

Health information technology: A new world for pharmacy

Lisa Webster and Rachelle F. Spiro

Abstract

Objectives: To provide a health information technology (HIT) primer for pharmacists, including the current state of HIT, future expectations, basic information and vocabulary, HIT vendors, communication standards, barriers to implementation, and strategies for pharmacists to ensure success.

Data sources: By the authors.

Summary: HIT is expected to provide integrated electronic health care with interactive exchange among patients, providers, government agencies, and insurers, resulting in an increase in the overall quality, safety, and efficiency of health care delivery with fewer medical errors, increased administrative efficiency, decreased health care costs, and expanded patient access to affordable health care. Government incentives are in place in an effort to expedite the nationwide implementation of HIT.

Conclusion: With the government and IT industry applying pressure, HIT is a reality; the only remaining questions are how quickly and how thoroughly HIT will affect the health care system.

Keywords: Health information technology, pharmacy practice, pharmacy management, barriers, practice standards.

Pharmacy Today. 2010(Feb);16(2):32–44.

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Disclosure: The authors declare no conflicts of interest or financial interests in any product or service mentioned in this article, including grants, employment, gifts, stock holdings, or honoraria.

The reference section for this article is available in the **JAPhA** version (available online at www.japha.org).

Learning objectives

At the conclusion of this program, the pharmacist will be able to:

- List at least five ways in which health information technology (HIT) is predicted to improve patient care.
- Provide at least five ways in which patient care might be at risk as a result of the adoption of HIT.
- Discuss six actions that pharmacists can take to help prevent patient harm related to the implementation and use of converging technologies.
- List four reasons for physician resistance to HIT implementation.
- Name six organizations involved in the development of HIT standards.
- State seven ways in which HIT is expected to benefit U.S. patients.

ACPE Activity Type: Knowledge-Based

In February 2009, Congress passed the American Recovery and Reinvestment Act of 2009 (ARRA). Known as the “stimulus package,” ARRA officially ushered in a new era in which American health care will be provided via health information technology (HIT). The stimulus package adds much needed muscle to President George W. Bush’s 2004 executive order for the establishment of the Office of the National Coordinator for Health Information Technology (ONC) to provide leadership for the development and nationwide implementation of an interoperable HIT infrastructure to improve the quality and efficiency of health care. ARRA set aside about \$150 billion for health care reform, approximately \$34 billion of which has been earmarked to encourage health care providers to adopt and effectively use HIT under the Health Information Technology for Economic and Clinical Health Act provisions. The legislation calls for the implementation of a nationwide health record system by 2014. As federal agencies, health care organizations, and the technol-

ogy industry work together to expedite nationwide HIT during the next 4 years, pharmacists need to broaden their knowledge and experiences with HIT to face the myriad of opportunities and challenges presented by a new world of electronic health care.

Because they are at the center of the medication use process, pharmacists will soon be faced with handling the multi-directional flow of all health care–related data and a variety of automated dispensing and billing processes. From electronic prescribing (e-prescribing) to point-of-sale (POS) technology, pharmacies will soon be electronically connected to other providers and patients—a trend previously stimulated by industry and now driven by the government. Like it or not, pharmacists are on an express train to electronically integrated pharmacy practices, and making the transition will require resilience and cooperation within the health care community.

As the health care community gears up for this challenge, a quote by 1991 Nobel Peace Prize winner Aung San Suu Kyi seems fitting: “We will surely get to our destination if we join hands.” Countless health care providers, organizations, and vendors have information and experience to share. Pharmacists must be diligent in preparing for HIT changes and ensure that their voices are heard as HIT standards and processes are developed.

Pharmacists must work with their pharmacy management system (PMS) vendors to develop technical integration solutions with the pharmacist’s workflow in mind. In their normal day-to-day operations, pharmacists will need to use their PMS to electronically communicate with other health care providers. Pharmacists’ PMS user interface should be easy to navigate, allowing them to integrate with other systems in a fashion similar to how search engines like Yahoo and Google are used to link websites. One distinction is that it will be a secure network with login-sensitive or Web-based portal access similar to those used with online banking and website purchasing. All of this e-communication needs to happen seamlessly to be effective and efficient. Many activities occur behind the scenes to make this communication possible.

At a Glance

Synopsis: Although health information technology (HIT) has been in the planning stages for decades, its widespread use has only recently been encouraged and now mandated by the U.S. government. HIT is expected to provide integrated electronic health care with interactive exchange among patients, providers, government agencies, and insurers, resulting in an increase in the overall quality, safety, and efficiency of health care delivery with fewer medical errors, increased administrative efficiency, decreased health care costs, and expanded patient access to affordable health care. Electronic prescribing can reduce medical errors, decrease pharmacy costs, improve both prescriber and pharmacy administrative efficiency, eliminate handwriting interpretation errors, reduce phone calls between pharmacists and physicians, reduce data entry, create electronic records to ensure that prescription information is retained, and expedite prescription refill requests.

Analysis: *Pharmacists and other professionals must be diligent in investigating, planning, and designing systems and processes to implement and maintain HIT with a high focus on personnel training and mindfulness of the importance of workflow and stresses in the health care environment. One problem observed in pilot studies is workflow disruption, which continues to challenge HIT adoption in physician offices, hospitals, and pharmacies. Another major challenge for HIT implementation is the need for communication standards to make the interchange of electronic information possible within the health care community. Much of the needed technology is already in place for HIT or could be put into place easily. However, the standardization necessary to write situation- or system-specific software interfaces to enable communication among systems is still being developed.*

Objectives

We sought to provide an HIT primer for pharmacists, including the current state of HIT, future expectations, basic information and vocabulary, HIT vendors, communication standards, barriers to implementation, and strategies for pharmacists to ensure success.

HIT today

HIT is expected to provide integrated electronic health care with interactive exchange among patients, providers, government agencies, and insurers, resulting in an increase in the overall quality, safety, and efficiency of health care delivery with fewer medical errors, increased administrative efficiency, decreased health care costs, and expanded patient access to affordable health care. In addition to the benefits to individual patient care, public health benefits include early detection of infectious disease outbreaks, improved tracking and evaluation of chronic disease management, improved postmarketing surveillance of

medications, and evaluation and reimbursement of health care services based on value.

Although HIT has been in the planning stages for decades, its widespread use has only recently been encouraged and now mandated by government. The present drive to accelerate the implementation of nationwide HIT began with President Bush's 2004 executive order for the establishment of ONC under the Secretary of the Department of Health and Human Services (HHS). Since then, public and private organizations have functioned together, building on years of previous work to develop the HIT infrastructure and standards harmonization necessary for nationwide HIT. The stimulus package of 2009 has provided even more federal funding for grants and incentives to physicians and hospitals in an effort to accelerate the ongoing development, implementation, and meaningful use of HIT.

The most critical element to the overall e-health care system is the electronic health record (EHR), which differs from the electronic medical record (EMR) in that it contains the pieces of information that need to be shared among health care providers using interoperability standards. The EHR is the individual patient's medical record in digital, interoperable format, including patient demographics, medical history, drug history, allergies, progress notes, current medications, laboratory test results, radiology images, and advanced directives. The EHR may be comprised of data from many locations or sources, including the patient or caregiver. It can interface with other care-related activities directly or indirectly via interface, including evidence-based decision support, quality management, and outcomes reporting.

An even more progressive medical record is the electronic personal health record (ePHR). Whereas the EHR is an electronic record that originates and is controlled by health care providers, the ePHR can be generated by physicians, patients, hospitals, pharmacies, and other sources but is initiated and controlled by the patient.¹ The Healthcare Information and Management Systems Society defines an ePHR as "a universally accessible, layperson comprehensible, lifelong tool for managing relevant health information, promoting health maintenance, and assisting with chronic disease management via an interactive, common data set of electronic health information and e-health tools."² It is a portable record that is owned, controlled, and shared by the patient or legal proxy(s) and is presented to the health care provider when and where the patient needs care. It must be secure to protect the privacy and confidentiality of the health information it contains, and it is not a legal record unless so defined and is subject to various legal limitations.² Because patient records are not stored on a Web server, the ePHR avoids the serious security and privacy issues plaguing other PHR systems. For this reason, it is a critical piece of the HIT structure that may eventually be able to handle privacy issues addressed by the Health Insurance Portability and Accountability Act of 1996 (HIPAA). It can also be an essential tool to assist pharmacists with information needed to provide medication therapy management (MTM) services.

An example of successful ePHR implementation is given in a recent article in *Health Data Management*, which describes a novel type of PHR created by Las Vegas-based Southwest Medical Associates, the group practice of UnitedHealthcare Nevada.

In October 2007, the 250-physician, 14-site group practice launched a secure portal on its website that allows patients to access a summary of their EMRs. In January 2009, the same group practice introduced a free portable medical record to its patients. Within 2 months, 2,700 disks were distributed and 5,000 more were authorized by patients, with no patient complaints being reported. The PHR is a wallet-sized disk that includes a link to a secure portal. The patient's identity is protected via a patient-defined password, an encrypted patient identifier with computer-generated check digits, and a unique identification number. After verifying the patient's identity, the link generates a PDF (Portable Document Format) file listing medications, medical conditions, recent hospitalizations, electrocardiogram results, allergies, emergency contacts, and other information. The patient can share these records with any provider who has an Internet browser.³

Benefits of HIT

Adoption of HIT is predicted to bring a wide range of benefits to both patients and health care providers, including improved patient care, lower costs, increased efficiency and productivity, improved communication and health care delivery, and improvements in reimbursement processes. In addition, HIT will provide the framework needed to track the effectiveness of treatment options and quality of care.

In 2006, the Agency for Healthcare Research and Quality (AHRQ) presented an assessment of the costs and benefits of HIT systems in various health care settings from an analysis of 256 studies testing clinical decision support (CDS), computerized provider order entry (CPOE), and EMR in both ambulatory and hospital settings. The results of this report indicated that HIT has the potential to dramatically transform the delivery of health care, making it safer, more effective, and more efficient in a variety of settings.⁴ It has been projected that effective EHR implementation in 90% of patient care settings could save nearly \$82 billion annually in health care efficiency and safety by the year 2015, with \$77.4 billion saved by increased efficiency, \$1 billion from reduction of inpatient adverse drug events (ADEs), and \$3.5 billion from reduction of ambulatory ADEs. Taking into account lower savings during the "ramping up" years, cumulative savings from improved efficiency and safety could reach \$628 billion.⁵

The Institute of Medicine has reported that preventable medication errors result in at least 1.5 million ADEs and 7,000 deaths each year in the United States.⁶ E-prescribing is expected to reduce these errors in a variety of health care settings. The results of a study of the potential impact of CPOE on prescribing errors in a 700-bed academic medical hospital indicated that 64.4% of all verified prescribing errors were likely to be prevented with CPOE, including 43% of the potentially harmful errors. Another 22.4% were judged as possibly prevented with CPOE depending on specific CPOE system characteristics.⁷

A 2008 retrospective review of 10 studies in hospital and ambulatory settings showed that CPOE and CDS contributed to a statistically significant decrease in ADEs in 50% of the studies. Four studies (40%) showed a nonstatistically significant reduction in ADE rates, and one study demonstrated no change. Stud-

ies on “homegrown” systems, studies comparing manual chart review to detect errors, and studies comparing e-prescribing with handwritten prescribing seemed to show a higher relative risk reduction than other studies. It was concluded that few studies of the effect of CPOE with CDS on the rates of ADEs exist and that none of these have been randomized controlled trials. More study is needed to evaluate the benefit of commercially developed CPOE with CDS systems on reducing ADEs.⁸

Medication reconciliation is another important process that is facilitated and optimized by HIT in both inpatient and outpatient settings. This process of identifying the most accurate list of all medications the patient is taking and using that list to provide correct medications for patients anywhere within the health care system will be more efficient and exact when all medication information is shared electronically in real time. Medication errors related to medication reconciliation typically occur when a patient is admitted to, transferred within, or discharged from a health care facility. From September 2004 to July 2005, the United States Pharmacopeia (USP) MEDMARX reporting program received 2,022 reports of medication reconciliation errors. Approximately two-thirds of the errors resulted from transfer within the facility, another 22% occurred at patient admission, and 12% occurred at time of discharge. Causes included performance deficit (88%), transcription inaccuracy (84%), documentation (83%), communication problems (82%), and workflow disruption (80%). The majority of errors involved improper dose/quantity, followed by omission error and prescribing error.⁹ The Institute for Healthcare Improvement estimated that as much as 50% of medication errors and 20% of ADEs in hospitals result from mismanaged medication reconciliation.¹⁰ Carefully designed and implemented EHRs and/or ePHRs could make medication reconciliation errors nearly nonexistent in the future.

Ultimately, an integrated EHR with CPOE would provide anytime, anywhere access to legible patient information with legible physician orders and signature on a real-time basis. The availability of real-time information would alert physicians to the patient’s medical history, current medications, CDS options, including drug–drug and drug–allergy alerts, and formulary/drug benefit plan coverage at the point of care. Other professional services, including pharmacy services, would receive physician orders before patient arrival, with no delays in order communication and interpretation or problems to be solved regarding drug benefit coverage. This would allow pharmacists providing MTM services to interact more effectively with other providers and ultimately document and measure the benefits of these services within the entire health care continuum.

Risks associated with HIT

Despite widespread and highly publicized expectations for HIT to have overwhelmingly positive effects on health care, safety risks associated with the implementation and use of these new technologies have emerged. In a 2005 study of 1,942 pediatric patients, an unexpected increase in mortality was observed coincident with the implementation of a commercially sold CPOE system. The hospital encountered considerable problems with

the implementation process for CPOE while simultaneously instituting other system changes that may have accounted for adverse effects. The lesson from this study is that serious unintended adverse effects can result if implementation of CPOE is not planned and executed carefully.¹¹

In December 2008, the Joint Commission issued a Sentinel Event Alert on the risks of improperly implemented HIT, directing users to be “mindful of the safety risks and preventable adverse events that these implementations can create or perpetuate.”¹² The commission’s alert was mainly directed toward socio-technical issues, stating that “these unintended adverse events typically stem from human–machine interfaces or organization/system design.” These issues include inadequate planning and training, failure to include front-line clinicians in the planning process, failure to consider costs and resources needed for ongoing maintenance, poor product safety reviews or alerts, over-reliance on vendor advice, and failure to consider the total impact of HIT on care processes, workflow, and safety.

The USP MEDMARX database for 2006 indicated that approximately 25% of the 176,409 medication errors recorded for that year involved some aspect of computer technology as part of the cause of the error.¹³ The most serious errors involved mislabeled barcodes, information management systems, or unclear or confusing computer screen displays. Technology-related adverse events can also result from strains placed on health care providers and staff if workflow is complicated or slowed by poorly planned new technology systems. In addition, patient safety is at risk when HIT systems are not updated consistently or if data are incomplete or inconsistent.

“Alert fatigue” has also been documented among clinicians using poorly implemented CPOE systems that generate excessive numbers of drug safety alerts. Health care providers have been reported to ignore and/or override alerts, making the technology counterproductive and potentially hazardous to patient safety.¹⁴ In a recent study of 233,537 electronic medication alerts, ambulatory care clinicians overrode most of the alerts, accepting only 9.2% of drug interaction alerts and 23% of allergy alerts. Clinicians were less likely to accept an alert if the patient had previously received the medication. These results suggest that current medication alerts may be an inadequate tool in protecting patient safety.¹⁵

Reports have also documented an actual increased risk for medication errors with HIT, with one study reporting that a leading CPOE system facilitated 22 types of medication error risks.¹⁶ Examples included fragmented CPOE displays that prevented a coherent view of patients’ medications, pharmacy inventory displays mistaken for dosage guidelines, ignored antibiotic renewal notices placed on paper charts rather than in the CPOE system, separation of functions that facilitate double dosing and incompatible orders, and inflexible ordering formats that generate wrong orders. Many of these error risks were reported to occur frequently.

As adoption of HIT is pushed by the government, health care leaders and providers are cautioned to proceed with care. The Joint Commission has published suggested actions to help prevent harm related to implementation and use of these new

converging technologies (Table 1).¹² First and foremost, pharmacists and other professionals must be diligent in investigating, planning, and designing the systems and processes to implement and maintain HIT with a high focus on personnel training and mindfulness of importance of workflow and stresses in the health care environment.

Barriers to HIT

As the technology and health care industries work together to organize a workable HIT network, barriers to HIT adoption continue to exist. Many physicians, nurses, and other health professionals, not to mention office personnel, remain resistant to the change and its associated upheaval. Costs of initial investment and ongoing maintenance costs remain problematic for both large and small health organizations. The time and disruption associated with training and implementation and the perceived lack of technical support for these functions are cause for concern. Health professionals worry about an ongoing disruption of workflow if HIT systems don't behave as promised. Product immaturity, particularly with interoperability issues, is also present, resulting in constant challenges. Interoperability requires enhanced electronic information systems to be able to communi-

cate electronically with each other using shared terminology and definitions. Thus, interoperable electronic health care systems must be designed with both system interoperability, or shared functions, and shared terminology. Last but not least, patients worry about the privacy of electronically stored and shared medical histories.

At a health care summit in late 2008, Robert M. Kolodner, MD, then National Coordinator for Health Information Technology at HHS, discussed the five major barriers to EHR adoption. Foremost was the financial problem; 66% of organizations indicated that they did not have the necessary capital, and 50% appeared to be hesitant because of uncertain return on investment. Other factors included difficulty of implementation (39%), productivity loss (41%), obsolete technology (44%), and whether EHR would meet the needs of the organization (54%).¹⁷

Anecdotal evidence suggests that physician adoption is problematic even when financial issues are remedied. Physicians are concerned about the time and effort needed to implement these systems even when vendors and other organizations offer funding for hardware and software. Problems exist with regard to training staff, workflow disruption, and lack of technical support. Furthermore, physicians often do not see the direct

Table 1. Joint Commission—suggested actions to help prevent patient harm related to the implementation and use of converging technologies

Examine workflow processes and procedures for risks and inefficiencies and resolve these issues before any technology implementation. Involve representatives of all disciplines.
Involve clinicians and staff who will use or be affected by the technology, along with IT staff with strong clinical experience, in the planning, selection, design, reassessment, and ongoing quality improvement of technology solutions.
Assess your organization's technology needs beforehand. Investigate how best to meet those needs by requiring IT staff to interact with users outside of their facility to learn about real-world capabilities of potential systems.
During the introduction of new technology, monitor for problems and address any issues as quickly as possible, particularly problems obscured by workarounds or incomplete error reporting.
Establish a training program for all types of clinicians and operations staff who will be using the technology and provide frequent refresher courses. Do not allow long delays between orientation and system implementation.
Develop and communicate policies delineating staff authorized and responsible for technology implementation, use, oversight, and safety review.
Before taking a technology live, ensure that all standardized order sets and guidelines are developed, tested on paper, and approved by the Pharmacy and Therapeutics Committee.
Develop a graduated system of safety alerts that helps clinicians determine urgency and relevancy. Review skipped or rejected alerts as important insight into clinical practice.
Develop a system that mitigates potential harmful CPOE drug orders by requiring departmental or pharmacy review and sign off on orders that are created outside the usual parameters. Use the Pharmacy and Therapeutics Committee for oversight and approval of all electronic order sets and clinical decision support alerts.
Provide an environment that protects staff involved in data entry from undue distractions when using the technology.
Reassess and enhance safety effectiveness and error detection capability, including the use of error tracking tools and the evaluation of near-miss events.
Monitor and report errors and near misses or close calls caused by technology through manual or automated surveillance techniques. Pursue system errors and multiple causations through the root cause analysis process or other forms of failure mode analysis.
Reevaluate security and confidentiality protocols as more medical devices interface with the IT network. Reassess HIPAA compliance periodically.

Abbreviations used: CPOE, computerized provider order entry; HIPAA, Health Insurance Portability and Accountability Act of 1996; IT, information technology. Contributing to these actions were Bona Benjamin, BPharm, and Karl F. Gumpfer, BPharm, American Society of Health-System Pharmacists; David C. Classen, MD, CSC Consulting, Inc.; Donald Mon, PhD, American Health Information Management Association; Tony Montagnolo, MS, and Ronni Solomon, JD, ECRI Institute; Ronald A. Paulus, MD, Geisinger Health System; and Patricia Wise, RN, Healthcare Information and Management Systems Society. Adapted from reference 12.

benefit of the system. More work needs to be done to ensure easy and rapid use and compatibility of these systems before physicians and their staff will embrace the new technology. Speed, ease of workflow, and technical support are major considerations for successful HIT implementation. Incentives from the Centers for Medicare & Medicaid Services (CMS) and other drivers will make HIT more widespread, particularly as connectivity and interoperability issues are resolved.

Additionally, anecdotal evidence in the long-term care setting indicated that although the e-prescribing process was workable, pharmacists, nurses, and technicians were somewhat dissatisfied with the system.¹⁸ The transmission from facility to pharmacy was rapid, reliable, and eliminated duplicate order entries. Prescribers said that seeing formularies and drug plan coverage at the time of prescribing was helpful. Some nurses thought the system was burdensome, but others indicated that it made their work easier. Pharmacy staff members were generally dissatisfied with several frustrating aspects of the system that made medication orders more time consuming. In addition to supporting better patient care, HIT systems can potentially save pharmacists and their operations time and money by improving productivity and efficiency. The problems noted in pilot studies seem to be related to workflow disruption, which continues to challenge HIT adoption in physician offices, hospitals, and pharmacies.

Community pharmacists have generally been positive toward HIT implementation. The results of a 2006 national survey showed that community pharmacists and technicians were mostly satisfied with e-prescribing.^{19,20} Pharmacists were slightly more favorable in their ratings of e-prescribing than technicians and gave highest ratings to its effect on patient safety and efficiency. Pharmacists were less favorable toward the effect of e-prescribing on communication and relationships with both patients and physicians. Pharmacists preferred e-prescribing to handwritten prescriptions because it eliminated handwriting interpretation. Technicians also preferred e-prescribing because of improved efficiency and speed in processing the prescription.

Patients may benefit most from HIT in all health care settings because HIT systems are expected to ensure fewer ADEs and prescribing errors, better clinical decision making, and time savings to patients. Although patients may appreciate some of the benefits of HIT, they have important concerns about the risks it presents to their health privacy. If patients lack trust in the security of the electronic exchange of individual health information, it may affect their willingness to disclose necessary health information and could have serious health consequences. Coordinated attention is needed to develop and implement appropriate privacy and security policies. The electronic exchange of health information will only be possible if all stakeholders, particularly patients, are engaged in a manner that respects variations in individuals' views on privacy and access.

The technology industry and private and public organizations agree that public trust is critical to HIT adoption and will only be possible through sound privacy and security policies with specific technology solutions. This would include a comprehensive privacy and security framework with enforced rules and

consequences for breaking those rules. The challenge is to provide an information-rich environment with easy data flow that is simultaneously private and secure. HIPAA rules will need to be upgraded to meet the challenges of HIT. New rules will also need to be developed for specific network nuances. Improved enforcement of privacy rules, increased penalties, extending HIPAA coverage to network exchanges, increased auditing of HIPAA violations, extending HIPAA coverage to electronic networks, tightening the rules for use around marketing services, and ensuring patients' access to their own records are all necessary to meet the privacy challenge.

Government incentives for physicians

Although optimism exists within the medical community that EHRs may improve the quality and timeliness of care, physicians have been slow to implement the HIT option. One recent survey showed that EHRs are currently used by fewer than one in five of the nation's physicians.²¹ A similar survey of all acute care hospitals that are members of the American Hospital Association indicated that only 1.5% had comprehensive electronic record systems.²² Just 17% of the hospitals surveyed had implemented CPOE for medications. The 2007 American Society of Health-System Pharmacists (ASHP) survey on the adoption of pharmacy informatics in U.S. hospitals suggested that "a fully implemented EMR is far in the future," with only 5.9% of hospitals being fully digital (without paper records).²³ The use of other HIT was also low, with an estimated 12% of hospitals using CPOE with CDS, 24.1% using barcode medication administration, and 44% using intelligent infusion devices (smart pumps). Many of technologies were described as not optimally configured.

At a conference in late 2008, former National Coordinator for Health Information Technology Robert M. Kolodner, MD, discussed survey results indicating that just 13% of physicians in ambulatory care had basic EHR systems and only 4% had fully functional systems. In practices with 1 to 3 physicians, only 9% had adopted EHRs, whereas in those with more than 50 physicians, about 50% had implemented them. HHS data also indicate that only about 10% of nonfederal acute care hospitals in the United States have EHR in place.¹

In response to nearly 70% of physicians citing lack of capital as their primary reason for postponing HIT implementation,¹ the federal government has provided specific financial incentives for physicians and hospitals to adopt and use HIT. The percentage of physicians using HIT is expected to increase rapidly as health care systems and physician offices prioritize HIT implementation to take advantage of available reimbursement incentives beginning in 2011 and avoid proposed penalties for noncompliance as 2014 approaches. The goal of HHS is to have EHRs in use in 80% of health care organizations and 50% of physician practices by 2010.

ARRA provides for eligible professionals who establish the "meaningful use" of a certified EHR in 2011 or 2012 to be entitled to incentive payments of \$18,000 in the first year (only \$15,000 if not in 2011 or 2012), \$12,000 for the second year, \$8,000 for the third year, \$4,000 for the fourth year, \$2,000 for the fifth year, and \$0 for any succeeding year. The incentives will

not be available after 2016 and will not be available to eligible professionals who first adopt EHRs in 2015 or subsequent years. Similar incentives for e-prescribing have been put in place by the Medicare Improvements for Patients and Providers Act of 2008. Prescribers who use e-prescribing would get payment increases as follows: 2% in 2009 and 2010, 1% in 2011 and 2012, and 0.5% in 2013. Those who do not use e-prescribing would be penalized starting in 2012 as follows: 1% in 2012, 1.5% in 2013, and 2% in 2014.

On December 30, 2008, CMS released its long-awaited proposed rule outlining provisions governing the EHR incentive programs, including defining the central concept of “meaningful use” of EHR technology. The CMS plan proposes phasing in meaningful use requirements in three stages between now and 2013. For professionals and hospitals to be eligible to receive payments under the incentive programs provided through ARRA, they must be able to demonstrate meaningful use of a certified EHR system. Stage 1 criteria emphasize collecting electronic health data in coded formats, implementing CDS tools, reporting clinical quality measures and public health data, and using EHR data to track conditions and coordinate care. CMS officials recommend stage 2 criteria proposed by the end of 2011 and stage 3 by the end of 2013. More information and lists of stage 1 criteria for professionals and hospitals can be found at www.healthcarefinancenews.com/news/eligible-provider-meaningful-use-criteria.

Pharmacy implementation of HIT

Although physicians have been slow to implement new technologies, pharmacists have been using computer systems for more than 3 decades, albeit mainly for dispensing, billing, and reimbursement purposes in the early years. Today, pharmacists use a wide variety of software systems, ranging from fully integrated software-as-a-service to MTM systems. Vendors offer PMSs and software for workflow management, e-prescribing, e-signature capture, POS solutions, inventory management, card processing, pricing and printing services, interactive voice response, accounts receivable, long-term care, e-medication administration records, claims processing, MTM, flexible spending account/health reimbursement account handling, I.V. processing, compounding, 340B reporting, and more.

Because of its experience with a wide range of computer software systems, the pharmacy profession is uniquely positioned to be a leader in the implementation of HIT. The challenge for pharmacists will be in adapting already available software systems to be interoperable with other health care professions and patients. Although relatively few pharmacies currently have systems that are integrated with other health care systems, several “off-the-shelf” solutions are available that PMS vendors can integrate into a pharmacy’s current PMS for both drug database management and e-prescribing and EHRs. The drug database systems are being marketed as physician-friendly CPOE solutions that are easier for the clinician than manual medication ordering. Medispan, First Data Bank, and Lexicomp are examples of drug databases that provide drug data profiles with integration software and drug reference integration. A list of vendors

for pharmacy technology can be found on the *Computer Talk* website (www.computertalk.com/content/section/6/115). The website has a link to each vendor’s website, including technology vendors for community pharmacy, hospital pharmacy, home care, long-term care, and assisted living; POS systems, pharmacy management, productivity, and workflow; and specialized products and services.

PMSs likely will have to use electronic POS processing in the future. Recent Internal Revenue Service regulations require pharmacies to employ POS systems that comply with the Inventory Information Approval System (IIAS) if they wish to continue accepting flexible savings account/health savings account cards as forms of payment. As of July 1, 2009, pharmacies that had not implemented an IIAS-compliant system were excluded from accepting flexible savings account/health savings account cards. To become compliant, pharmacies had to complete a self-assessment questionnaire and become certified by the Special Interest Group for IIAS Standards. Larger community chain pharmacies are already being told to send both over-the-counter and cash purchase data to Surescripts to enhance medication history information for e-prescribing. These developments underscore the need for pharmacies to implement a full range of electronic processes in order to function in today’s electronic health care environment.

Pharmacists must work with their PMS vendors to develop technical integration solutions with the pharmacist’s workflow in mind. In their normal day-to-day operations, pharmacists will need to use their PMS to electronically communicate with other health care providers. Pharmacists’ PMS user interface should be easy to navigate, allowing them to integrate with other systems in a fashion similar to how search engines like Yahoo and Google are used to link websites. One distinction is that it will be a secure network with login-sensitive or Web-based portal access similar to those used with online banking and website purchasing. All of this e-communication needs to happen seamlessly to be effective and efficient. Many activities occur behind the scenes to make this communication possible.

Development of communication standards

One of the biggest challenges for HIT implementation is the need for communication standards to make the interchange of electronic information possible within the health care community. Much of the needed technology is already in place for HIT or could be put into place easily. What is lacking is the standardization necessary to write situation- or system-specific software interfaces to enable communication among systems. Standards help systems “speak the same language” more easily (Appendix 1 in the electronic version of this article, available online at www.japha.org). Pharmacies need to have the communication standards in place to electronically communicate with hospitals, physician offices, laboratories, radiology, and patients and caregivers, in addition to providing billing, reimbursement, dispensing, and clinical functions. Some of the work to make this feasible has already been completed and much more is in progress.

Many organizations are working together to ensure HIT interoperability, including organizations working to develop and

promote these communication standards for the pharmacy profession (online Appendix 2). These organizations, both public and private, have worked together since 2005 within the framework of the American Health Information Community (AHIC) under the guidance of ONC. In December 2008, AHIC completed its work by recommending specific actions to achieve a common interoperability framework for HIT. HHS then initiated a new private sector entity, the AHIC Successor Inc., also known colloquially as AHIC 2.0, with broad-based participation from the public and private sectors to further advance the use of common standards and policies. The AHIC Successor was replaced in January 2009 by the National e-Health Collaborative (NeHC), which is a new non-profit organization that is a public-private partnership dedicated to the creation of a secure, interoperable, nationwide HIT network. The list of participating stakeholders includes federal and state agencies, health systems, payers, health professionals, medical centers, community hospitals, patient advocates, major employers, nonprofit health organizations, commercial technology providers, and others. NeHC works in close partnership with the Health Information Technology Standards Panel (HITSP), the Certification Commission for Health Information Technology, and the National Health Information Network, as well as other health and IT organizations.

The HIT Policy Committee and the HIT Standards Committee are federal advisory committees created by ARRA to make recommendations to ONC on a policy framework for the development and adoption of the national HIT infrastructure and the standards, implementation specifications, and certification criteria for the electronic exchange and use of health information, respectively. The HIT Standards Committee will develop, harmonize, and certify standards and provide for the testing of these standards by the National Institute for Standards and Technology.

NCPDP is one of the standards development organizations (SDOs) involved in HIT and standardization. NCPDP is the only SDO that has a focus on pharmacy services and has the most representation from the pharmacy services sector of health care. Members include pharmacies and pharmacists, manufacturers, payers and processors, vendors, and other interested parties such as wholesalers and consultants. NCPDP has working groups to develop and maintain standards for each step in the prescribing process, including the e-prescribing standard (SCRIPT). The NCPDP standards that exist today are shown in Table 2.²⁴ As of April 2009, researchers have concluded that for e-prescribing, only the medication history, formulary and benefits, and prescription fill status notification standards are actually ready for use. Other foundation standards must be further enhanced. Additional information about NCPDP standards is available at www.ncdp.org.

Another group active in developing and promoting HIT standards for pharmacy is the Pharmacist Services Technical Advisory Coalition (PSTAC), which is comprised of the following seven national pharmacy organizations: the American College of Clinical Pharmacy, Academy of Managed Care Pharmacy, American Pharmacists Association, American Society of Consultant Pharmacists, ASHP, National Association of Chain Drug Stores

Table 2. Current NCPDP standards for electronic prescribing process

SCRIPT Standard: Facilitates the transfer of prescription data among pharmacies, prescribers, intermediaries, and payers. The current standard supports messages regarding new prescriptions, prescription changes, refill requests, prescription fill status notification, prescription cancellation, medication history, and transactions for long-term care environments. Enhancements have been added for drug use/utilization review alerts, standardized Sig (instructions), allergies, and diagnosis information. Future enhancements may include lab values, patient drug profiles, prescription transfers, and formulary inquiries.

Batch Transaction Standard

Billing Unit Standard

Financial Information Reporting Standard

Formulary and Benefit Standard

Medicaid Subrogation

Member Enrollment Standard

Payment Reconciliation Payment Tape Format

Pharmacy Identification Cards

Postadjudication Standard

Prescription Transfer Standard

Telecommunication Standard

Universal Claim Form

Medication History Standard

Abbreviation used: NCPDP, National Council for Prescription Drug Programs.

(NACDS), and National Community Pharmacists Association (NCPA). PSTAC was established to improve the coding infrastructure necessary to support billing for pharmacists' professional services and to secure pharmacy's place in the electronic data interchange (EDI) health encounter/claims processing and paying environment. The Coalition was originally formed as the X12 Pharmacy Advisory Panel by NCPA in response to the release of the HIPAA-compliant *X12N 837 Health Care Claim: Pharmacy Professional Services Companion Guide: Professional*. The guide provides the unique standardized electronic data and format requirements (EDI transaction segments) that are equivalent to submitting a health care encounter/claim for professional services submitted by pharmacists and pharmacies on the paper CMS Form 1500. The coalition was successful in securing X12 as a standard for electronic billing of professional pharmacist.²⁵

PSTAC has also been successful in obtaining a set of HIPAA-compliant CPT (Current Procedural Terminology) billing codes for pharmacists to use to bill third-party payers when providing MTM services. In January 2008, these codes, which were initially approved as Category III ("emerging technology" or "tracking" codes), became available for use as Category I (permanent) codes. The codes can only be used by pharmacists, although physicians and other nonpharmacist providers may perform MTM services. The codes are as follows:

- 99605 Medication therapy management service(s) provided by a pharmacist, individual, face-to-face with patient, initial

15 minutes, with assessment, and intervention if provided; initial 15 minutes, new patient

- 99606 Initial 15 minutes, established patient
- 99607 Each additional 15 minutes (list separately in addition to code for the primary service)

Clinical vignettes for each of the three codes and other information for using the codes are available on PSTAC's website (www.pstac.org).

PSTAC has also succeeded in obtaining important revisions in the Health Care Provider Taxonomy Code List for Pharmacy Service Providers and Pharmacy Suppliers. The code list is a set of unique alphanumeric codes, 10 characters in length, that describes the types of patient care services provided by health care providers and is structured into three distinct levels, including provider type, classification, and area of specialization. New codes went into effect on October 1, 2006, for geriatric, oncology, and compounding pharmacy, as well as changes in definitions for the following existing pharmacist categories: nuclear, nutrition support, pharmacotherapy, and psychiatric.

As of May 23, 2007, health care providers who are covered under HIPAA are required to obtain a National Provider Identification (NPI) number. This includes basically any provider who transmits any health information in electronic form between two parties to carry out financial or administrative activities related to health care. Pharmacies and pharmacists who transmit health information in an electronic format must obtain an NPI number. PSTAC encourages individual pharmacists to obtain an NPI. Using an individual NPI traces delivery of a professional service to the rendering pharmacist, thus allowing the pharmacist to be recognized as a service provider. More information and instructions for applying for an NPI can be found at the National Plan and Provider Enumeration System website (www.nppes.cms.hhs.gov).

Another key organization in the development of HIT standards is HITSP, which is composed of SDOs, health care providers, public health agencies, patients, and government agencies. The panel's mission is to help the public and private sectors define a widely accepted and useful set of standards to support widespread interoperability among health care software applications, in regard to how they interact in a local, regional, and national health information network. The panel is tasked with harmonizing standards in the health care industry to enable and advance interoperability of health care applications and the interchange of health care data, both supporting the delivery of care and public health.

Since ARRA was enacted, the role of HITSP is being reevaluated. Recently, HITSP was charged with reviewing all previous work and will be making recommendations to the HIT Policy and Standards Committees on their harmonization efforts of previous use cases. One of those is the Medication Management use case (IS 07). The Medication Management Interoperability Specification defines "specific standards to facilitate access to necessary medication and allergy information for patients, clinicians, pharmacists, health insurance agencies, inpatient and ambulatory care, etc."²⁶ As directed by ARRA, HHS adopted and published an Interim Final Rule on an initial set of standards, implementation

specifications, and certification criteria on December 30, 2009.²⁷

E-prescribing and pharmacy

E-prescribing is the paperless computer-to-computer transfer of prescription data among prescribers, pharmacies, and payers. It is not the use of e-mail or facsimile transaction. It connects health providers, patients, and agencies in real time and can include medication history and messages regarding new prescriptions, prescription changes or cancellation, refill requests, and other prescription information.

As with any new innovation, e-prescribing provides benefits but poses new problems that must be addressed. E-prescribing has been shown to improve efficiency in the pharmacy with substantial time savings. In one study, new e-prescriptions required 26.6% less pharmacy staff time to process than other new prescriptions (walk-in, phone, and facsimile). Refill e-prescriptions required 10.2% less staff time. The savings in pharmacy labor costs created by e-prescribing have been estimated to be \$0.97 for every new prescription and \$0.37 for every renewed prescription.²⁸ At the same time, a major concern for pharmacists is clarification of who will pay transaction fees associated with the process of receiving and filling orders places on the e-prescribing system. Currently, the pharmacy pays the transaction fees for the e-prescription coming into the pharmacy and the charge to send the prescription to the pharmacy benefit manager or plan for payment. Physicians pay no transaction fee. For pharmacies, the transaction fees approximate \$0.22 per claim and higher.²⁹ These fees obviously offset some of the savings in pharmacy labor costs.

Ten years ago, the Institute of Medicine recommended that all prescribers and pharmacies use e-prescribing by 2010, but progress in the use of e-prescribing has been slow and, therefore, achieving this goal seems unlikely. Although e-prescribing is allowed in all 50 states, it cannot be used for the prescribing of controlled substances. This is a major obstacle to widespread use of e-prescribing by physicians because the need for two systems, both e-prescribing and a parallel paper system for controlled substances, compromises any savings intended with e-prescribing.

After much pressure from Congress and the HIT community, in June 2008, the Drug Enforcement Agency (DEA) published long-awaited proposed regulations that would provide prescribers with the option of issuing electronic prescriptions for controlled substances. Although welcomed by proponents of HIT, the proposed regulations present several problems for pharmacists that have been addressed in comments to DEA before a final ruling. The proposed rulings do not recognize pharmacists as practitioners with prescribing authority, therefore undermining the ability of pharmacists to provide patients with collaborative drug therapy management. Pharmacists may also be burdened with an additional workload involved in checking DEA's database for a physician's registration before dispensing a controlled drug. Another problem for both pharmacists and pharmacy benefit managers is that DEA may not allow pharmacists to make a generic substitution for a brand-name product via the electronic system. Public comments on the proposed regulations were accepted

until September 2008. DEA is likely to accommodate pharmacy groups to some extent when it publishes the final rule.

Regardless of these obstacles, pharmacies will need to use e-prescribing in the near future to comply with regulatory and reimbursement requirements. Data show that pharmacists are implementing e-prescriptions at a fast pace to meet that need. Estimates indicate that only 2% of the approximately 1.47 billion new prescriptions and renewals eligible for electronic routing in 2007 were being transmitted electronically. In 2008, Surescripts estimated that the number of electronic prescription transactions routed electronically would exceed 100 million, increasing the percentage of the nation's new prescriptions and renewals transmitted electronically to approximately 7%. In its 2008 National Progress Report on E-Prescribing, Surescripts reported that the total e-prescribing message volume doubled between 2007 and 2008 to more than 240 million.³⁰

NACDS estimated that at the end of 2008, approximately 76% of community pharmacies in the United States were connected for prescription routing and six of the largest mail order pharmacies were able to receive prescriptions electronically. Of independently owned pharmacies, 46% were connected to the Surescripts network for prescription routing in 2008 compared with 27% in 2007.³⁰ As more standards for electronic communication of health care data are certified, this percentage is expected to increase exponentially.

Use of e-prescribing is expected to benefit all participants in the health care system, including physicians, office staff, pharmacies and pharmacists, patients, and health plans. E-prescribing can reduce medical errors, decrease pharmacy costs, improve both prescriber and pharmacy administrative efficiency, eliminate handwriting interpretation errors, reduce phone calls between pharmacists and physicians, reduce data entry, create electronic records to ensure that prescription information is not lost, and expedite prescription refill requests. Physicians using e-prescribing will have access to formulary and insurance coverage information, potential drug-drug and drug-allergy interactions, and CDS tools at the point of care. E-prescribing is generally welcomed by patients because it saves them both time and money.

To begin the implementation of e-prescribing, pharmacists should work with their current PMS vendors. Here are the basic steps involved in implementing e-prescribing in your pharmacy:

- Confirm that your pharmacy management software is certified for e-prescribing communication.
- Ask your PMS vendor to enable e-prescribing functions in your system. This can be done through an e-prescribing network, such as Surescripts.
- Contact NCPDP (www.ncdpd.org) for messaging standards and other helpful information.
- Ask your vendor about necessary software upgrades, transaction fees, staff training, and prescriber database maintenance.

Get more information on e-prescribing at www.surescripts.com, www.nationalerx.com, www.himss.org/ASP/topics_eprescribing.asp, www.ehealthinitiative.org, and www.cms.hhs.gov/eprescribing.

Testing of HIT standards for e-prescribing

As organizations and agencies work together to develop and certify HIT standards, critical pilot studies have been undertaken to test and validate the standards. In January 2006, CMS and AHRQ awarded five pilot grants to study the use of e-prescribing standards—four in ambulatory settings and one in long-term care settings.^{31,32} The results of the pilot projects supported the adoption of new e-prescribing standards by demonstrating that three initial standards are already capable of supporting e-prescribing transactions. These are the standard transactions that provide physicians with patients' formulary and benefit information; medication history, including medications prescribed by other providers; and the fill status of patients' medications, so that the prescriber receives an electronic notice indicating whether a patient has picked up a prescription, in order to help monitor medication adherence.

The e-prescribing pilot studies also identified three initial standards that need further development. They are the standards used to convey structured patient prescription instructions (Sig), nomenclature to describe clinical drugs, and messages that convey prior authorization information. NCPDP has worked with AHRQ and CMS to enhance the functionality available for exchanging structured and codified Sig, electronic prior authorization functionality, and the use of RxNorm for standardized medication nomenclature. The ability to include Sig in a structured and codified way is already possible with SCRIPT version 10.4 and later. Industry is continuing to test and optimize this complex standard for sharing prescription instruction information. At the same time, NCPDP is working with industry to enhance the appropriate standards for electronic prior authorization and medication nomenclature.³³

Overall, the pilot studies demonstrated that e-prescribing is technically feasible and can work effectively in both ambulatory and long-term care settings. Substantial time was saved compared with prescribing via faxes as a result of decreased time spent sorting faxes and processing new admissions and orders. Also, a slight decrease occurred in time spent on new or changed orders and on handling insurance rejections. In the long-term care setting, electronic communication between facility and pharmacy occurred in less than 1 second.³²

Advocates assert that e-prescribing will increase productivity in community pharmacies, and research is under way to support this claim. In one study conducted in 10 outlets of a single community chain pharmacy organization, e-prescribing improved pharmacy staff productivity with an average reduction in pharmacist labor cost of about \$0.97 for each new prescription and \$0.37 for each renewed prescription. New electronic prescriptions required 26.6% less staff time to receive and process compared with all other types of prescriptions. Renewal electronic prescriptions required 10.2% less time than all other non-e-prescription types.²⁸ Both pharmacists and technicians surveyed in the study showed strong support for the e-prescribing method.

Increased productivity in the community pharmacy because of e-prescribing is described in many anecdotal reports. Owners of independent community pharmacies and directors of opera-

tions for community chain pharmacies welcome the change to e-prescriptions. Pharmacists have reported reduced hours each day resulting from the elimination of unnecessary phone calls and faxes. Wait times for physician responses are also reported to be drastically reduced.

The pilot studies also showed that e-prescribing can be successful in long-term care settings.¹⁸ Differences in ambulatory versus long-term care e-prescribing include three-way communication among prescriber, nurse, and pharmacy, adjustments for resident versus patient information (e.g., unit, bed, facility data), medication delivery, open-ended medication chart orders that need to be cancelled or discontinued, the need for the long-term care facility staff to know the medication was actually dispensed, and the fact that resupply requests represent nearly 80% of long-term care orders. Because of these differences, some technical modifications to the usual standards are needed. All technical modifications have been made, and the current e-prescribing NCPDP SCRIPT version 10.6 is approved for both the long-term care and ambulatory settings.

In acute care settings, the adoption of e-prescribing has been slow, particularly in small community hospitals, which make up approximately 89% of U.S. hospitals. The ASHP 2008 national survey of pharmacy practice in hospital settings reported trends toward electronic communication and the continued gradual adoption of e-prescribing systems with CDS. The survey reported that approximately 12% of hospitals use CPOE and one in five uses e-prescribing for outpatient prescriptions.³⁴ The results of a 2008 survey of nearly 1,300 U.S. hospitals by Leapfrog (a voluntary member organization whose goal is to improve the quality and value of health care services funded by private employers)

indicated that only 7% of respondents met Leapfrog standards for using CPOE systems.³⁵

Is pharmacy ready?

With the government and IT industry applying pressure, HIT is a reality; the only questions remaining are how quickly and how thoroughly will HIT affect the health care system. Pharmacists who hesitate to use up-to-date technology run the risk of falling behind in patient care services, marketing options, and recruiting opportunities. The question remains: how good does the system need to be before it is implemented? With the health care community being pushed by government incentives, the debate over HIT readiness may be a conversation of the past.

With reports of as many as 90% of pharmacies technically ready to receive CPOEs, pharmacists appear to be ready to move forward in broadening the scope of HIT in their practices. Preexisting computerized systems may be helpful in some circumstances and a hindrance in others. Pharmacists will need to very carefully plan for operational and technical changes to provide new networks and to alter existing ones to function with multidirectional flow. Changes made too quickly without optimal planning and consideration may lead to more serious problems down the road. Preliminary time spent in planning and training is critical.

Prudent pharmacists will follow these strategies to success: manage your knowledge base, manage your expectations, train and prepare your staff, secure adequate IT support, stay positive, and, most important, always remember the patient. Your ability to improve medication-related outcomes may ultimately be coupled with the successful use of HIT in your pharmacy.

Assessment Questions

Instructions: The assessment test for this activity must be taken online; please see "CPE processing" below for further instructions. There is only one correct answer to each question. This CPE will be available at www.pharmacist.com no later than February 28, 2010.

1. **The wide range of benefits of health information technology (HIT) to both patient and health care providers include**
 - a. Improved patient care, lower costs, increased efficiency, and decreased physician visits.
 - b. Improved patient care, lower costs, increased productivity, and fewer treatment options.
 - c. Improved patient care, lower costs, increased productivity, and improvements in reimbursement processes.
 - d. Reduction in adverse drug events (ADEs), improved medication reconciliation, lower costs, and decreased need for communication among health care providers.

2. **The MEDMARX database has recently shown that computer technology is involved in some aspect of medication errors**
 - a. Almost never.
 - b. 10% of the time.
 - c. 20% of the time.
 - d. 25% of the time.
 - e. 35% of the time.

3. **The Agency for Healthcare Research and Quality has projected that electronic health record (EHR) implementation in 90% of patient care settings could save nearly**
 - a. \$3.5 billion annually.
 - b. \$100 billion annually.
 - c. \$1 billion from reduction of inpatient ADEs.
 - d. \$2 billion from reduction of ambulatory ADEs.
 - e. None of the above alternatives is correct.

4. **The Joint Commission has issued a Sentinel Event Alert on the risks of improperly implemented HIT, which are mainly directed toward**
 - a. Physicians.
 - b. Nurses.
 - c. ADEs
 - d. Sociotechnical issues.
 - e. Both alternatives a and b are correct.

5. Barriers to HIT implementation include

- Costs of initial investment, ongoing maintenance costs, workflow disruption, and lack of staff.
- Costs of initial investment, ongoing maintenance costs, workflow disruption, and lack of technical support.
- Costs of initial investment, ongoing maintenance costs, problems with staff training, and government incentives.
- Costs of initial investment, ongoing maintenance costs, government incentives, and workflow disruption.
- Costs of initial investment, ongoing maintenance costs, product immaturity, patient privacy, and government interference.

6. A 2006 survey showed that community pharmacists and technicians were mainly satisfied with e-prescribing, with pharmacists

- Slightly less favorable in their ratings than technicians, giving their highest ratings to its effect on patient safety and efficiency.
- Slightly less favorable in their ratings than technicians, preferring handwritten prescriptions to e-prescribing.
- Slightly more favorable in their ratings than technicians, giving their highest ratings to its effect on patient safety and efficiency.
- Slightly more favorable in their ratings than technicians, giving their highest ratings to improved communication and relationships with both patients and physicians.

7. A majority of physicians cite which of the following to be their primary reason for postponing HIT implementation?

- Workflow disruption
- Lack of technical support
- Problems with staff training
- Lack of capital
- Difficulty of implementation

8. HIT is expected to benefit patients by

- Ensuring fewer ADEs, even though prescribing errors may increase.
- Saving pharmacists and technicians time in processing prescriptions.
- Increasing privacy and security of health care information.
- Ensuring better clinical decision making.

9. Government incentives for physicians and hospitals to adopt and use HIT include

- Incentive payments of \$18,000 over 3 years for establishing EHRs in 2011 or 2012.
- Incentive payments of \$18,000 in the first year for establishing EHRs in 2011 or 2012.
- Reduced incentive payments for establishing EHRs after 2016.
- Reduced incentive payments for establishing EHRs after 2015.

10. E-prescribing is the paperless computer-to-computer transfer of prescription data among prescribers, pharmacies, and payers

- Using e-mail functions.
- Using facsimile transaction.
- Not using e-mail functions or facsimile transaction.
- Including all prescription data except medication history.

11. What percent of the estimated 1.47 billion new prescriptions and renewals eligible for electronic routing in 2007 were being transmitted electronically?

- | | | |
|--------|--------|--------|
| a. 25% | c. 10% | e. 20% |
| b. 50% | d. 2% | |

12. The communication standard that facilitates the transfer of prescription data among pharmacies, prescribers, intermediaries, and payers is the

- Telecommunication Standard.
- Prescription Transfer Standard.
- Prescription Data Standard.
- SCRIPT Standard.
- Medication Data Standard.

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The American Pharmacists Association is accredited by the Accreditation Council for Pharmacy Education as a provider of continuing pharmacy education. The ACPE Universal Activity Number assigned to the program by the accredited provider is 202-0000-10-104-H04-P.

"Health information technology: A new world for pharmacy" is a home-study continuing education activity for pharmacists developed by the American Pharmacists Association.

13. The results of five pilot studies of the use of e-prescribing standards in ambulatory and long-term care settings demonstrated that

- a. No time was saved compared with prescribing via faxes.
- b. Increased time was spent on handling insurance rejections.
- c. E-prescribing can work in ambulatory but not long-term care settings.
- d. Considerable time was saved compared with prescribing via faxes.

14. The results of one study conducted in 10 community chain pharmacies showed that

- a. New electronic prescriptions required 10.6% less staff time to receive and process compared with all other types of prescriptions.
- b. Renewal electronic prescriptions required 26.6% less time than all other non-e-prescription types.
- c. E-prescribing improved staff productivity with a reduction in pharmacist labor cost.
- d. E-prescribing resulted in a higher average reduction in pharmacist labor costs for renewed prescriptions compared with new prescriptions.

15. The American Society of Health-System Pharmacists 2008 national survey of pharmacy practice in hospital settings reported that the following percent of hospitals were using computerized provider order entry:

- a. 40%
- b. 25%
- c. 2%
- d. 12%
- e. 60%

16. From 2004 to 2005, the majority of medication reconciliation errors reported by the MEDMARX reporting program

- a. Resulted from transfer within the facility.
- b. Occurred at patient admission.
- c. Occurred at time of discharge.
- d. Occurred despite transcription accuracy.

17. In the MEDMARX 2006 report, the most serious medication errors involving some aspect of computer technology involved

- a. Mislabeled barcodes, information management systems, or workflow complications.
- b. Mislabeled barcodes, unclear or confusing computer screen displays, or workflow complications.
- c. Mislabeled barcodes, information management systems, or unclear or confusing computer screen displays.
- d. Workflow complications and strains on health care staff.
- e. Incomplete or inconsistent data.

18. The American Recovery and Reinvestment Act of 2009 provides for the following:

- a. \$150 billion earmarked for HIT under the Health Information Technology for Economic and Clinical Health (HITECH) Act provisions
- b. Implementation of a nationwide health record system by 2011
- c. \$34 billion earmarked for HIT under HITECH Act provisions
- d. \$30 billion earmarked for government incentives for adoption of EHRs by 2011

19. CPT (Current Procedural Terminology) codes are a listing of descriptive terms and identifying codes for reporting

- a. Medical services and procedures provided by physicians only.
- b. Medical services and procedures provided by hospitals only.
- c. Medical procedures provided pharmacists only.
- d. Medical services and procedures provided by physicians or by pharmacists providing medication therapy management services.

20. The National Council for Prescription Drug Programs is one of the standards development organizations involved in HIT and is composed of

- a. Pharmacies and pharmacists.
- b. Pharmacies, pharmacists, manufacturers, vendors, payers, and other interested parties.
- c. Pharmacies, pharmacists, and manufacturers.
- d. Pharmacies, manufacturers, and wholesalers.

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