



# Technology, Population Health, and Human Wellness

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## 1 Progress and Promise over a Half-Century

It has been more than a half-century since Dr. Lawrence Weed published his landmark paper ‘Medical Records that Guide and Teach’ in the March 14, 1968, issue of the *New England Journal of Medicine*. His insight—that technology could bring order to the sometimes overwhelming and chaotic world of medical practice—gave birth to the world’s first Electronic Medical Records<sup>1</sup>.

For two generations now, physicians and technologists have built on that vision, but only in the last decade has the medical community begun to appreciate three essential facets of healthcare and healthcare IT. This paper will examine each of the three in turn, illustrating ways in which physicians have and can continue to reshape their thinking about the electronic health record (EHR).

The EHR is a digital version of a patient’s traditional paper medical chart, containing patient histories and demographics, medications, treatment plans, and lab results. The best of today’s EHRs do still more: They connect physicians to networks of patient data, manage communications, and employ analytics to deepen understanding of the health of populations.

State-of-the-art EHRs add value because they provide physicians with tools to analyze cohorts of patients, identify those with common needs, and guide care efforts to target those patients most in need and most likely to benefit from interventions.

Moreover, the best EHRs on the market today also serve to minimize the risks of physician burnout by reducing clicks, making documentation easier, and integrating with interoperability networks to ensure that doctors have access to complete patient data, on demand and at the point of care.

Let us examine three aspects of healthcare that follow naturally from the power of today’s advanced EHRs:

- **I: Population health is central** to addressing the healthcare challenges of the future
- **II: The full power of the EHR** must be employed to best impact patient outcomes
- **III: Patients must be empowered** as full partners in a shared healthcare journey

## 2 Why Population Health is Central

A 2015 survey conducted by the Milken Institute School of Public Health at The George Washington University defined population health as “an opportunity for health care systems, agencies and organizations to work together in order to improve the health outcomes of the communities they serve”<sup>2</sup>.

Population health can be thought of as a set of tools and techniques for achieving broader public health goals. Public health agencies are concerned with big-picture matters such as sanitation, vaccination rates, and controlling disease outbreaks. Population health, while sharing many public health goals, brings together public and private agencies, data analysis, and the power of EHRs to identify patterns and develop proactive strategies for improving the health of a given set of patients or an entire community.

Three key questions guide population health efforts:

- How can the application of technology, including analytics, not only improve care quality but create an entirely new model of care?
- How can a fully integrated EHR improve follow-up and patient satisfaction to build strong, two-way engagement?
- How can technology be used to achieve the first two objectives more efficiently?

### 2.1 Step 1: Understanding the New Care Model

Today, industry-leading EHRs allow doctors to recall and analyze data more quickly and in

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greater quantities than any paper-based system. An integrated EHR brings together questionnaires, lab tests, observations, and progress notes.

The initial patient encounter is measured from first contact through proper follow-up, but is only the beginning of the care process. What appears to be a closed-loop system turns out to be a semi-open one to which new information is constantly being added.

Moreover, telemedicine can now create a second cycle of care in which the visit takes place in the comfort of the patient's home, allowing for more frequent interaction and emphasizing preventive medicine throughout the year.

## **2.2 Step 2: Building Two-Way Engagement**

The management of chronic conditions illustrates how doctors can strengthen engagement. Such illness can be managed from one office visit to the next, but management may be more effective with wearable devices that permit remote patient monitoring.

A 2018 analysis published in *NPJ Digital Medicine* “found that remote patient monitoring showed early promise in improving outcomes for patients with select conditions, including obstructive pulmonary disease, Parkinson's disease, hypertension, and low back pain<sup>3</sup>.”

## **2.3 Step 3: Achieving Care and Engagement More Efficiently**

The third step in placing population health at the center of modern healthcare arises from a simple question: How do we achieve better care outcomes and strengthen patient engagement more efficiently?

The answer lies not in working harder, but in working smarter—and leads directly to core population health principles. As doctors use healthcare IT to better understand individual patients, they realize they can intervene on behalf of all patients who share common conditions.

When properly integrated and equipped to take advantage of EHR big data and artificial intelligence, an EHR can help physicians move from the particular to the general, analyze the efficacy of their interventions, and offer positive feedback that enhances overall performance. Population health tools can do still more, allowing doctors to manage patients with chronic illness, evaluate and stratify risk, predict the

likelihood of hospitalizations, and manage patients moving among care settings.

## **3 Realizing the Full Power of the EHR**

Having sketched a working definition of population health, we turn to the second of the fundamental facets and ask: How medical practitioners make full use of the EHR?

### **3.1 Complexity and Data in Healthcare**

The exponential growth in the complexity and volume of patient data has led physicians to conclude that the only ally in the fight to tame technology is more technology.

In healthcare today, there are simply too many data points for even the most gifted physician to evaluate on their own. If doctors cannot discern what is most significant in the patient record, they might waste time and resources replicating previous work, order unnecessary tests, or miss a diagnosis.

### **3.2 Data Proves its Worth**

Lingering opposition to technology has evaporated as physicians and office staff have witnessed the power of healthcare IT.

A drug recall, for example, used to take days or weeks to communicate via phone, fax, and email. With today's messaging software, the EHR can identify all patients and practices impacted by a recall, generate a report, and reach each of them using a variety of modalities, including email, text, and app and portal notifications.

Such speed and efficiency are critical for reducing the possibility of medical errors and patient harm.

And while every physician has witnessed the power of analytics to extend their diagnostic and management capabilities for patients with chronic conditions, they also understand that software is intended to enhance rather than replace human judgment in the art of medicine<sup>4</sup>.

### **3.3 Improving Care with Greater Cost Efficiency**

But technology does come with a caveat, one outlined in a 2013 article in *MIT Technology Review*, in which economist Jonathan Gruber

warned that “In health care, new technology makes things better, but more expensive”<sup>5</sup>.

The key challenge in maximizing the power of the EHR, then, consists in finding ways to leverage the technology *while controlling costs*.

The following cases illustrate how healthcare IT can be leveraged to achieve public health and population health goals.

## 4 Case in Point

### 4.1 New York City: Primary Care Information Project

In 2007, the New York City Department of Health and Mental Hygiene launched an EHR initiative as part of the city’s Primary Care Information Project (PCIP).

Involving a coalition of community health organizations and more than 3,200 physicians, PCIP aimed to support health goals related to prevention and primary care, including:

- Facilitating connections between communities and clinical resources.
- Educating physicians on the adoption and use of information systems.
- Adapting data and health information to facilitate improvements in patient care.
- Translating federal, state, and local policies and programs into actions.

### 4.2 Better Health in the Big Apple

New York City’s PCIP is a textbook example of how Electronic Health Records, in combination with provider and patient education, could make a major difference in the health of a community.

According to the office of then New York City Mayor Michael R. Bloomberg:

- Between 2008 and 2011, the number of preventive care services that participating doctors provided grew, on average, by about 290%<sup>6</sup>.
- The use of EHR technology led to improvements in detecting certain preventable health problems, including high blood pressure, tobacco use, high cholesterol, and diabetes<sup>6</sup>.
- An additional 81,000 patients improved their diabetes management, 96,000 New Yorkers got help controlling high blood pressure, and 58,000 people received assistance in quitting smoking<sup>6</sup>.

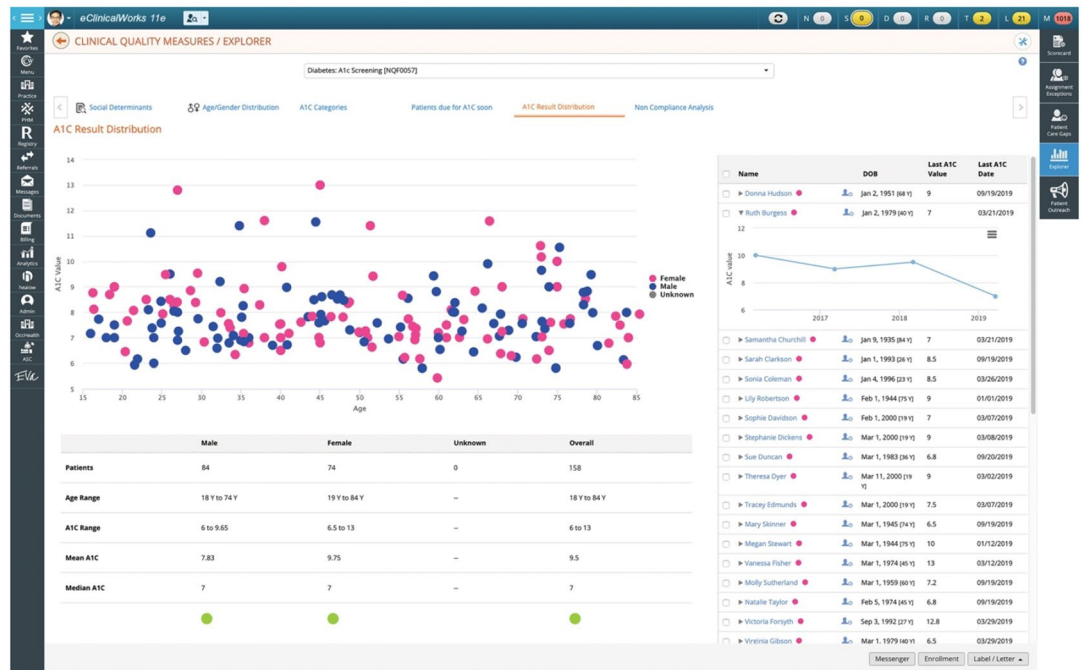
The NYC Hub Population Health System (Hub) was built to create those closed-loop networks discussed above, making it easier to analyze the quality of care across one of the world’s largest and most diverse cities.

### 4.3 Quality Measures for Population Health

As noted in the *Journal of the American Medical Informatics Association*, the PCIP was centered squarely on population health<sup>7</sup>.

The PCIP identified more than 30 quality measures, beginning with access to care. The project identified areas of the city with high body-mass index (BMI) values, suggesting an elevated risk for diabetes, heart disease, and stroke. And the project was able to correlate such areas with a lack of access to high-quality food, including fresh vegetables.

“Given the geographic component of these queries,” Michael D. Buck and colleagues wrote, “these EHR datasets can be linked to other Geographical Information System (GIS) data like air quality and census socioeconomic information to give a more complete picture of health issues and disparities throughout NYC.”



Integrated analytics in the eClinicalWorks® EHR yield reports such as this one showing

Integrated analytics in the eClinicalWorks® EHR yield reports such as this one showing distributions of hemoglobin A1c values, helping alert providers to which of their patients are at risk for diabetes.

## 5 Case in Point

### 5.1 Commonwealth of The Bahamas: National Health Insurance Authority

In The Bahamas, the country has launched an ambitious program to address population health challenges in which the medical conditions are familiar, but the geography demands a different approach from that of a major urban area. The 385,000 residents of the Bahamas live on about 30 inhabited islands in an archipelago of some 700 islands and cays spread over 500 miles of the Atlantic Ocean in an area east of Florida.

In 2016, the National Health Insurance Authority (NHIA) was established to address several issues:

- The Bahamas' current healthcare system is fragmented, meaning services are often duplicated, leading to waste and inefficiency<sup>8</sup>.
- Even in 2020, approximately 50% of Bahamians are uninsured, while 20% are covered by the NHI and 30% have private insurance<sup>9</sup>.

- The nation has seen a sharp increase in diabetes, present in 13.9% of the population, and a death rate attributable to diabetes of 37.9 deaths per 100,000 people<sup>10</sup>.

The NHIA is leading the nation toward a universal healthcare system that promises higher quality, affordability, and more financially sustainable health services and health insurance for all Bahamians.

### 5.2 Telemedicine Working, Broader Rollout Ahead

Although the EHR program in The Bahamas NHIA is ongoing, the early reports suggest the program is working as intended.

It has been interesting to see how residents of areas of the Bahamas that previously lacked any access to healthcare—and where it would be impractical and not cost-effective to open a facility—are now able to obtain services through telemedicine.

## 6 Patients Must be Empowered

Having established the centrality of population health and having illustrated how the use of technology can be maximized to achieve health goals in diverse settings, we now address the third of

our healthcare facets—the need to empower patients in their own care.

### 6.1 Going Beyond a Login

Establishing a strong bond between the healthcare provider and the patient is at the heart of medicine, but engagement is about more than providing patients with an app and a login or enabling them to access records through a portal. It requires outreach and education through multiple channels to build the understanding that health is a shared journey.

The advantage that today's doctors and patients enjoy is that technology—including wearable health devices and telemedicine—is putting access to healthcare within the reach of an ever-growing percentage of healthcare consumers.

### 6.2 How Telemedicine is Empowering Everyone

In response to the Covid-19 pandemic, many physicians have increased their use of telemedicine or adopted it for the first time. As a result, they realized that telemedicine can be used not only for routine primary care, but also

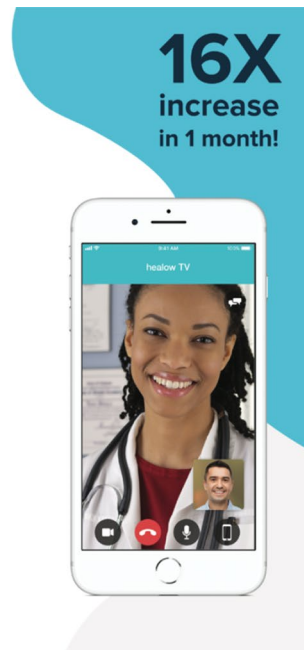
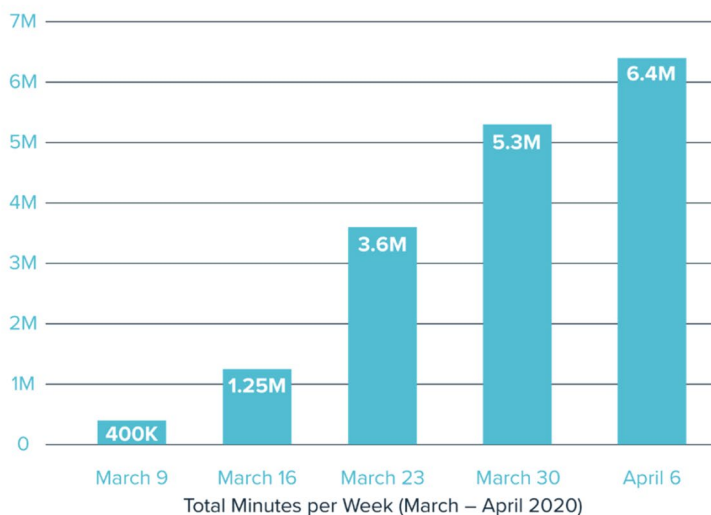
for specialties covering diagnoses, wound care, consultations, and pre- and post-operative assessments.

The value of remote care is particularly evident in behavioral and mental health<sup>11</sup>. Often, patients do not feel comfortable coming to a clinic or may lack the time to do so. Telemedicine is breaking down barriers of time and distance and removing the stigma often attached to mental health services. Many medical providers, including therapists, report that telemedicine has led to more meaningful and insightful visits.

Moreover, patients increasingly expect their doctors to offer telemedicine. That expectation grew in response to Covid-19 but makes sense independently of the pandemic. Healthcare consumers recognize that telemedicine can extend care to remote and underserved communities, as well as to individuals for whom time and mobility may be issues.

As one recent analysis concluded, “Telemedicine is still an integral step in the right direction as medical practitioners are deploying innovative approaches to manage the COVID-19 situation.”<sup>12</sup>

## eClinicalWorks healow Health and Online Wellness healow TeleVisits™ Utilization



In a one-month period in March to April 2020, eClinicalWorks saw a 16-fold increase in the use of healow TeleVisits among physicians seeking ways to limit the spread of illness while continuing to provide care to patients.

### 6.3 The role of Wearables

Wearable health devices, including fitness trackers and blood glucose monitors, also have enormous potential to strengthen patient engagement.

As referenced above [3], the ability to link such devices to an EHR gives physicians unparalleled insight into the day-to-day health of patients and an early warning system that can indicate when a medical intervention is needed.

A July 2019 study found that while adoption of wearable health devices “has lagged when compared to other well-established durable technology products, such as smartphones and tablets”, potential benefits will be more fully realized “when consumers have strong and positive intentions to adopt wearable healthcare technology”.<sup>13</sup>

### 6.4 Summary: The Impacts of a Pandemic in a Changing World

Finally, it is important to recognize the unexpected beneficial impacts of Covid-19. To be sure, the pandemic has taken an enormous toll on human life and caused serious economic loss worldwide. But it has also had three discernible impacts on healthcare that, understood in the context of population health, may point the way to a better future for all.

### 6.5 A Catalyst for Technology Adoption

First, the pandemic sped adoption of key technologies that have the potential to address longstanding and seemingly insoluble challenges in healthcare. Healthcare IT is finally beginning to cut across national boundaries as well as boundaries of race, nationality, gender, and class.

Telemedicine is perhaps the most visible of these trends. The greatly enhanced role remote visits now play in the U.S. market is likely to be confirmed by legal and regulatory actions as lawmakers and policy makers recognize their value for improving healthcare access, equity, and affordability.

### 6.6 Better Preparation for the Future

Second, the changes include a better understanding of both the strengths and weaknesses of medical systems. While public health experts have long warned of the potential for such a pandemic, the reality of this crisis has driven that message home.

In a general sense, the events of 2020 have underscored the need to improve the capacity and resilience of health systems. More specifically, they have placed population health in the spotlight, illustrating the value of big data, analytics, and artificial intelligence to identify emerging crises and take steps to reduce their impact.

### 6.7 Toward a New Understanding of ROI

Finally, the combination of emerging technologies, population health tools, and a renewed appreciation of the importance of engaging patients is demonstrating, with real results, the meaning of return on investment to the healthcare community.

Physicians and patients are coming to understand that technology’s impact on human health cannot be expressed solely or completely through a spreadsheet or a bottom line. It is coming to be understood in human terms, in the quality of care we offer and the impact that care has on both individual wellness and the good of society.

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