wearable mobile, and cloud computing		Helps determine whether poor compliance contributes to treatment failure
23andMe (2006, \$1.1 billion)	Direct-to-consumer genetic testing using saliva	Informs people of their genetic background and relative risks for numerous diseases	Traditional genetic counseling services and laboratory facilities that may provide a revenue stream for hospitals	Empowers patients to choose which disease-screening strategies best suit them May create more demand for downstream screening

\* Data are from a *Wall Street Journal* list of venture-funded health care companies with valuations of \$1 billion or more, excluding biotech companies (<http://graphics.wsj.com/billion-dollar-club>).

physician providers are limited by scope-of-practice regulations. And although customer service is important in health care just as it is in taxis, patients want assurances that the aspects of care they can't readily observe — say, the surgeon's technical competence — are of the highest quality. As would-be disrupters in medicine know, taking a chance on a provider of unknown quality is very different from taking a chance on an Uber driver.

Despite bold promises and, in some cases, impressive growth, innovations in care delivery that

2% of primary care visits.<sup>5</sup> They do not appear poised to transform U.S. health care.

But if past changes have fallen short of expectations, that doesn't mean that disruption won't come. Uber demonstrates that large gaps between what consumers want and what they're getting can't last forever. Market forces will seek to fill that void. Some regulated monopolies exert such tight control that entry is very difficult (e.g., cable, telephone, and Internet services in Canada and pharmaceutical companies in the United States), but because their

dures, the Health Insurance Portability and Accountability Act (HIPAA), poor interoperability of electronic health records, and restricted referral networks. But some of these regulations address genuine needs, and they benefit powerful constituencies. They are unlikely to fall soon.

Yet successful innovators will find ways to solve the problems of unmet expectations and breach artificial barriers to market entry. Because health care is multidimensional, companies can either attack traditional providers to gain market share, as Uber does now, or start by nibbling at the edges in ways that could ultimately disrupt the industry, as Uber did at its inception (with an app). The companies listed in the table, for instance, aim to improve health care by bringing technological innovations to bear on perceived market opportunities. These examples currently seem limited in scope, some of them having little to do with service delivery. But just as better medications and percutaneous interventions reduced the need for cardiac surgery, these enterprises may evolve to disrupt major aspects of health care someday.

One hundred years ago, physicians were unregulated and received highly variable training. Fifty years ago, physicians and hospitals could perform surgery and cure bacterial infections. Now our armamentarium for treating heart disease, cancer, some lethal viral illnesses, and chronic diseases is vastly larger; one could not have imagined many of these possibilities even a short time ago. Medicine has more to offer than it ever has. But flaws in U.S. health care represent opportunities for developers of alternatives.

***Recent delivery innovations don't appear poised to overtake established care providers.***

***But if past changes have fallen short of expectations, that doesn't mean that disruption won't come.***

have been introduced over the past decade do not appear poised to overtake established care providers. The prospect of high-quality surgery at much lower costs has attracted American patients to Thailand, Singapore, and other countries for care. Yet the limited data available suggest that medical tourism accounts for a small fraction of care delivered to Americans. Online medical care and telemedicine offer convenience and potentially lower costs but remain relatively small niches and are often services offered by established providers, rather than threats to their business. Retail clinics were introduced with the promise of convenient, quick service for urgent care of common conditions at lower-than-usual cost. These clinics have proliferated rapidly, but they still account for only about

monopoly is conferred by the state, it is vulnerable to shifts in political sentiment. Uber faces daunting political opposition in many places, but the poor quality of existing service and the overwhelming demand for something better will probably determine who wins that dispute. Most government officials understand this reality. Failure to respond to public opinion on a matter that is so visible to voters puts politicians at risk.

Barriers to entry are so common in health care that we take them for granted. Arguably, some of them might be removed to permit innovation without putting patients at risk — including state-based licensure, country-specific board certification, educational prerequisites that prolong training for physicians who perform technology-based proce-

Uber's message for health care is clear. Providers have three choices: ignore innovators and hope for the best; call for increasing regulation to make it harder for innovators to enter the market; or compete on quality and efficiency, disruptive though that might be. We recommend the last option. If health care professionals and hospitals welcome, enable, and embrace our Uber-equivalents (as we've done many times before), we will be able to offer valued and affordable services. Most important, we will sustain and enhance our roles

in health care by earning and maintaining our patients' trust.

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## HISTORY OF MEDICINE

# Stroke and t-PA — Triggering New Paradigms of Care

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Stroke takes no prisoners. Every day, more than 14,000 people of all ages and ethnic backgrounds die from a stroke. According to the World Health Organization, stroke is the second leading cause of death among people over 60 years of age and the fifth leading cause among those 15 to 59 years of age. The annual number of deaths from stroke exceeds the number from AIDS, tuberculosis, and malaria combined, and it's the leading cause of long-term disability globally.

Today, stroke is seen as a medical emergency. Suspected stroke is prioritized in triage systems, public health campaigns promote public recognition of stroke onset, and health systems have been reconfigured to permit speedy access to stroke care. But this response is a recent phenomenon, dating, I would argue, to the 1995 publication of a research

article by a National Institute of Neurological Disorders and Stroke (NINDS) study group on recombinant tissue plasminogen activator (t-PA).<sup>1</sup>

It's rare to be able to date a shift in the conception and treatment of a condition to a particular moment. But the results of the NINDS trial marked a watershed in the history of stroke, since t-PA was the first proven therapy for acute stroke. Its success drove the reconceptualization of stroke as a medical emergency and made patients with stroke a priority of health systems for the first time. Today, stroke commands attention in public health agendas and policy initiatives worldwide. The recognition of the importance of this disorder could not have been anticipated as recently as the early 1990s.

Stroke has always been part of the medical landscape. Hippocrates described one-sided paralysis

with associated loss of speech, calling it apoplexy. In the 17th century, Johann Wepfer suggested that apoplexy was caused by interference with cerebral blood flow, and throughout the 18th and 19th centuries, researchers studied the condition to explore relationships between lesions and brain function. In the mid-20th century, pioneers such as Canadian neurologist C. Miller Fisher built a new understanding of stroke through clinical and pathological studies. Fisher established that the incidence of thrombosis of the carotid artery was much higher than had been thought and that transient ischemic attacks were critical warning signs of stroke. Around the same time, new techniques such as angiography, cerebrovascular surgery, and anticoagulation began to be introduced.

In 1954, Fisher moved to Massachusetts General Hospital (MGH), where he and neurology