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HEALTH ALLIANCE

Connected Personal Health in 2015: "Getting it Right!"

Looking back on the emergence of integrated person-centered health

"This Vision Paper is a creative synthesis of many ambitious ideas about possible developments in the field of telehealth. These imaginative glimpses of telehealth futures, crafted by some of the leading health and technology experts in the field, project a fascinating new world of personal health possibilities that could become very real within the next few years. Making "best-case scenarios" such as these come true is part of the Continua Alliance's mission to promote sustained leadership in technology R&D, service innovation, public policy, corporate strategy, and personal behavioral changes around the world.

Join us in imagining the possibilities!"

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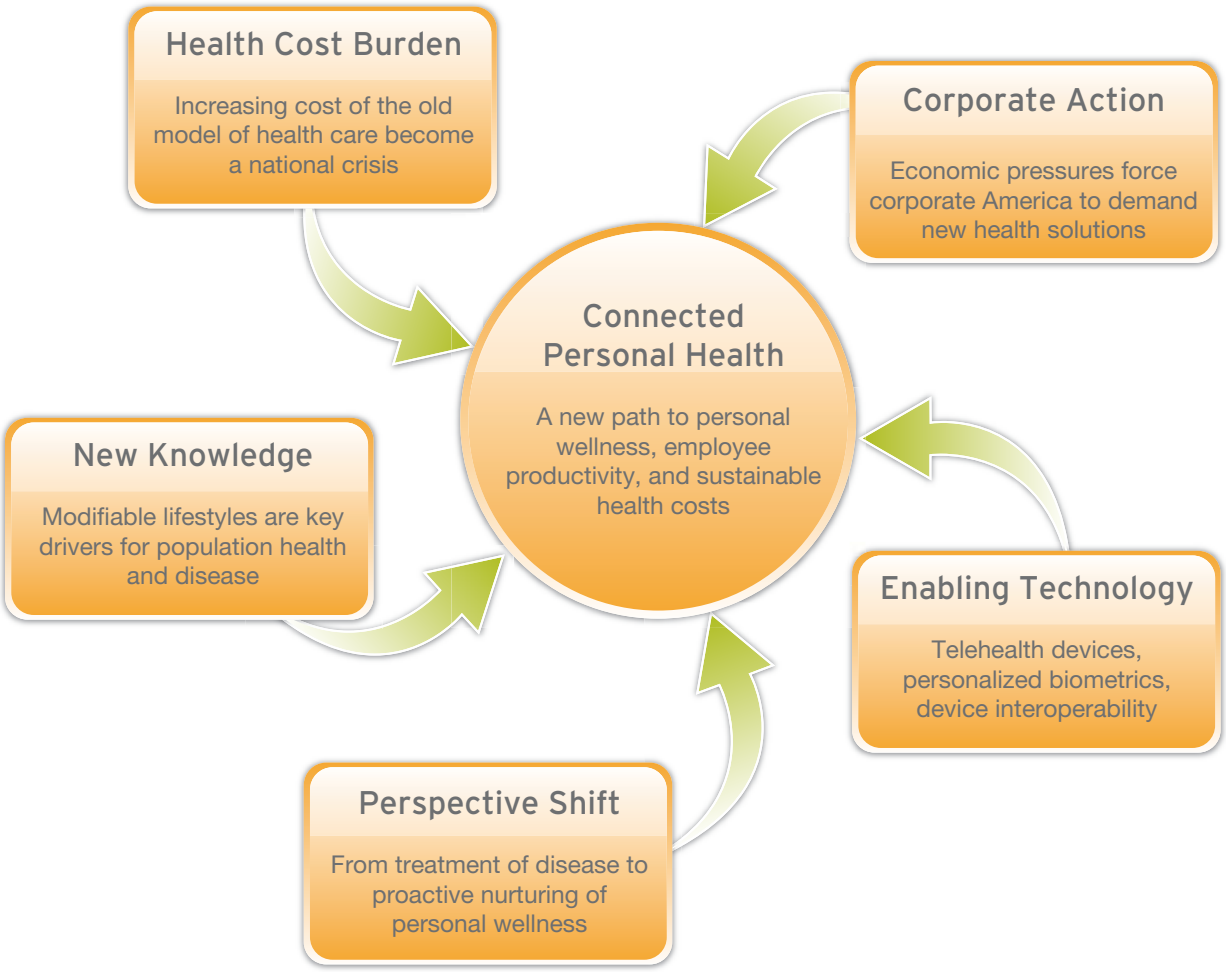
Discovering a New Path to Personal Wellness

This historical analysis charts a coalescence of forces and events that turned America and other nations onto a new path to health. Twenty years ago, health care systems based on outmoded views of wellness and disease were in an unsustainable spiral of expectations, expensive treatments, and increasing costs. Once manageable health costs had grown into a financial burden that sapped the life from US corporations and crippled the country's ability to compete on the global front. As the health burden began to create economic pain on both national and global scales[1], corporate leaders took up the challenge and aggressively designed solutions.



When looking back to the early 21st century, it is now clear that a coalescence of factors set the stage for a breakthrough, and enabled the transition to a wellness-based approach to national and global health.

The critical shift in perspective

Health economists were stunned by what happened in Finland in the late 20th century. In a 30-year period beginning in the 1970s, cardiovascular disease (then the most common cause of death in that country[2]) dropped by over 50% among the middle-aged Finnish population. This turn-around was attributed to new health programs that emphasized 'population responsibility' for lifestyle changes such as improved nutrition, increased activity, and quitting smoking. Finland's health care expenditures per capita during this time were reported to be 20% less than the EU average and their health costs as a percentage of GDP were actually trending down[3]. The clear lesson from Finland's experience was that inexpensive changes to daily health habits yielded improvements in personal health status and subsequent reductions in population health costs far beyond those achievable with modern medications or treatments. People could manage health risks at a personal level, and at the same time achieve impressive economic benefits on a national scale.

Realization: Modern lifestyles were creating an epidemic of chronic illness

As the century turned, scientists were becoming aware of a disturbing epidemiological trend: Diseases of the old were becoming diseases of the young. Research showed, for example, that the onset of Type II Diabetes (formerly a disease of adults) had shifted dramatically in the wrong direction in the US, and was fast becoming a new epidemic in the pediatric population[4]. The prevalence of strokes among middle-aged women was also on the rise[5], and health experts became convinced that poor nutrition and sedentary habits were driving the population to premature onset of chronic illness.

At the same time, medical research was also providing a reason for hope: Modification of lifestyles could prevent or delay disease onset, thereby maintaining large portions of the population in a low risk status. In fact, a striking pattern of research results indicated that the risk for chronic illnesses such as cardiovascular disease, diabetes, and even some types of cancer, could be reduced by 60-80% via personal attention to "modifiable health"[6,7]. As health lifestyle measures and personal biometrics became commonplace, the lifestyle precursors of many diseases could be monitored well before chronic illness developed. Thought leaders such as Edington of the University of Michigan Health Management Research Center built a strong case that investment in the maintenance of wellness would have a much greater return than treatment of disease after it was present[8]. The research and analysis from such thought leaders provided four illuminating messages that guided a new path to health[9]: (1) Poor health lifestyles dramatically increase population risk for disease[10]; (2) The costs of waiting to intervene until after disease is present are staggering[11]; (3) Low risk populations can remain healthy by modifying personal health behaviors[12]; and (4) Return on investment from such wellness-focused programs was achievable and dramatic[13].

Corporations delivered the skill set to drive change

In the mid 20th century, employer-sponsored health care was about 3% of after-tax profits and could be readily absorbed into business production costs. Soon however, the economic consequences of a treatment-based system became painfully clear, as US health care costs doubled in a 30-year period[14] and were forecast to reach 20 percent of GDP by 2017[15]. At the time, more than 75% of health costs were being consumed by chronic care management[16], and health economists forecast steady increases of almost 7% per year in national health costs. Business leaders realized that the status quo – paying more and more for health benefits while the overall health of their employees declined – was an unacceptable slide into economic ruin. Corporations took matters into their own hands and began to drive changes.

In the early 1990s Intel recognized that many "accidents" were predictable, rules-based, and preventable. Back injury rates for example, were clearly linked to poor lifting techniques. Such insights led to programs that specifically targeted preventable workplace safety events and yielded results so dramatic they were almost unbelievable. In less than 10 years, work hours lost due to safety problems were reduced by almost 90%[17]! Key lessons learned from the Intel experience were that "rules-based" links between behavior and safety could be identified and addressed. Prevention-based programs enabled employees to predictably "get it right" day in and day out, leading to sustained improvements in individual safety.

Armed with such powerful success in personalized employee safety, corporations took the next step, and began to build prevention-based programs aimed at employee health. Their goal was to generate health maintenance results that equaled the benchmarks of the best-practice safety programs. Their strategy was to similarly identify the rules-based links between lifestyle and health, and to empower employees and their families to monitor and manage those links. To accomplish this, corporate leaders used a core system of technologies to cognitively "connect" individuals to their modifiable health habits as never before. For each person, user-friendly mobile sensors and integrated health information acted in concert to simplify and visualize the interaction between lifestyle and wellness. A non-intrusive, secure ecosystem of connected health technology enabled employees to "get health behavior right" day in and day out, allowing them to manage their own health trajectories.

Technology advances enabled a new vision of connected personal health

Personal health technology (such as internet-based home asthma monitoring) and mobile devices (such as cell phone-based personal health records) emerged in the first decade of the 21st century. Connected person-centric applications provided people with personalized health information integrated with decision

support tailored to individual wellness and disease management. This timely emergence of remote biometric devices and connectivity provided the technology infrastructure critical for the new vision of personalized health maintenance programs. Older modes of health assessment based on self-reporting of "perceived health behaviors" were replaced with biometric devices that provided objective, quantifiable metrics of modifiable health habits. Real-time feedback, coupled with personalized representation of their health indicators, raised people's health literacy to new levels. Providing not just general health information, but placing each employee within the context of that information, encouraged individuals to manage their own health trajectories, just as instrumentation allowed a pilot to maintain position on a glide path to a safe landing.

Continua Health Alliance: A pathfinder for connected wellness

Supporting new person-centric systems across a distributed environment of multiple devices, applications, platforms, and locations demanded new levels of data exchange and interoperability[18]. As new perspectives, knowledge, and technology converged to enable a turning point in health management, leading technology and health care companies collaborated to form an open industry alliance to improve health. The Continua Health Alliance[19] formed in 2006, with a mission to establish an ecosystem of interoperable personal health systems to empower people and organizations to better manage their health and wellness. Continua served as a powerful change agent, providing a venue for evaluation and promotion of interoperability guidelines for integration of formerly siloed devices, sensors, platforms, and data repositories. As early as 2008, Continua began introducing technical guidelines (relying on existing technology and data standards), that enabled companies around the world to produce interoperable health sensors and monitoring devices. Moreover, Continua provided a vision for the interoperable use of information technology in personal wellness programs. The Continua "connected wellness" vision was promoted via industry outreach and introduced a scalable, population-based solution for health management. As a result, new wellness programs multiplied, and the market for integrated medical devices expanded dramatically from a narrow focus on the chronically ill to a vastly broader focus on wellness for the population at large.

Time Capsule [2009] Connected Wellness: A Personal View

In the past, infrequent Health Risk Assessments (HRAs) and health check ups made it hard for Adrienne to stick to her wellness efforts. Adrienne was convinced that she should improve her health behavior, but with 12 months between annual HRAs, she had little incentive or support for attending to it on a regular basis. "I'm just too busy today. I'll have more time next week." Despite good intentions, she would repeatedly slide back to her old poor health behaviors.

Her connected wellness program changed all of that. Now Adrienne looks forward to her financial incentives for tracking lifestyle markers at regular, frequent intervals. Non-intrusive activity sensors are capturing her daily energy expenditure and uploading this information to her cell phone-based personal health record (PHR). Each month, she painlessly collects a drop of blood at home and sends it off to the specially accredited laboratory for a biometrics panel. Her lab results are quickly and securely transmitted to her PHR, and in almost real time, she can see the connection between her daily wellness activities and her personal physiological response as indicated by her insulin resistance burden and HDL levels.

Adrienne quickly found that her wellness program became an easy routine to sustain and a real source of personal satisfaction and motivation. She has opted to have her PHR data mirrored to a web-based health portal, and has also selected which health data may be shared with her care providers. She has customized her wellness plan with convenient automated alerts and reminders.

"It's easy now to know what I should be doing and to remember to do what I need to do. I can see for myself the health results of my own daily behavior."

How Health and Economic Benefits Were Realized

Early success via expansion of existing employee health programs

Early successes for the new vision of health and wellness were achieved via incremental, affordable extensions of existing Health and Productivity Management (HPM) initiatives. A common approach was to offer personalized wellness monitoring as an option to employees already participating in health maintenance programs. These employees were initially offered incentives for regular and continuing participation in expanded health lifestyle monitoring. Pedometers to monitor activity levels, glucose level meters, and medication tracking devices are examples of health interventions that were affordable, easy to adopt, and effective at changing health lifestyle behaviors. Educational outreach programs promoted the vision and rationale of personal wellness programs, within corporations and across the nation.

Connected wellness solutions enabled sustained changes in health lifestyles

HR executives were initially skeptical about technology-enabled wellness initiatives. They knew that the single most important factor in improving employee health would be sustained lifestyle changes. Getting people to change behaviors, particularly those related to nutrition and activity levels, had been an uphill challenge, and simply throwing novel technology at the problem was not expected to succeed.

What they learned was that the best solutions, such as those supported by the Continua Health Alliance, were attuned to this challenge and in fact, used technology to "digitalize and personalize" modifiable health, specifically enabling and complimenting the best practices of behavioral science. These connected personal wellness solutions:

- Eliminated behavioral barriers by providing convenient, mobile monitoring.
- Attracted and rewarded employees via a variety of corporate incentive programs.
- Provided real-time, easy-to-understand biometric results to employees, thereby increasing the frequency and immediacy of positive feedback.
- Represented health lifestyle behavioral trends within a personalized context, and showed employees the real connection between wellness behaviors (such as better nutrition) and health status metrics (such as improved HDL levels).
- Engaged and reinforced employees on an individual level via customizable alerts and regular interaction with personalized virtual health coaches.
- Sustained employee engagement via participation in connected health communities that provided social support and reinforcement.

Early demonstration of the value of wellness programs

Early HPM programs that integrated technology innovations, employee engagement, and objective metrics quickly began to show positive results[20]. These pilot projects showed that more frequent measurement points (as opposed to annual health assessment questionnaires) provided welcome feedback to employees and enabled an almost real-time visualization of their personal health trends. Innovative experiments with usability and user interfaces included cell phone-based personal health records, friendly home collection biometrics, and virtual health coaches that provided guidance, encouragement, and reminders based on personalized decision support applications. Pilot wellness projects provided proof-of-concept that introducing small sets of rules-based health guidance to healthy employees empowered them to define and steer to their own paths of personal wellness.

Initial successes were soon extended to broader populations where the cost-benefit ratios for early intervention (that is, keeping low risk populations in a healthy, low risk status) were better by an order of magnitude. Personalized monitoring with real time connectivity supported the corporate ability to assess aggregate health trends for employee populations on a monthly or quarterly basis. Typical pilot

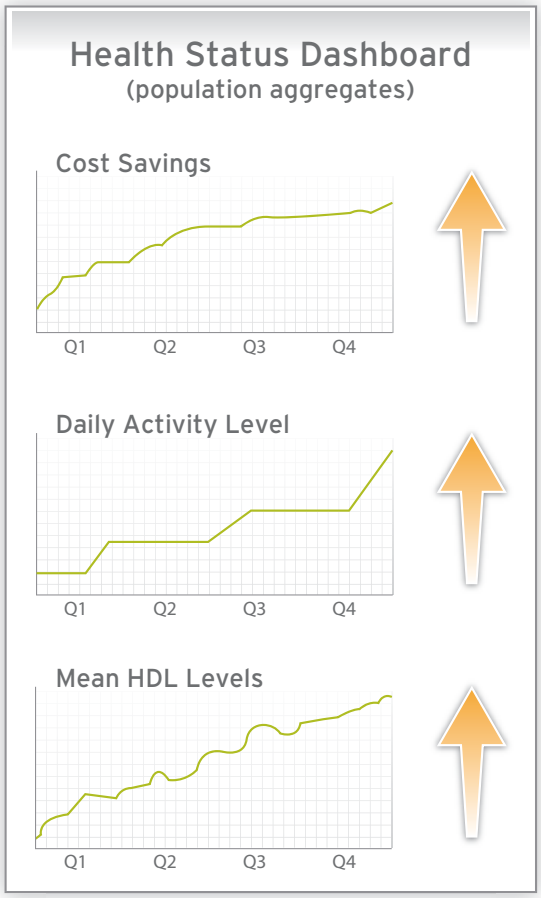
wellness programs provided clear demonstrations of effectiveness and return on investment. Results for health costs per employee, productivity loss due to absenteeism, and other metrics, all showed dramatic improvements. Moreover, use of the objective population metrics derived from connected health monitoring supported predictive modeling of ROI[21], and also allowed for a value-based comparison across different HPM programs and offerings. This new comparative ability supported a free-market selection and adoption of the most effective programs and technologies.

Time Capsule [2012] Connected Wellness: The Corporate View

It has been three years since the core health program was initiated at Adrienne's company. At each board meeting, in addition to reviewing financial and operational management dashboards, it has become routine to review an employee health program.

The careful planning and thoughtful incentives have paid off. The VP of Human Resources reports that participation in the core health program has increased steadily to 82% and is continuing to yield improved population health metrics. Mean HDL (good cholesterol) levels, for example, have increased by 10mg/dl and medical research shows that a change of this magnitude has been associated with a 50% reduction in heart attacks. Within their corporation, they are beginning to achieve results equal to the Finland benchmark and are now able to do regular predictive modeling of health-driven return on investment.

Earlier HPM programs had required at least 3-5 years before cost savings could be calculated. With connected wellness programs, for the first time quarterly projected cost savings due to optimization of modifiable health could be projected within just 2-3 years of program initiation.



Population health repositories built with voluntary, de identified data served as the foundation for the corporate health status dashboards.

The employee response to personalized wellness programs

An important realization generated by these early wellness programs was that employers were able to create health value for their employees while simultaneously reducing health cost burdens on a corporate scale.

- During pilot implementations, employees were first drawn by a combination of curiosity and incentives. They rapidly gained proficiency with the new biometric monitors at their disposal. They found that the granular, more frequent health status information allowed them to make and evaluate personal choices about their health behaviors and wellness goals.

- As pilot programs were expanded to broader employee populations, early adopters began to internalize the benefits of participation. They appreciated individualized feedback, noticed changes in their own health status, and were empowered to set and strive for personalized health goals. Company-provided incentives remained appreciated, but became less important.

- When wellness programs were rolled out on a company-wide basis, an important cultural change took place both in the family and in the workplace. Individuals sought out or created "health communities" wherein like-minded persons shared plans, goals, and enthusiasm for health-maintaining lifestyle changes. At home, wellness monitoring habits cascaded to other family members (typically spouses) with little or no incremental costs, resulting in a broadening of health management within families and further savings in health benefits costs for employers.

- Initial concerns about privacy and confidentiality were allayed as employees learned they were in complete control over how and where their data were shared, and that earlier security deficiencies in the industry had been remedied by a thoughtful strategic framework of standards for safeguarding personal information.

- Over time, employers observed that technology-enabled wellness had transformed passive, disease-trending populations into engaged, individual managers of personal health. As never before, employees understood that their daily health habits mattered, and were enabled to act on that understanding.

How Forward-Thinking HR Executives Made this Transition Happen

From an historical perspective, it is important to capture the specific actions that forward-thinking executives took to start America and other nations on a new path to health:

- As the health economic burden threatened the very existence of corporations large and small, HR executives actively sought innovative solutions. They kept abreast of technology advances as well as new thinking about health and wellness by participating in industry initiatives such as the Continua Health Alliance.

- HR executives realized that the goal of proactive employee health enabled by connected wellness programs was attainable via affordable, feasible initiatives. They carried this new learning to their CEOs, CFOs and their colleagues.

- HR executives designed and implemented pilot projects by augmenting existing HPM programs incrementally with connected personal health monitoring. They took advantage of support, education, and advice offered from the Continua Health Alliance and its members.

- Using education, incentives, and promotion, HR executives nurtured employee participation and acceptance in pilot wellness initiatives. Corporate wellness programs were designed with employee participation up front, and had the clear purpose of providing primary health benefits to individuals and their families.

- HR executives assured that optimal use of health technology included user-friendly devices and interfaces, complete employee control over personal health information, state-of-the-art security systems and confidentiality policies, and overabundant levels of technical support.

- As the pilot studies demonstrated ROI and benefits based on objective health status metrics, HR executives shared these results at the corporate board level and championed broader role out of such initiatives in national and international forums.

Conclusions

In a period of four decades near the turn of the 21st century, a societal-scale change in health attitudes and behaviors began to take hold. Health cost pressures acting at personal, corporate, national, and international levels set the stage for this transition. New understandings arose that unhealthy, but modifiable behaviors were by far the major cause of premature chronic disease. Empirical research demonstrated the high value of early intervention and conversely, the staggering costs of postponing intervention until disease symptoms were manifest. In a significant breakthrough, the focus of health intervention was expanded to include maintaining wellness in the general population.

At this critical juncture, an alliance of leading health and technology companies foresaw the need to establish and promote the connectivity and interoperability that would allow information to be exchanged securely and efficiently in a distributed, personalized, health environment. There emerged a connected ecosystem of biometric devices, integrated mobile personal sensors, and personal health data repositories. This system formed the foundation for a connected wellness solution that allowed health and productivity management programs to be re-designed around the concept of proactive, personalized individual wellness. No longer was the responsibility for health care relegated to a handful of medical specialists attempting to treat diseases across a population. No longer were modern populations passive recipients of bad health. Instead, these new integrated technologies enabled every individual to make healthy lifestyle choices on a daily basis.

Human resource executives saw this opportunity clearly and stepped into a leadership role. They understood that connected health technologies could uniquely enable the best practices of behavioral science in supporting sustained lifestyle change on a path to employee health. They realized that technology would provide the cognitive link between individual behavior and personal physiology and for the first time, give employees the ability to sense, track, and redirect their own health futures. These corporate leaders designed and implemented early connected wellness initiatives, forged from a thoughtful blend of incentives, technology, and employee involvement.

The dramatic success of pilot wellness programs initiated by these innovators drove widespread adoption and a wave of change, as health systems around the world recognized the clear value proposition. Technology-enabled core wellness solutions were offered to communities around the world, and could be effectively adopted by individuals regardless of gender, age, culture, or geography. Connected wellness formed a flexible, universal core health solution – a proven health engine that could be tailored by each individual, while being rolled out by corporations across the nation and the world. The challenge of poor health behaviors – a virtual plague that had daunted health systems across the globe – was met. Connected personal health solutions led world communities on a new path to health, one person at a time.

Acknowledgements

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