

Virtual Healthcare Delivery: Defined, Modeled, and Predictive Barriers to Implementation Identified

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ABSTRACT

Provider organizations lack: 1. a definition of "virtual" healthcare delivery relative to the products, services, and processes offered by dot.coms, web-compact disk healthcare content providers, telemedicine, and telecommunications companies, and 2. a model for integrating real and virtual healthcare delivery. This paper defines virtual healthcare delivery as asynchronous, outsourced, and anonymous, then proposes a 2x2 Real-Virtual Healthcare Delivery model focused on real and virtual patients and real and virtual provider organizations. Using this model, provider organizations can systematically deconstruct healthcare delivery in the real world and reconstruct appropriate pieces in the virtual world. Observed barriers to virtual healthcare delivery are: resistance to telecommunication integrated delivery networks and outsourcing; confusion over virtual infrastructure requirements for telemedicine and full-service web portals, and the impact of integrated delivery networks and outsourcing on extant cultural norms and revenue generating practices. To remain competitive provider organizations must integrate real and virtual healthcare delivery.

INTRODUCTION

February 2000, I completed a telemedicine Needs Assessment of a provider organization consisting of two hospitals and thirty-nine community group practices located throughout Massachusetts. During the nine months of fieldwork prior to submitting the report I observed the organization be aggressively lobbied by companies offering: "full service" web portals (Dr.Koop.com and Americasdoctors.com), health content on web compact disk, telemedicine technologies, and systems supporting ubiquitous internal video teleconferencing.

What these companies had in common was their promise of "virtual" products and services. What became apparent during the vetting process was the provider organization's lack of a working definition of "virtual" and furthermore, the absence of a model to assist the provider organization in determining which, if any, of the virtual products and services fit their core business, budget, and strategic trajectory.

Virtual Healthcare Delivery Defined

Erroneously, within the healthcare sector, the term "virtual" has become synonymous with high tech. This is due in part, to the precedent set by early video-teleconferencing technologies popularized by telemedicine. For example, at this provider organization in 1997, a specialist conducted a follow up appointment with his patient in Monaco using video teleconferencing. This one-on-one telemedicine encounter between patient and provider, performed in real time, across great distance and multiple time zones, was, for its time, certainly high tech but it was not, by definition, virtual healthcare delivery.

In practice, virtual healthcare delivery is defined by asynchronicity, outsourcing, and anonymity. Real or traditional healthcare delivery, by way of contrast, is characterized by the patient and practitioner meeting in real-time, face-to-face, utilizing a provider organization facility. Thus, the aforementioned video teleconferencing is not a significant component in the larger strategic shifts that this paper considers in effecting a full-scale model of virtual healthcare delivery.

Presently, the challenge is for provider organizations to develop a methodology for determining what blend of real/virtual hybrid products, services, and processes complement their core business, budget, and strategic trajectory. The purpose of this paper is to provide such a model; a real-virtual healthcare delivery model that allows provider organizations to systematically deconstruct healthcare delivery in the real world and reconstruct the appropriate pieces in the virtual. The rationale for integrating complementary real and virtual services, technologies, and infrastructures, and developing a virtual arm of the provider organization is to remain competitive in the market place. Being competitive, as the medical informatics and healthcare management literature is quick to point out, means meeting consumer's access, convenience, and self mastery needs while containing or reducing the provider organization's costs [1].

Model for Real-Virtual Healthcare Delivery [2]

Depicted below is a classic 2x2 model featuring the real and virtual patient, and the real and virtual provider organization.

	Real Patients	Virtual Patients
Real Provider Organization	1. Real Patients	2. Virtual Patients
Virtual Provider Organization	3. Real Patients	4. Virtual patients

Conceptualizing these quadrants individually allows the entire spectrum of clinical and administrative healthcare delivery stakeholders to identify and discuss activity currently undertaken in each of these quadrants, determine if their end user population is large enough to warrant the investment, and systematically strategize about objectives, timeframes, resources, and so on. For the purposes of this paper, the model focuses on the provider organization and the patients it serves. However, the model could just as easily be centered on clinicians and the provider organization relative to virtual healthcare delivery, or administration and the provider organization relative to virtual healthcare delivery. Following are representative healthcare delivery scenarios for each of the four quadrants.

To reiterate, definitions for real and virtual healthcare delivery are:

- *Real products/services/processes are delivered in real time, face-to-face, and involve provider organization facilities;*
- *Virtual products/service/processes are asynchronous, outsourced, and anonymous.*

Quadrant 1: real patient: real provider organization

- Patients meet one-on-one with real practitioners in real hospitals or practitioner’s offices.

Quadrant 2: real provider organization: virtual patient

- Anonymous patients access the provider organization’s in-house web site for background information on plastic surgery services and rates.

Quadrant 3: real patient: virtual provider organization

- One of the provider organization’s young female patients, diagnosed with gestational diabetes, receives on-line remote monitoring and management of her condition through an outsourced third party company contracted by the provider organization.

Quadrant 4: virtual patient: virtual provider organization

- The provider organization sponsors an on-line breast cancer support group offered on a renowned women’s health website.

Using this model a provider organization can determine for each quadrant: 1. preferred patient population, 2. organizational focus clinical, commercial (marketing, advertising, branding), educational (prevention, training, upgrading), or all three, 3. organizational goals (expand market share, reduce costs, increase revenues, and so on), 4. teletechnology products and services, 5. web portal products and services, and finally, 6. the requisite outsourced integrated delivery network to support the teletechnology and web interfaces.

As noted earlier, the model’s strength is that it allows a provider organization to compartmentalize healthcare delivery into four distinct quadrants. For patients, practitioners, and administration, each of these quadrants represents a unique sphere of encounters, services, products, values, costs, and liabilities. Furthermore, each sphere has all of these characteristics. This means, for example, that an organization, conceptually, can assess its programs or initiatives in healthcare delivery in Quadrant 3. and then move the entire initiative to Quadrant 4. and assess it there.

Similarly, 100% of a patient’s care plan can start off in Quadrant 1. However, as virtual healthcare delivery options unfold his/her care will be a combination of services, for example: 20% from Quadrant 1., 36% from Quadrant 2., 33% from Quadrant 3., and 11% from Quadrant 4. Additionally, the percentage will change dynamically in keep with alterations in the clinical state. All of this is to say that the movement between these quadrants is fluid,

transparent, and unlike the capitated, managed care, or fee-for-service models which exclude patient populations, this model, although it segments the patient population (real/virtual), applies to all patients independent of insurance status.

Furthermore, this model supports the current premise that a significant and growing percentage of healthcare delivery will be virtual [3]. It is not inconceivable that, using virtual healthcare delivery, the entire healthcare system will be inverted and that the virtual on-line interface in Quadrant 4. will become the patient's entry point into the healthcare system. To elaborate, the front line of healthcare would be the web portal. The second line would be RN triage, and the third line would be the face-to-face encounter with the practitioner, taking place in Quadrant 1.

Finally, it is important to understand that the integrated delivery network, and web portal interface, integral to virtual healthcare delivery, would remain constant across all four healthcare delivery quadrants. In other words, if the provider organization were to outsource its entire integrated services infrastructure it would be contracting for one infrastructure, not four individual infrastructures.

To conclude, the purpose of the model is that it can be used by a provider organization to systematically develop a big-picture design for a streamlined, strategic healthcare delivery strategy that capitalizes on the overlap between the organization's existing strengths in the real world and the efficiency, cost savings, and e-potential afforded by the virtual on-line world.

METHODOLOGY

The Telemedicine Needs Assessment, for a provider organization in Massachusetts, carried out August 1999 – February 2000, entailed qualitative and quantitative research programs to include: 1. cross-sectional, institution-wide, in-depth interviews; 2. a survey distributed to all clinical practitioners to assess current computer, web, and telemedicine technology usage and needs; and 3. on-going participant observation at administrative and clinical meetings and during day-to-day operations at the provider organization. The following predictive barriers to virtual healthcare delivery are distilled from interviews and participant observation data.

FINDINGS

At this provider organization, barriers to implementing virtual healthcare delivery coalesced around: 1. integrated delivery networks and outsourcing, 2. confusion over virtual infrastructure requirements for telemedicine and full service web portals, and finally, 3. the impact of integrated delivery networks and outsourcing on extant cultural norms and revenue generating practices relative to barriers one and two.

Barrier 1: Telecommunication integrated delivery networks and outsourcing For the provider organization, telecommunication integrated networks and outsourcing posed two interrelated and seemingly insurmountable practical and cultural hurdles: 1. *Uncharted strategic partnerships with integrated delivery networks would replace familiar service relationships, and 2. Integrated delivery networks would necessitate outsourcing.* Formerly, individual companies sold a single technology or service for that technology to the provider organization (for example PICTEL or VTEL). By way of contrast, the telemedicine company lobbying the provider organization came packaged with strategic partners offering a call center, data management and archiving center, secure IP-VPN internet service provider, and so on. Unfortunately, for the provider organization, the proposed telecommunication integrated delivery network was wholly dependent on outsourcing for its services such as: a 24/7 call center, data management, data archiving, e-commerce capabilities, and so on. At the time of the study, all of these outsourced services were outside the culture and strategic plan of the provider organization. At the same time, these same integrated services could not be provided in-house. The provider organization's IS staff reported that they lacked the requisite skills and did not have the autonomy, flexibility, adequate IS infrastructure, or operational resources to respond quickly to proposed web and telemedicine technology initiatives. Finally, the provider organization's outsourcing alternative, high pressure, "limited-time-only" affiliated partnerships with newly established web portals were soundly rejected because the canned solutions would have exchanged the provider organization's identity for the external brand of the dot.com and failed to fully address the provider organization's entire virtual healthcare delivery infrastructure needs.

Barrier 2: Confusion over virtual infrastructure requirements for telemedicine and full service web portal *The provider organization's lack of conceptual frameworks for web portal and telemedicine technologies impeded the corporate*

decision making process. The provider organization's administration did not have a conceptual framework for differentiating between the web portal and the infrastructure required to support it. Furthermore, the provider organization couldn't conceptualize the interdependent and overlapping integrated infrastructure requirements of the telemedicine and web portal technologies. For example, both the full service web portal and the telemedicine program for the remote monitoring and management of acute and disease populations, that the provider organization was entertaining, would require a 24/7 call center. Finally, it was not transparent to the provider organization's administration that the telemedicine technology and web portal individually or together, required the highly specialized integrated delivery networks' service provider's skills and its integrated and interoperable interface to be fully operational.

Barrier 3: The impact of integrated delivery networks and outsourcing on extant cultural norms and revenue generating practices *Integrated delivery networks push the business model envelope.* Because telemedicine and web portal technologies came bundled with communications and data management infrastructure, they offered the provider organization the opportunity to segue straight into strategic e-commerce care-delivery applications and related business opportunities. These technologies were, in effect, imposing a new advertising, marketing, and business culture that historically had been outside the purview of traditional hands-on clinical practice [4]. Additionally, the provider organization had to declare its espoused agenda. The telemedicine company alleged that cost savings could be realized if their integrated delivery network was used to remotely monitor and manage chronic heart failure patients. This caused the provider organization to question, "*Would virtual healthcare delivery's potential for savings negate real healthcare delivery's potential to generate revenue?*" Finally, and probably most importantly, *the provider organization was sensitized to tech innovation.* At the time of the study, the provider organization was immersed in rectifying a hugely expensive institution-wide IS implementation gone. Consequently, innovation on the scale required by full-scale virtual healthcare delivery would be considered only if there was an immediate and guaranteed return on investment. Without a clear understanding of these technologies and their requisite infrastructures, the provider organization was unable to determine where there would be a return on investment.

DISCUSSION

This provider organization lacked: 1. a concise definition of "virtual" healthcare delivery relative to the products, services, and processes offered by telemedicine technologies and full service web portals, and 2. a model for integrating real and virtual healthcare delivery. Additionally, for the provider organization, integrated delivery networks and outsourcing, ignorance of web and telemedicine technologies and their requisite infrastructures, and finally the impact of the aforementioned barriers on extant cultural and revenue generating norms, posed significant barriers to implementing virtual healthcare delivery.

The prevalence and scope of clinical and telecommunications integrated delivery networks, which form the backbone of virtual healthcare delivery, is increasing [5]. The significance of these findings for other provider organizations integrating real and virtual healthcare delivery, underscores the valuable contribution qualitative data can make when grappling with complex and quickly evolving research subject matter [6].

Findings set out in this paper signify a shift in how we identify and analyze barriers relative to healthcare delivery. There is a telling parallel between the provider organizations forced to move from familiar service relationships into unproven strategic partnerships; and the medical informatics community forced to move from studying barriers to the uptake of free-standing technologies (computer/software applications), to researching barriers to burgeoning clinical integrated delivery networks [7], and the telecommunication integrated delivery networks articulated here. Although barriers, for example: organizational issues [8], organizational complexity [9], and the rapid evolution of technologies [10] and of technological infrastructures [11], have been documented extensively, and clearly have relevance to the implementation of telecommunications integrated delivery networks, the context for those barriers and the three presented in this paper are markedly different.

Typically, contexts for barriers to technology uptake have centered on institution-wide, in-house, IS implementations. An example would be decision support software. In these contexts, a representative barrier studied would be "physicians' resistance to computers"[12] --- meaning computers as freestanding tools supporting real healthcare delivery. In the new paradigm proposed, a representative barrier would be "resistance to outsourcing" --- meaning resistance to one of an entire strategic

matrix of systems supporting virtual healthcare delivery.

To summarize, medical informatics technologies supporting real and virtual healthcare delivery are renowned for the restructuring of organizations and redefining of roles and work processes [13] [14] [15]. Until recently, research on barriers to healthcare delivery has taken place in Quadrant 1. Now, we have the opportunity to apply our skill sets in Quadrants 2, 3, and 4.

RECOMMENDATIONS

Steps a provider organization can take to successfully integrate strategic real and virtual healthcare delivery products, services, and processes include:

- Institute clear definitions for real and virtual healthcare delivery,
- Establish a shared real-virtual healthcare delivery model that accommodates all stakeholders' espoused agendas,
- Develop a layman's understanding of telecommunication integrated delivery networks, full-service web portals, and their interdependent infrastructures, and finally,
- Outsource appropriate clinical, administrative, and telecommunication services.

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