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The Emergence of Distance Health Technologies

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ABSTRACT

Removing the geographic barriers to health care and extending care to the home has been the goal of the health-care system for decades as the introduction of new information technology capabilities has driven operational efficiencies in our daily lives. Patient demand for convenience and access continues to surge as these technologies are used for their personal lives. Coupled with the need to lower our health-care cost structure, distance health technologies are emerging as a care facilitator for our arthroplasty patients. A critical aspect of introducing distance health technologies is the requirement to define the entire episode of care. Once defined, metrics to assess success can be measured, and clinical and technical outcomes can be determined. Distance health technologies are emerging in the management of the arthroplasty episode of care through the preponderance of connectivity coupled with the adoption of mobile technologies, ushering in a new era of improved efficiency, efficacy, satisfaction, and outcomes while providing greater value for our patients.

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The emergence of distance health technologies as a care modality for our arthroplasty patients has become a reality in 2018 [1]. Extending the healthcare environment to the patient's home has been a goal for decades. Over the years, the barriers for making this possible on a grand scale have impeded progress. Whether it was reimbursement and payment strategies, technology platforms, devices, security, or clinician workflow and incentives, distance health has resided just out of health care's tight grasp and standard of care for many years. In the interim, we have witnessed many years of trials, experiments, and modest growth in distance health while the barriers are being addressed. Doctors, employers, insurers, government leaders, and innovators have been gradually removing demographic, logistical, financial, regulatory, and

technological barriers. Meanwhile patient demand continues to surge as the technologies are used for their personal lives.

The most important contributors to progress are the mobile technologies and the preponderance of connectivity. More people are connected now than ever before with over 80% of Americans owning smartphones [2] and nearly 75% have broadband service [3]. The demand for distance health now has the global infrastructure to support and accelerate it. Hospitals are also getting ready for the new technologies. Ninety percent of healthcare executives reported to have or are currently building a telehealth program [4]. Over 7 million patient users are predicted in 2018, a 19-fold increase from 2013 [5]. New technologies are being applied to existing care processes. Greater than 19 million patients are projected to use remote monitoring devices that record and report monitoring information to their doctors in 2018 [6]. Platforms are also being developed that enable interaction between clinicians around the world. After years of experiments and modest growth, momentum is building to establish distance health as a widely accepted standard of care.

Remote, digital, and distance health technologies (or "telehealth") encompass a group of technologies and services that enable care for those patients who are not physically colocated in time or space with the services and the professionals providing care

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for them or other clinicians providing care for them. In 2018, these forces have converged to change the way patients expect and demand their care and the way in which clinicians provide care for their patients. For those patients who are challenged to travel any distance for their health care, including postoperative arthroplasty patients, these distance health technologies are enabling the physically infirm as they can remove the impediments to their care. Removing the geographic barriers to care can provide more efficient, timelier, and more optimal outcomes while also leading to significant cost savings. The role of this communication is to describe the emergence of distance health technologies in the care of our arthroplasty patients.

Distance health technologies have been evolving for many years as advances in information and communication services have been introduced and applied to various healthcare scenarios. The critical stage for adoption has been reached as the technologies, regulatory, and financial considerations are becoming more permissive for main stream implementation. A revolution is underway in our patient care models as we usher in a new era of improved efficiency, improved efficacy, and hopefully improved outcomes at a lower cost and increased value [7]. Distance health technologies have the capability to help us achieve these goals, and the trends in the adoption and utilization of these technologies will increasingly impact our arthroplasty practices over the coming years [8]. However, distance health technologies can only be effectively applied when the underlying processes are well designed and appropriately controlled [9]. Our arthroplasty care processes must be rationally designed and applied before distance health technologies can provide the desired benefits [9,10].

We are actually in the midst of 2 revolutions simultaneously: clinical care and distance health technologies. Over the past 6 decades, we have witnessed a digital revolution that started with the introduction of the transistor and led to computers, the Internet, the World Wide Web to mobile communications and computing

[11]. The migration from analog to digital devices has forever changed the way we perform our daily activities. The emergence of distance health technologies is here today because we have seen an evolution with small adaptations developing which increase the ability of the organism or the person or an organization to compete to survive and to thrive amidst the competitive forces and threats to its survival [12]. Adoption of these changes permits the survival of the one most organized around the response to the challenges being experienced. In order to survive as arthroplasty surgeons, we must develop an episode of care and have active management of this episode of care for our patients. This episode of care management includes descriptions of the care continuum and all of the metrics that would help us understand whether we have been successful in our endeavor. Only then can we examine what is in our distance health technology inventory. So we begin first with an examination of what the future may hold in the midst of this telehealth evolution or revolution. Removing the geographic barriers to care is quickly becoming the norm during this digital and care revolution.

Technologies have evolved to provide even more function and more features for the user and a better return on investment for those who produce them. The telephone originated with a simple point-to-point communication service over a couple of wires [13]. Through the advent of early analog and then digital technologies, we have gone from the rotary dial to the touch tone system, then to briefcase-size mobile phones, and we now have technologies being held in our hand that have computing power that exceeds a building full of the older technologies. Current mobile devices, thanks in large part to the genius of Steve Jobs, are handheld, have the ability to communicate, access data, and analyze and control devices remotely irrespective of physical location. This anywhere, anytime culture has become the norm (Fig. 1).

The iPhone (Apple) was introduced less than a decade ago and its touch screen has revolutionized the way in which we

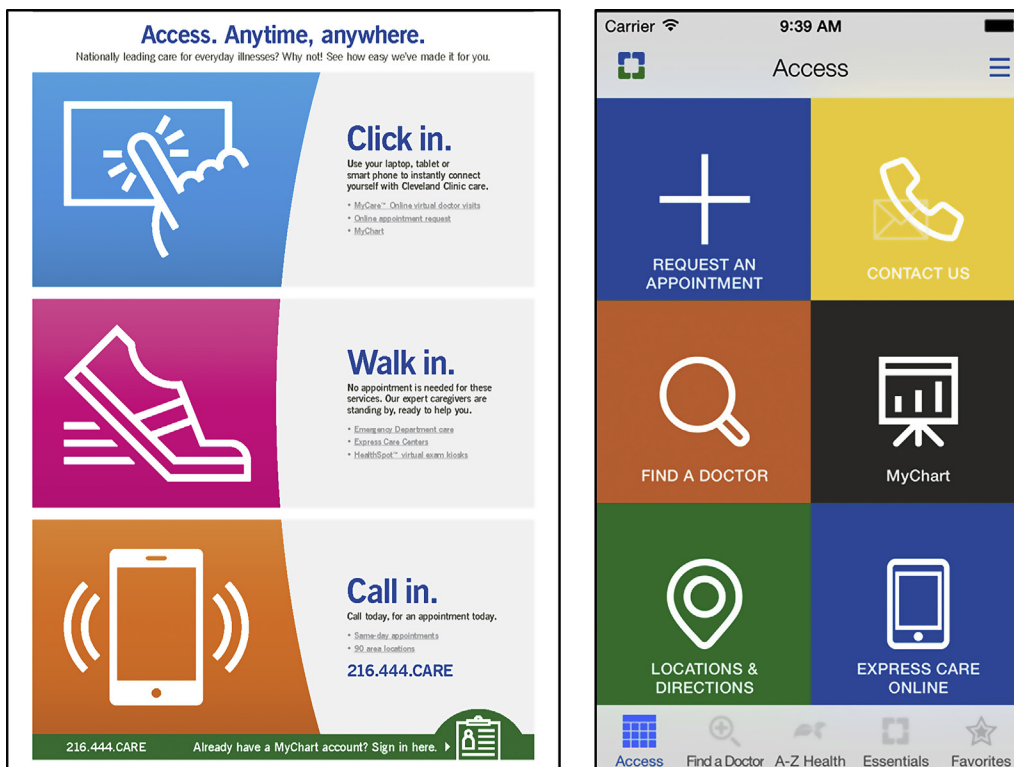


Fig. 1. Consumer and patient portals for mobile phones.

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