

HOME-CENTERED HEALTH CARE: LEVERAGING TECHNOLOGY, PREVENTION, AND LIFESPAN HEALTH PLANNING*

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ABSTRACT

Healthcare reform requires an organizing vision for transforming our current highly segmented, reactive, and inequitable system of care. This article reviews trends that are currently intersecting and impacting healthcare delivery including aging, consumerism, and new information technologies. The organizing vision advanced includes a fundamental transformation of healthcare with prevention, planning, and the home at its center, and utilizing technology in support of expanded connectivity and holistic, relationship-based care networks.

NON-TRANSFERABLE ASSETS

The U.S. Healthcare System, designed a century ago, has demonstrated a unique inability to evolve, and has been overtaken by a variety of global demographic forces that have, through mutual reinforcement, accelerated the rate of environmental change. The assets we currently include in our definition of the healthcare

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system—the bricks and mortar of our hospitals and our patient offices; our human resources as embodied in our training, roles, responsibilities, and payment incentives; our educational curricula; and our continuously reengineered processes targeted at in-patient safety and efficiency—are poorly adapted to support the creation of a preventive healthcare system. Rather, these elements are original, or second or third, iterations of a century-old interventional care system. This system survives through active resistance of those empowered by it and due to our collective inability to imagine and execute a more inclusive and anticipatory healthcare system.

Prevention is grounded in education and behavioral modification, beginning before birth and extending beyond death. A successful preventive healthcare system aims to advantage multigenerational relationships in order to provide multiple, repetitive inputs in real time that allow micro-adjustments in one's daily life plan. Such a system is fundamentally forward focused and requires intimately informed, highly motivated, and deeply committed individuals to encourage health and wellness in individuals, families, and communities. The practical execution of a preventive system relies on strategic lifecycle health planning and management on the one hand, and adherence to palliative treatment plans for patients with chronic disease on the other. Our current system largely ignores the former, and performs unevenly and inefficiently the latter.

TECHNOLOGY AND RE-ENGINEERING HEALTH

A preventive healthcare system requires an organization locus for planning and execution. There is only one location that is both geographically identifiable and politically viable as a candidate—the home. While the home may be where the heart is, it is most certainly not currently where the health is.

General Electric (GE) recognized the “moldability” of the home when it launched its remarkable exhibit called the “Carousel of Progress” at the World's Fair in New York in 1964. The GE exhibit, beginning at the turn of the century and projecting into the 1980s, advanced the transformative power of innovative, home-based technology. Their case was simple: by improving our toasters and refrigerators, GE improves our lives. As we begin a new century, a similar case is being made for healthcare. In the same way that America views homelessness as a social failure, we have begun to view “healthlessness” as a national shame. From varying sectors of society, including government, financial, home technology and entertainment, a transformation question has emerged. If we were able to leverage technology—informational technology, diagnostic and imaging technology, entertainment technology, financial system technology to equitably re-outfit and at least partially improve the health of homes—could we efficiently re-center our healthcare system around the home and support preventive health planning?

The market place has already answered in the affirmative. Forrester Research forecasts that the wide range of home health technology-enabled products currently in development will find an explosive growth market beginning in 2010 and becoming fully robust by 2015 [1]. Thousands of technology, entertainment, and financial firms are now investing in the parallel build-out of elements of a future preventive home-centered health system. They are working in partnership with governments and municipalities, and with major academic engineering powerhouses such as MIT [2], the University of Rochester [3], Carnegie Mellon [4], and the University of Michigan [5]. Their current visions lack scope and context. For example, there is little acknowledgment of the value of the patient-physician relationship, care teams, and multigenerational prevention in these groups' strategic research and product development plans. The emphasis has been on the use of consumer health electronics to support independence, aging in place, and chronic disease management, rather than on multigenerational health lifecycle management [6, 7].

AN ORGANIZING VISION

Transforming our current healthcare system requires both an organizing vision and new forms of collaboration with partners who possess financial assets, informational technology expertise, and existing positions in the American home. In 2005, in partnership with leaders from the American Association of Homes and Services for the Aging (AAHSA) and the Center for Aging Services Technologies, including over 300 technologically focused corporations, a new and fuller vision of integrated and preventive health, security, and wellness emerged [8]. At the center of this vision is the home. Where the current primary loop of our health care system travels from hospital to physician's office and back again, the new center loop would be from home to care team and back to home. Informal caregivers in the home would become fully enfranchised members of physician-led, often nurse-directed, care teams. These family caregivers would not only be linked virtually to their multigenerational families and to their care teams, but also to other informal family caregivers, thereby effectively addressing the profound sense of isolation that comes with these roles. A wide range of secondary loops would evolve from generalist to specialist, from clinician's office to hospital, from care team to insurer or pharmacy. But the primary loop, where confidence and trust reside and where data would originate and from which privacy access would be granted, would be home-centered [9].

The information flowing out of the home would be real-time, continuous, and virtual. It would include vital signs and diagnostic and imaging results sent wirelessly to care teams. The healthy home would be outfitted with ubiquitous, low cost sensors able to track motions, actions, and interactions. On-site intelligence software would interpret the information and analyze it. A human team partner communicating through a friendly interface of one's choice—wristwatch,

phone, radio, TV, or computer—would provide professional assessment while acting as a guide and virtual companion assessing the performance of Activities of Daily Living (ADL); recommending increased fluid intake, diet alteration, or change in exercise routine; providing reminders on medication or dosage; and coordinating communication with family members [7].

Care teams performing in a truly preventive health system would require new skills and a high degree of team collaboration. Specific roles for physician, nurse, and other formal and informal caregivers would need to be redefined. Physician-led teams would be reimbursed for managing complexity. Informal caregivers would become home health managers, rewarded with lower health insurance premiums or tax benefits for accomplishing healthy family outcomes. Nurses' roles as coaches, educators, and behavior modifiers would expand with the full support and encouragement of physicians. Offices would see much less traffic, as most care could be accomplished without a visit. Yet physicians and nurses would make a good living, and even have time to visit their patients in their own homes [10, 11]. Hospitals and specialists, along with their advanced diagnostics and special interventional capabilities would remain a necessity. But with the success of an anticipatory preventive healthcare system properly incentivized to financially reward health, these services would become more centralized and require fewer services per capita. The surviving services would see higher volume and would be expected to consistently deliver better outcomes.

COLLAPSING DATABASES

Augmenting and supporting this transformational vision is a rich, evolving, and increasingly transparent virtual data field. Three enormous health databases are in the process of going virtual or electronic. The first of these is the Clinical Research Database (CRD). Massive portfolios of complex data are generated en route to FDA approval. In the past, these studies were not fully transparent to the public. On the back end of the Vioxx withdrawal, where questions were raised whether early negative results suggesting a significant cardiac risk had been suppressed, an agreement was reached to make major research databases transparent to all [12]. For better or worse, the public will soon have electronic access to the vast majority of positive and negative results of studies at the time of completion.

The second database is the Continuing Medical Education Database (CME). Nearly 20% of all U.S. continuing medical education programs are now conducted online [13]. Within 10 years, most CME will be offered online and in real time rather than episodic segments. Hand-held devices are today standard medical equipment in many care sites. These devices catalogue encounters, provide immediate database support to the patient-physician relationship during the evaluative and joint decision-making process, and integrate with information support search engines. It is already clear that in a preventive healthcare system, where

information and planning are synonymous with health, CME will be interchangeable and indecipherable from the care itself [14].

This brings us to the third database, Continuing Consumer Education (CCE). As the consumer health movement continues to evolve from educational empowerment to active engagement and inclusion in the healthcare team, patients and their families will require the same hand-held mobile hardware and information software as other care team members. This will help avoid any confusion that might arise from multi-tracked information and accelerate the need for simple and well-designed educational products [14]. By using the same devices and mobile educational platforms, compatibility along the primary “home to care team to home” loop, will be assured. As these three virtual databases become more visible and prominent, they will begin to merge, and the gaps between them will begin to disappear. If, for example, a study reveals that it is safer and better for mother and child to provide epidural anesthesia at 2 cm rather than 5 cm dilation during labor, and that doing so not only does not increase C-section rates but ensures safer, more comfortable labor and better Apgar scores for the baby, the transfer of such knowledge to practice would take multiple years in our current system [15]. However, virtual CRD and CME create the ability to collapse those databases upon each other and rapidly inform the appropriate caregivers of this new knowledge so that treatment regimens can be immediately adjusted. The translation gap between research and practice has disappeared [16].

If CRD and CME collapse upon each other, CME and CCE will in many ways become one and the same. Here again we are challenged by a translation gap between professional recommendations and patients’ adherence to agreed-upon plans. In an anticipatory preventive healthcare system, individuals and their families would be encouraged to plan for health, and to codify those plans within a Lifespan Planning Record (LPR). An LPR would be computerized software that came standard with all new computers, and provide the forward-looking scaffolding which cues the consumer planner for data input, action, and verification at specific timed intervals. For example, the LPR would include the prescribed schedule for immunizations and would cue parents to seek immunization at the prescribed time. It would have embedded medication information and would provide automatic reminders through the computer or an integrated device such as a cell phone or wristwatch. It would include recommendations for cancer screenings at appropriate times. It would be an intelligent and dynamic software tool with the ability to customize the plan based on the patient’s Family History and Past Medical History, current diagnostic information, and future DNA mapping.

All of this planning would be shared with the individuals’ care team, and designing and adhering to the agreed-upon plan would be a shared responsibility. Currently, patients adhere to episodic plans only 50% of the time at best [17]. However, one could anticipate much higher rates of adherence if the data created by the patients and their caregivers, complete with their own aspirations for

wellness, was properly organized and accessible online [18]. As we move from intervention to prevention, healthcare will be an information, decision, and planning dominated service, and will be anchored by three massive, collapsing databases—discovery (CRD), medical (CME), and consumer (CCE)—with ownership residing where the data originated, with the people, and provided primarily to their professional caregivers [19].

FEAR REINFORCES SILOS

Rigid silos are not unique to healthcare, but in healthcare they have been raised to an art form. Strongly held ideological positions or policies reinforce backward-facing command and control systems. Fear fuels and maintains the status quo—fear of change, fear of territorial intrusion, fear of erosion of declining reimbursement [20]. Our disorganized and disintegrated healthcare system continues to exist today because those in power believe that a more rational and cogent national approach would bring price compression, limits in access, and loss of control. Yet, at the same time, there is growing recognition that preservation of this broken system ensures such massive inefficiency, cost escalation, variability, and safety concerns that the very problems we have intended to avoid are occurring anyway. We are now experiencing market-induced price compression, inequities in coverage, and service and quality disintegration with high variability based on outcomes monitoring [21].

The ever-advancing megatrends will continue to stress and disrupt our status-quo. Eventually, these silos will vaporize completely. To elaborate, just 4 years ago, United Healthcare purchased the first insurer-owned bank. Late last year, BlueCross BlueShield announced its own Blue Healthcare Bank, giving its members a place to save and withdraw money for health expenses [21, 22]. In 2005 and 2006, roughly 450 of the world's largest banks and financial institutions entered the healthcare service sector because they saw a unique opportunity for profitability in the form of Health Savings Accounts. They sought to leverage their vast information technology, investment expertise, and system management skills to simultaneously manage an investment portfolio of \$75 billion while managing millions of daily transaction points off a health debit card, each with a fee [23].

Over the last several years, 400 of the largest multinational electronic, computer, and media firms, have joined together in a single national advocacy organization called the Center for Aging Services Technologies in Washington, DC, with long-term care providers and the prevention and wellness community working together to drive health into the home [24]. Finally, nearly every major media/entertainment firm that touches new media including health content and health searches now has a formal health division, often with a physician leader at the helm. In addition, everyone from Microsoft to Google has advanced their version of a Lifespan Planning Record, making it abundantly clear that the

future unifying health information platforms will not be provided by hospitals or physicians, but will be under the control of health consumers, and offered for free, much as G-mail and Google documents are provided today [25, 26].

By 2015 it is quite possible that national medical organizations and the national nursing organizations will remain locked in place over issues of autonomy, independent scope of practice, licensure, and prescription dispensing. Yet in the decade that has passed, new industries—financial institutions, technology firms, entertainment giants and entrepreneurs—will have build—out something brand new. These new players will not be burdened by a century of tradition, and they will possess vast financial assets, enormous in-house information technology expertise, and an existing product presence in the American home. Most important, they recognized in 2008 that there was a fundamental shift in power and control underway; a shift to team approaches, mutual decision-making and organized health planning. Their strategic plans envisioned a marked decline in both the necessity for office visits and the number of prescriptions written because treatment plans in the future would be encoded in agreed upon lifespan health planning tools. Prescriptions would give way to lifecycle health planning, adherence management would automate long-term therapies, and consumer coaching would customize, if not personalize, many of the decisions. For nursing and medicine, still focused on the hospital-office interface as their primary loop, the battle in 2015 is over. The rest of the world is now concentrating on the creation of healthy homes and preventive health planning. The reason for the original professional battle and the reason for the silos are no longer relevant. They were constructs of an infrastructure built out in a different century and for a totally different purpose.

CONCLUSION

The scenario above reflects what could happen, not what must happen. The alternative is constructive transformation. But this shift would require caregivers, traditionally suspicious of technology for fear that it will dehumanize their relationships with their patients, to embrace technology. They must develop openness to new and innovative partnerships, and be committed to advancing virtual connectivity between the people and the people caring for the people. These concepts—a primary loop from home to care team to home; the re-engineering of the home for health; physician-nurse partnering; informal family caregiver inclusion; automated, family-centered data outflow; continual assessment and coaching feedback; advanced medical communications with elimination of discovery to clinician to patient translation gaps; and, in addition, universal coverage with active targeting of our most vulnerable populations, whether they be elderly in Florida, rural in Montana, or poor and disabled in Tucson or West Philadelphia—are both sound and achievable if we are willing to serve and committed to lead.

The trends that are transforming healthcare—an increase in aging populations, consumerism, the Internet, broadband reach, expansion of family caregivers, and globalization—will continue to accelerate the healthcare system toward a home-centered healthcare vision whether or not physicians and other healthcare professionals participate. Yet, without the active participation of caring doctors, nurses, and health professionals, the vision can never be truly complete. Absent mutual advocacy, consumerism points toward an entirely different outcome. Knowledge and consumer involvement will still rise. Financial, technology, and entertainment vendors will still succeed in the creation, marketing, and sales of products that transform our homes. However, relationships will fall away. Our envisioned “double-connect” to each other (technology that provides a permanent, constant connection between the people and the people caring for the people) becomes a “double-check” on each other (technology used by consumers to perform second opinions on the people and institutions with whom they traditionally shared confidence and trust). The bright promise of health populism reverts to the dead weight of health separatism. Technology, one way or another, will transform healthcare.

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