

# Informatics and Why It Matters

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*Health informatics provides a communication link between patient data and information and healthcare providers to assure that the right information is provided to the right person at the right time to make the right healthcare decisions.*

## In this chapter you will learn:

- The definition of health informatics
- How informatics helps increase patient care quality and safety while reducing patient care costs
- The interface of health informatics and the electronic health records (EHRs)
- How informatics addresses the Quadruple Aim

## Key Health Informatics Terms

Data, Informatics, Quality, Communication, Health Information Technology for Economic and Clinical Health (HITECH), Information Technology (IT)

### **Consider this!**

*Mike T. is a 54-year-old Ohio native with a 9-year history of chronic sarcoidosis and recent open-heart surgery. After several years of*

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*self-managing his disease, Mike and his wife Pam decided to move to Arizona, hoping the warm climate would relieve his sarcoidosis symptoms. Two months after the move, Mike was admitted to an Arizona ED for chest pain.*

*Upon arrival, Mike was extremely short of breath (SOB), diaphoretic, and having severe chest pain. Obtaining his complex medical history was difficult due to his symptoms, and exacerbated because Pam was out of town and unreachable by ED staff. Mike was able to provide only allergy-related and Ohio hospital information to his nurse, Sara, before he became unresponsive and was intubated.*

*Sara soon discovered the hospitals were not on the same EHR system; therefore, the electronic transfer of medical records could not be done. The interventional cardiologist arrived at Mike's bedside, demanding Mike's cardiac history, stating, "We only have a few minutes to get him to cath lab. I can see the scar from open-heart surgery, but what did he have done? I won't go in there blind!"*

- *What will happen with Mike?*
- *Would his care be different if records were obtained immediately?*

## INTRODUCTION

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The sentinel 2001 publication by the Institute of Medicine (IOM), *Crossing the Quality Chasm: A New Health System for the 21st Century*, addressed issues in healthcare quality, cost, and burden. The report discussed concerns related to overuse and duplication of unnecessary procedures, underuse of procedures deemed to be beneficial, and medical errors resulting in unsafe practices. The report cited six specific aims to improve healthcare, targeting safe, effective, patient-centered approaches to timely, efficient, and equitable care. The IOM published a series of reports addressing healthcare needs, providing a road map to improved patient outcomes. Fundamental points for healthcare improvement were the need to radically change the healthcare system, including increasing patient safety by reducing error, increasing communication efficiency through the quality of a learning health system, transforming the nursing environment to create a better workflow, containing healthcare costs, and facilitating these improvements through information technology. Making this happen would require an educational reset, creating competencies (Chapter 2, Informatics Frameworks and Competencies: What a Nurse Needs to Know) related to training

necessary to move into the digital age and incorporate information technology into bettering patient outcomes.

So what is information technology? Information technology is a systems approach to storing, retrieving, and distributing information using computers. Health information technology (HIT) uses a computerized or EHR, electronic medical record, and public health record (Chapter 6, The Electronic Health Record, Electronic Medical Record, and Personal Health Record). We suggest that *informatics* is the *science* and *study* of information technology and processes, but *health informatics* is the science and study of HIT and processes to improve patient care.

## INFORMATICS AND THE EHR

Electronic communication is a widely accepted form of person-to-person or person-to-group interaction. The world has become a smaller planet due to the usability and speed of global communication devices, including computers and smartphones, wearables, email, and social media platforms. According to the American Health Information Management Association (AHIMA Work Group, 2014), health informatics is the “scientific discipline that is concerned with the cognitive, information-processing, and communication tasks of healthcare practice, education, and research, including the information science and technology to support these tasks” (p. 60). Health informatics can move the American healthcare system toward quality care by enhancing communication between practitioners and patients—increasing the patient-provider dyad by increasing the human-computer interaction. The merging or melding interdisciplinary communications will decrease the healthcare silos and increase a team approach to collaboration to increase patient outcomes. Go team!

### Fast Fact Bytes : : : :

Meaningful use is:

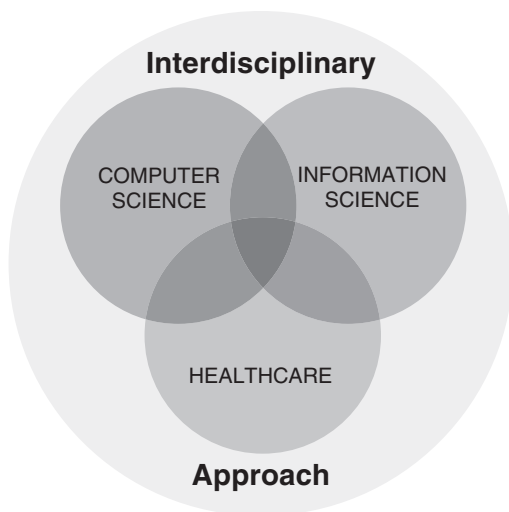
- Using a certified EHR in a way that helps patients and providers, such as e-prescribing
- Ensuring that certified EHRs facilitate electronic health information exchange to improve care (Centers for Disease Control and Prevention, n.d.)

From a healthcare practice perspective, the initiation of EHRs, electronic medication administration records (EMARs), and computerized provider order entry (CPOE) changed the way many nurses and other healthcare providers practice. Laws, such as the Health Information Technology for Economic and Clinical Health (HITECH) Act (a part of the American Recovery and Reinvestment Act of 2009), were put into place to encourage EHR implementation and use of these systems in meaningful ways (U.S. Department of Health & Human Services [HHS], n.d.-a). Electronic access to patient information, provider orders, and clinical decision-making tools via EHRs and EMARs allows bedside and primary care nurses to provide care, administer medications, and connect patients to resources in a safer, more efficient manner (Office of the National Coordinator for Health Information Technology, 2013). The ability for interdisciplinary communication explodes with the use of HIT, making it easier to comprehensively reconcile medications and e-prescribe medications quickly, saving time and money while increasing productivity—not to mention decreasing burden and healthcare costs! The CPOE has made the difficult and dangerous task of interpreting physicians' orders a thing of the past.

## INFORMATICS AND EDUCATION

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Nursing education took steps to incorporate the use of data and information into their curriculums and tying the EHR to patient care. Educators, in the era of the Internet, are moving education to a digital environment not only to assist in spreading the concept of digital learning but also to reach many healthcare providers at all levels of learning. The emphasis on the need to maximize the use of data and information for better patient outcomes is creating greater interest in interdisciplinary conversations surrounding patient care (Figure 1.1). Consider the *Consider this!* case of Mike and how greater access to medical information may have facilitated his care. Nursing access to his previous health records would have expedited his care, allowing for better understanding of what the scar on his chest meant. We are all teachers and learners when it relates to information technology. Pay attention, grasshopper!



**Figure 1.1** Interdisciplinary approach to health informatics.

Source: Lynda R. Hardy. Used with permission.

### Fast Fact Bytes ::::

#### Digital Education

- A meta-analysis of 86 experimental and quasi-experimental studies was completed.
- Almost two-thirds of studies showed digital students did better than traditional students.
- Digital programs were superior to traditional brick-and-mortar learning (Briggs, 2010).

A tsunami of technology-based electronics has come our way. The use of smartphone and tablet applications possesses a multitude of bedside educational resources for healthcare provider and patient use, aiding in administering medications, performing procedures, translating languages, and allowing patients real-time access to their health information. Similarly, online patient education portals, which provide education and house personal health information, allow patients to more actively participate

in self-care. These portals can be accessed via website, and many have mobile apps. There is an app for that! Chapter 9, Digital Health: mHealth, Telehealth, and Wearables, will explain more.

As nursing continues to elevate the profession by increasing educational requirements and encouraging professional development, the need for nursing faculty continues to rise. Online teaching gives flexibility to instructors, increasing the number of faculty available to teach nursing. Online learning management systems foster creative thinking and engage diverse student populations. The tsunami discussed earlier has a greater reach in educating the next generation of informatics educators with the depth and breadth of knowledge to provide sound education at all levels of nursing education.

### Fast Fact Bytes ::::

About 96% of American adults own cellphones with 81% owning smartphones (Pew Research Center, 2019).

Melnyk and Fineout-Overholt (2019) posit patients are multifaceted, requiring nurses of all preparations to be knowledgeable and efficient at generating new research, as well as finding evidence to support practice. PhD nurse scientist researchers and DNP integrators of evidence into practice now have largely unlimited access to the literature at their fingertips. The process of research and evidence exploration has changed significantly, with the publication of nursing research increasing considerably since the advent of electronic databases, online document sharing, professional listservs, and social media communication applications.

Technology operationalizes the research process by heightening the topic specificity and speed when locating literature via electronic categorical searches. Databases with a myriad of research tools, such as the Cumulative Index to Nursing and Allied Health Literature (CINAHL), are huge time-savers when finding appropriate evidence, as well as collecting and analyzing data. Online document-sharing applications, such as Google Docs and Dropbox, have enabled multiple contributors to collaborate more efficiently without constant email lag. Nursing organization-specific listservs allow *intradisciplinary* nursing and *interprofessional* healthcare team members to easily discuss

issues of all kinds, adding to the robustness of subject matter and therefore study design and implementation. Social media communities of practice (CoPs) have empowered nurses to securely exchange practice information, education, and support, leading to clinical expertise in application of evidence-based practice (EBP) and research (Isaacson & Looman, 2017). Technology is constantly evolving, requiring nurse informaticists and nurse educators to continually update nurses about the most current applications available to find evidence, implement change, and improve patient care.

### Fast Fact Bytes ::::

Communities of practice (CoPs) are online support communities made up of practitioners who:

- Share common interests
- Participate in joint activities and discussions
- Share tools and professional experiences (Isaacson & Looman, 2017)

## INFORMATICS AND EVIDENCE

Practice change must be evidence based to be successful and sustainable. According to Melnyk and Fineout-Overholt (2019), patient acuity is increasing, requiring a greater evidence base to provide appropriate care. True EBP requires the inclusion of critical appraisal of systematic approaches, clinical expertise application, and consideration of patient preferences and values. Utilizing informatics within this EBP framework enables exhaustive literature searches, facilitates practitioner collaboration, and collects patient preferences both individually and aggregately.

Performing comprehensive yet rapid and efficient peer-reviewed literature searches is no longer the exception but is now the rule for both researchers and those applying evidence to practice. Informatics provides many tools to aid in these searches. Online access to the literature via filtered scholarly databases and Boolean search terms allows nurses to drill down to the specific topics they wish to explore, decreasing frustration and

encouraging less-experienced researchers and writers to continue their journey toward EBP. Additionally, reference management services such as RefWorks, Write n Cite, and Endnote enable online storage and organization of articles, contributing to an author's ease of access to find information. Informatics also provides numerous ways to compile, format, and present evidence-based ideas, as well as receive the needed feedback to evaluate those ideas and make appropriate changes. Nurse informaticists and nurse educators have an important role in keeping nurses current and competent with available electronic resources that assist with examining large databases of evidence (data mining), to promote application of evidence to practice and thereby improve patient outcomes.

### Fast Fact Bytes ::::

Articles identified as peer-reviewed are:

- Read and approved by groups of experts in that area
- Considered more credible, strengthening the evidence (The Ohio State University, n.d.)

## DIGITAL IMPLICATIONS

The digital revolution has begun—and we are all in it. McKinsey's sentinel article (Manyika et al., 2011) warning of the impact of big data and information technology on healthcare was a shot across the bow, explaining that the tsunami was on its way—but did we listen? “Today's medical professionals are more likely to greet you with an iPad and stylus in hand, rather than a paper folder and pen” (NursesJournal.org, n.d., para. 1). Nurses use desktop and mobile applications to administrate hospitals, manage units, educate staff, and care for patients. A vast number of online clinical healthcare resources, including those associated with evidence-based guidelines developed by professional organizations, government entities, and hospital systems, have been developed to be used by the healthcare team at both the point-of-care and within the C-suite.

Top applications for bedside nurses include those dealing with medication administration, language translation, decision-making tools, procedural guidelines, and assessment. Nurse educators present information to clinical staff via a variety of methods, such



as online learning modules, social media–moderated specialty or organizational specific CoPs, and computer-based annual education. Administrative nurses use many electronic resources to hire and evaluate staff, prepare budgets, determine staff productivity, assess risk, and analyze medical errors. For most nurses, mobile devices and desktop computers are two of their most important clinical tools, creating a direct link from clinical expertise to practice. Today’s students, nurses, and educators are understanding the need to increase their toolkit, including methods to visualize health-related data to better manage nursing workflow and productivity.

### Fast Fact Bytes ::::

Five criteria for appraising websites include the following:

- **Audience:** Whom is the author expecting to view the site?
- **Authority:** Is the author’s name, contact and organizational information listed on the site?
- **Bias:** Is the delivery tone and information presented done impartially?
- **Currency:** Does the site have functioning links and last updated dates given?
- **Scope:** Does information have depth and appropriate citations? (Yale University, n.d.)

Assessing and incorporating patient preferences into practice is perhaps the most important prong in the EBP process. Regardless of what the evidence shows, or the practitioner knows, if the patient’s values do not align with the proposed implementation of research, it will not be successful or sustainable. Educating patients is the first step in practitioner–patient value alignment. Academic databases and professional websites, however, are not the only place to find health information. The endless amount of available online health information can be overwhelming to many and learning to navigate the Internet and appraise the validity of resources is critical for patients (Silver, 2015) as well as nurses. Teaching patients to appropriately search, correctly interpret, and apply online health information as an addition to regular professional medical care is key, creating trust within the nurse–patient relationship, moving it toward value alignment.

Although the rate of application of evidence to practice is slow, researchers and clinicians continue to seek ways to bridge this gap. Informatics removes communication barriers from researcher to clinician to patient, allowing evidence to be integrated into practice. The nurse informaticist is in a prime position to lead the movement of evidence into practice, possessing the knowledge and technical skill set to enhance collaboration among the patient-centered healthcare team.

### Fast Fact Bytes ::::

It takes approximately 17 years to integrate evidence into nursing practice (Committee on Quality Health Care in America, IOM, 2001).

## ADDRESSING THE QUADRUPLE AIM

The IOM publications *To Err Is Human* (Kohn, Corrigan & Donaldson, 2000) and *Crossing the Quality Chasm* (Committee on Quality Health Care in America, IOM, 2001) contain information regarding the alarming rate of medical errors within American healthcare. These sentinel publications warned of the need to modify practice for better patient outcomes, but even now, that rate has continued to climb. Discussions related to the critical need for EBP in healthcare, establishing the STEEEP (safe, timely, effective, efficient, equitable, and patient-centered) guidelines for healthcare redesign, including the need for patient care, encourage a response from healthcare organizations and academic to move traditional nursing approaches to care toward the integration of evidence into nursing education and practice.

### Fast Fact Bytes ::::

#### STEEEP Principles

Care must be **s**afe, **t**imely, **e**ffective, **e**fficient, **e**quitable, and **p**atient centered!

Furthering the EBP-to-healthcare approach, the Triple Aim includes “improving the individual experience of care; improving

the health of populations; and reducing the per capita costs of care for populations” (Berwick, Nolan, & Whittington, 2008, p. 760). It became clear that these added initiative stressors placed on clinicians have taken a toll, making the Triple Aim difficult to attain as well as sustain. The remedy proposed by Bodenheimer and Sinsky (2014) suggested adding a fourth aim: supporting the need to decrease healthcare providers' burdens and make their work lives better. Combining STEEEP principles and Quadruple Aim components with informatics provides a practical framework that nurse informaticists can build on.

### Fast Fact Bytes ::::

People using online portals:

- Possess higher levels of education
- Frequent the use of the Internet (Ancker et al., 2015)

### Quadruple Aim 1

Quadruple Aim 1 addresses individualizing patient care. Informatics professionals work toward this goal through various methods like initiating patient portals for care. These private, protected, patient data repositories allow the interaction and communication of healthcare consumers with healthcare providers, taking advantage of digital connections such as video appointments, remote monitoring, and wellness programs. Portals provide a partnership between patient and provider, decreasing misinformation, lost appointments, and treatment delays. Epic's MyChart® and Cerner's HealtheLife<sup>SM</sup> are two online patient engagement tools utilized today. These programs are individualized to organizations based on branding and options purchased, with patients having the functionality to further personalize their own health record by changing settings and even linking accounts from different facilities.

### Quadruple Aim 2

Aim 2 focuses on bettering population health using STEEEP principles of equitable and timely care. The HHS (1980) issued the Healthy People initiative in 1980, determining priority national

health disparities and action plans to narrow these gaps. The Healthy People 2020 initiative further drills program objectives down into leading health indicators (LHIs) that address the nation's most current critical health issues (HHS, n.d.-b). The Internet has enabled this program, reaching consumers, organizations, healthcare professionals, and students, to guide many with a framework on which to build health promotion initiatives. While Healthy People 2020 names global health as an objective, discussing communicable disease control, other programs such as the World Health Organization's Global Health Initiatives (n.d.) also use informatics to disseminate big data regarding global issues on a country-by-country basis.

### Fast Fact Bytes ::::

The Healthy People 2020 initiative:

- Contains 42 topics with over 1,200 objectives
- Has prioritized these objectives into 26 leading health indicators (LHIs) within 12 topics (HHS, n.d.-b)

### Quadruple Aim 3

The third Quadruple Aim tackles decreasing healthcare costs using the STEEP principles directed toward efficient and effective care. Patient care cost containment is being addressed by every organization within the United States. Informatics is essential in leveraging this goal, allowing facilities to rapidly collect and analyze EHR information, combining the efforts of multiple stakeholders for more rapid consumer involvement. Healthcare practitioners seek out best practice guidelines and benchmark their data against others within their field, creating published standards of care for all to follow and thereby working toward better, safer patient outcomes.

### Quadruple Aim 4

Quadruple Aim 4 supports the need to decrease healthcare worker burden. There is no corresponding STEEEP principle associated with goal 4, but efforts are being made to increase provider health and wellness through workplace improvement processes. The

six elements of a healthy work environment (HWE) for nurses include skilled communication, true collaboration, effective decision making, appropriate staffing, meaningful recognition and authentic leadership (American Association of Critical-Care Nurses, 2016). After 15 years of working toward an HWE, we continue to struggle. However, in recent years, informatics has greatly enhanced all six of these components by creating a multitude of electronic venues to encourage nursing teamwork, assist with bedside and managerial decision-making, and recognize great patient care. The nursing informatics professional is the leader of the electronic nursing environment and is charged with maintaining its health.

### Fast Fact Bytes ::::

Hospital Compare, a website maintained by the Centers for Medicare & Medicaid Services (CMS), allows consumers to compare organizations based on publicly reported data ([www.medicare.gov/hospitalcompare/search.html](http://www.medicare.gov/hospitalcompare/search.html)).

## WHY DOES HEALTH INFORMATICS MATTER?

It matters because it provides the evidence to better patient care through increasing patient safety and quality and decreasing patient care costs and provider burden. Health informatics gives us the data and information we need to increase our knowledge and wisdom as we approach the four critical goals of the Quadruple Aim. The digital ecosystem that incorporates informatics gives healthcare providers rapid ability to determine individual, institutional, and population-based trends with the ability to act faster and with greater precision to ensure adequate responses to healthcare emergencies. Health informatics ensures that we get the right information to the right person and the right time to make the best health-related decisions on current, accurate data.

It matters because without access to real-time data and information, there is no knowledge and wisdom, and our healthcare system depends on providing the right information to the right person at the right time.

## SUMMARY

This chapter introduced the rationale and importance of educating all levels of nursing about the use of data in decision-making. Using data as a road map for patient care provides the right information to the right person at the right time. Data are powerful, and they inform practice! As you continue through this book, keep in mind the lessons taught and the insights provided—*Consider this!*—and if the ED healthcare providers had access to Mike’s previous medical record, they would have known the following:

- He had three major vessels greater than 80% occluded with multiple stents placed.
- He had previous angioplasties where Plavix was not sufficient to maintain coronary artery patency.
- He had allergies to many antibiotics that may be needed to prevent postincident infection.
- His sarcoidosis puts him at high risk for anesthesia.

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