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## Health information technology: A key ingredient of the patient experience

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### Abstract

In this exploration to understand the linkages of health information technology (HIT) and patient experience, a comprehensive literature search was conducted using the key words, “information technology, HIT, patient experience, patient satisfaction, and technology”, on the MEDLINE, PubMed, and EMBASE databases resulting in over 1,000 citations. Eventually, 35 of the most relevant articles were reviewed and 11 identified as key references to include in beginning to explore the question, as the transformation of healthcare continues, how can technology enable a positive return on investment to a patients’ perception of their care in an organization and how can technology impact the patient experience? The results reveal there is in fact more questions than answers that exists and therefore further opportunities for exploration and research are encouraged. That noted, the literature and examples emerging in practices across healthcare are showing that technology and the patient experience are moving closer to one another as each day passes. HIT is truly evolving as a key ingredient in the patient experience conversation.

### Keywords

Health information technology, HIT, patient experience, enabling technology

### Introduction

On March 23, 2010, President Barack Obama signed into law the Affordable Care Act (ACA), which encompasses the ambitions of improving the quality of healthcare, reducing costs, and improving access to health care services. Within the landmark bill, healthcare providers are expected to achieve the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) measures, a standardized national survey used to collect and measure patients’ perceptions of their hospital experience. As part of the ACA, the government’s Value Based-Purchasing (VBP) program utilizes data from the HCAHPS to calculate and define a hospital’s incentive based payments.

Developed by the Agency for Healthcare Research and Quality (AHRQ) in partnership with the Centers for Medicare & Medicaid in 2002, HCAHPS measures have become a key driver in patient experience initiatives across the United States. As a result, health information technology (HIT) has been considered a key element in improving the patients’ perceptions, this is accomplished by improving the legibility and accessibility of information amongst caregivers, as well as, providing prompt access to past medical records.<sup>1</sup> Increasing interest of HIT was generated when the Institute of Medicine in 2001 published the report, *Crossing the Quality Chasm*, where authors of the report mentioned HIT and the critical role it will play in the design of health care systems.<sup>2</sup> Since then, various government agencies and healthcare

associations have publicized that HIT reduces redundant data collection and enhances communication amongst caregivers.<sup>3</sup> This has led many to believe that information technology can play a role in improving a patients’ health care experience and thus, positioning patient experience in the forefront of healthcare transformation and HIT strategies and investments.

Despite the definition differences of health information technology, for the purposes of this paper, HIT will be defined as technologies used by healthcare provider organizations in the patient care setting.<sup>4</sup> These technologies include: computers, mobile devices, software, and various communication devices. It is recognized that patient care/clinical equipment, such as a magnetic resonance imaging (MRI) machine may have impact on the patient experience and improve the patient’s perception of their healthcare provider; however, for the purposes of this paper, those technologies were excluded.

As the ACA and VBP program mature, healthcare organizations will cautiously transform from the traditional fee-for-service model to a pay for performance (or total value) cost structure. However healthcare organizations cannot wait, as VBP rewards acute-care hospitals for the quality of care they give to Medicare patients by offering the hospitals incentive payments. Hospitals will be rewarded based on how closely they follow the best clinical practices and how well they enhance the patient’s experience of care as reported by their HCAHPS score.

A comprehensive electronic search using key words, “information technology, HIT, patient experience, patient satisfaction, and technology”, on the MEDLINE, PubMed, and EMBASE databases resulted in over 1,000 citations. Eventually, 35 articles were scanned and 11 were identified as key references to include in the literature review. As the transformation of healthcare continues, how can technology enable a positive return on investment to a patients’ perception of their care in an organization? Which technologies will likely influence the patients’ experience and ultimately rate the organization high as defined by “likelihood to recommend” question on the HCAHPS survey? This literature review will explore the utilization of health information technology (HIT) and accompanying strategies by healthcare organizations to impact the patient experience.

### Review of the Literature

Health information technology’s impact on patient experience is categorized into four subgroups: first, quality, communication, and safety; second, technology tools; third, technology as an enabler; and finally, the electronic health record (EHR) and access. It is important to note, that these categories are not the only categories and should not be considered a common distinction.

#### Quality, Communication and Safety

Connecting patient safety and quality was highlighted by King et al, where it was discovered that 30% of physicians believed that the use of an EHR improved communication between the patients. An EHR aided the physician in alerting of a potential medication error (65%), critical lab values (62%), and well as essential screening or preventative care measures 47% of the time.<sup>3</sup> In 2014, Feeley, Sledge, Levit, and Ganz, presented their findings of the implementation of a learning healthcare IT system to improve the quality of cancer care.<sup>5</sup> Combating the perpetual introduction of new therapies in genomics, proteomics, molecular testing, and pharmacology, clinicians in the treatment of cancer are challenged to stay current with new research. Since the first cancer care assessment of quality in 1999, the adoption of IT has been at a crawl and tried with such systems as the American Society of Clinical Oncology’s CancerLinQ and Kaiser Permanente’s Healthconnect to link clinicians to an expansion network. Feeley et al’s perspective highlights the Institute of Medicine’s report on *Delivering High Quality Cancer Care: Charting a New Course for a System in Crisis*, and recommends that a system be developed that provides real-time analytics of cancer patients across the care continuum.<sup>5</sup>

While the adoption of EHRs improves the accessibility of the patient’ record to all caregivers at any time, communication amongst caregivers can greatly impact the patient experience according to Lorenzi, describing the

benefits of communication systems already in use at healthcare organizations. Communication systems that interface with the EHR, patient monitors, and critical systems are empowering caregivers to be more productive and effective in the healthcare setting. Integrating the nurse call system with the EHR, monitors, bed alarms, and patient care applications provides the caregiver with the right information to perform quality nursing care.<sup>6</sup>

At Mercy Gilbert Medical Center in Gilbert, Arizona, they implemented iCareChat in the maternity rooms using web-cameras to enable the ability for patients to interact with family members and friends. Results of the adoption of iCareChat, improved the patients’ overall experience in a competitive marketplace.<sup>7</sup>

Despite opposing views on the true value of the relationship between patient experience and patient quality, this gap will decrease as HIT adoption continues. Policy makers and patients continue to see a connection between patients’ outcomes and the patient’s perceptions of their care.<sup>8</sup> Perhaps in efforts to validate the correlation between HIT and patient satisfaction, law makers could adopt the adaptive neuro-fuzzy inference system (ANFIS) methodology as applied by Roham, Gabrielyan, & Archer to reach such conclusions where it was discovered that patient satisfaction is a result of the quality of healthcare.<sup>9</sup>

#### Technology Tools

From wearable devices to electronic access to your medical record, technology tools in the healthcare industry have reached the patient’s home. As patient’s transform to consumer-focused interactions with their healthcare providers, access and convenience will differentiate the market.<sup>10</sup> Driven by the need for convenience, healthcare providers will be stressed to focus their HIT on delivering value. Leveraging the use of various technologies that have long been in place by other industries, such as registration kiosks and online payment, healthcare providers will need to budget accordingly to meet these new demands.<sup>10</sup> Integration of communication systems can direct specific alerts and patient requests to assigned nurses and escalate unanswered alarms when necessary with the nurse call system technology. Making the systems intuitive and interactive with have a direct impact of patient satisfaction scores.<sup>6</sup>

Healthcare providers will find that adoption of technologies will become a market differentiator in the future and necessary. Technologies that directly connect the healthcare provider with the patient, known as interactive technologies will provide a virtual visit in true interaction form. Hospitals are already putting into use the ability to push patient education videos and information into the patient’s home through the EHR and patient portals. At Banner Good Samaritan Medical Center, a noise reduction initiative to increase HCAHPS scores was

implemented and patients were able to alert nursing staff if too much noise was occurring outside their room through a call-button type feature on the bed. As a result, HCAHPS scores at Banner Good Samaritan Medical Center increased from 64.2% to 73.3%.<sup>7</sup>

In certain cases, it appears the literature on technologies with a direct impact on patient satisfaction scores has been funded or published directly by software and technology companies. However, the use of such technologies as electronic way finding, electronic check in, Wi-Fi, and a cellular distributed antenna system (DAS) are gaining attention as true contributors to improving the patient experience.

### Technology as an Enabler

At The Ohio State University Medical Center (OSUMC), a data-driven approach was essential in improving the patient experience. Based on a data driven model, OSUMC focused on two strategies, nurse rounding and patient discharge calls to generate significant improvements in patient experience. Leveraging the use of HIT to sustain and hardwire the strategies, OSUMC experienced an increase of 15% of a few years of their patient experience scores.<sup>11</sup>

Ball, Garets, & Handler argued that the use of computerized applications for physician ordering and alerting are enablers to positively impacting patient quality and building a culture of safety. Combating the number of medical errors in the US, and the Institute of Medicine's report that medical errors are the 8<sup>th</sup> leading cause of death.<sup>12</sup>

### Electronic Medical Records & Access

"Where is the patient chart?" was a common phrase in hospitals twenty years ago. Now, healthcare organizations can have multiple care givers accessing a patient's medical record from virtually anywhere that internet access is available.<sup>9</sup> When the paper-based documentation system was used, the chart was not readily available resulting in the patient repeating themselves or reminding the care provider of pertinent information.

According to HealthIT.gov, the average cost to implement an EHR is estimated to cost between \$15,000 to \$70,000 per healthcare provider. Thus a 500-bed hospital with 400 physicians is estimated to cost \$50m to implement plus an on-going approximate cost of \$10m of operating expense.<sup>13</sup>

Restuccia et al discovered a relationship between the adoption of HIT and quality, showing hospitals with an 85.23% adoption to HIT adherence resulting in the highest quality scores.<sup>1</sup> Although the survey data on the organization's HIT adoption was based on the data from quality managers in the respective organizations, Restuccia

et al show that HIT are key enablers to these strategies.<sup>1</sup> In comparison, a primary care study based on the patient-centered medical home model and the intersection of quality and EHRs was conducted in a prospective cohort study in the Hudson Valley between 2008 and 2010.<sup>14</sup> In this setting, focusing on the care coordination, the EHR plays a significant role to ensure patient information is readily available at all points of the patient's care and treatment. Across 300 practices including 675 physicians, Kern et al revealed that quality improvements were sustainable by the adoption of the EHR.

Further evidence by King et al, analyzed the clinical benefits of EHR use.<sup>3</sup> Based on data from the 2011 National Ambulatory Medical Care Survey Electronic Health Records and the 2001 NAMCS Physician Workflow Survey, 1,793 respondents provide their perceptions of EHR adoption by physicians. It was observed that 78% of physicians surveyed stated that the use of an EHR enhanced the level of care delivered.<sup>3</sup>

Beyond the traditional medical center setting, in western New York, a patient-centered medical home model (PCMH) was being organized to improve quality, lower costs, and improve the patient experience. In order to improve population health in this region, care coordination was critical and it was agreed that HIT would play a major role by implementing an EHR. Successful implementation of the EHR was instrumental in making the clinic setting a welcoming environment and impacting patient experience.<sup>15</sup>

Ensuring that the EHR is as adopted as other clinical applications can greatly impact the patient experience, including: patient registration, records management, and information infrastructure systems. As Roham et al points out, many healthcare providers are still in the early staging of implementing an EHR and if not completely installed can have a negative impact on patient satisfaction metrics (2014, p. 134).<sup>9</sup>

### Discussion

Technology can have soft benefits or indirect benefits to the patient experience yet questions remain if they can have a direct impact on the HCAHPS score. Questions ultimately arise as to whether the costs associated to such technologies outweigh the financial implications of not achieving the HCAHPS measures as part of the VBP.

Technology should not overwhelm that patient and shift the organization's focus from the basic and inexpensive tactics that impact patient care, such as: smiling, regular updates, touch, and nonclinical touch points.

The common denominator in many strategies to improve patient experience is dependent on having the right and

fully executed technology to sustain the objective. Time and time again, the research and articles explored, shared stories of organizations with key ingredients and steps necessary to improve patient experience. These include having senior level support, at the c-suite level and across the executive team, next the organization focuses on one to two key strategies to improve patient care and the patient's perceptions, third, the organization looks to adopt both process improvement principles and technology to sustain the changes necessary to improve. Granted several components although at times bigger or smaller depending on the organization are critical, having the right data, real-time data, accountability, motivation, and excellent planning are critical.

Healthcare organization that have fully deployed and supported organizational strategic imperatives aligned with key drivers, which are essential to patients' perceptions, can improve patient satisfaction scores. It is further improved by the adoption of a well-deployed electronic medical record and active senior leadership support.

As the cost of healthcare skyrockets, making the shift to invest significantly in HIT will be a financial challenge for most organizations. As Feeley et al, "it [HIT] is an investment our nation cannot ignore".<sup>5</sup> Government agencies, including the Centers for Medicare and Medicaid Services and the Department of Health and Human Services will need to find creative ways to support the adoption of HIT.

From the review conducted, it is clear that we are early in exploring the connection between HIT and the patient experience, and additional research is necessary to demonstrate the value that various technologies can have. Has the EHR directly impacted the patient experience? Has the investment in patient portals and open access to their healthcare providers achieved bottom-line financial results? Which technologies have the highest ROI? How do start-up companies and healthcare providers measure and predict the impact to the patient experience when developing a new technology or process? These questions require further investigation if we are to begin building a reliable connection between technology and experience.

## Conclusion

Through the lens of a patient, a healthcare provider's clinical competence may no longer be enough to attract a prospective patient or retain an existing patient. It may be that a patient's experience will be the only factor when selecting a healthcare provider. Thus, by putting the emphasis on a patient's care experience, healthcare providers will see improvements in their own patient satisfaction survey data, HCAHPS, and their bottom-line.

Researching this topic has produced more questions than answers as the topic is rather new and little research has been performed to confidently answer the question. Although most in the profession will agree that HIT can have a positive impact on the patient experience, weighing those benefits against the cost will be challenging. As healthcare organizations are looking to reduce costs, improve quality, and increase patient satisfaction, hospital chief executive officers may have to spend money on technology to achieve all three of those benefits. In the digital age of mobile health, the internet of everything, wearable devices, and consumerism, technology will soon become a common and integrated part of our lives.

We must continue to research and gain understanding of the benefits technology can have on the patient experience. We will also be challenged to work to achieve those benefits while managing the costs so critical to healthcare today. The importance of HIT in enhancing a healthcare provider's effectiveness, image, and quality of care is proving to be one of the most effective methods of transforming the healthcare.

Many healthcare organizations have realized that customer satisfaction is an important competitive differentiator in the marketplace and are leveraging HIT to help address service quality issues to engage, attract, and retain patients.<sup>12</sup> Regardless of the strategies utilized to improve patient satisfaction scores, technology plays a multitude of roles and is an imperative of the healthcare business.<sup>16</sup> When effectively installed and highly-adopted, these technologies will drive bottom-line financial results and high patient satisfaction scores. The challenge will be which ones to adopt first and at what pace. This is about survival and no longer about building the business case. Although potentially disruptive and expensive, HIT is now and will continue to grow as a key ingredient in improving patient experience.

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