The impact of electronic health records on pharmacy practice

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With the American Recovery and Reinvestment Act (ARRA), which was signed into law in 2009, Congress set ambitious goals for the nation to integrate information technology into healthcare delivery.1,2 A segment of ARRA, the Health Information Technology for Economic and Clinical Health Act (HITECH), authorized incentive payments through Medicare and Medicaid to providers that use certified electronic health records (EHRs) to achieve specified improvements in healthcare delivery and implement a nationwide EHR system by 2014.3

At the bill’s enactment in 2009, only 11.9% of hospitals made any use of EHRs, with only 2% meeting what would be stage 1 meaningful use criteria.4 Only 21.8% of office-based physicians had basic electronic systems and only 6.9% had fully functional electronic systems.5 The U.S. Department of Health & Human Services (HHS) finalized the meaningful use criteria for the first 2 years of the 3-stage incentive program in mid 2010.5 The bill’s health information technology (HIT) component followed the earlier Office of the National Coordinator (ONC) for Health Information Technology created by presidential executive order in

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Goal: To assist pharmacists and pharmacy technicians in understanding the impact of electronic health record (EHR) systems on pharmacy practice, as the use of EHR systems continues to increase.

After participating in this activity, pharmacists will be able to:

● Summarize the impact on pharmacy practice of the new HHS rules governing the use of electronic health record (EHR) systems.

● Identify the ways in which EHR systems will increase the efficiency of pharmacy practice with respect to continuity of care, formulary checks, drug-to-drug and drug-to-allergy interactions, and medication reconciliation.

● Summarize the challenges pharmacists face as EHR systems come into increasingly wider use.

● Apply the process of pharmacists using EHRs to case scenarios.

After participating in this activity, pharmacy technicians will be able to:

● Recognize the impact on pharmacy practice of the new HHS rules governing the use of EHR systems.

● Identify the ways in which EHR systems will increase the efficiency of pharmacy practice with respect to continuity of care, formulary checks, drug-to-drug and drug-to-allergy interactions, and medication reconciliation.

● Recognize the challenges pharmacists face as EHR systems come into increasingly wider use.

Pharmacists are eligible to participate in both the knowledge-based and application-based activities, and will receive up to 0.2 CEUs (2 contact hours) for completing the activity/activities, passing the quiz/quizzes with a grade of 70% or better, and completing an online evaluation. Statements of credit are available via the online system.

Pharmacy technicians are eligible to participate in the knowledge-based activity and will receive 0.1 CEU (1 contact hour) for completing the activity, passing the quiz with a grade of 70% or better, and completing the online evaluation. Statements of credit are available via the online system.

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The American Recovery and Reinvestment Act of 2009 set ambitious goals for the nation to integrate information technology into healthcare delivery. The Health Information Technology for Economic and Clinical Health Act segment of the bill provides incentives for Medicare and Medicaid providers to use certified electronic health records (EHRs) to achieve specified improvements in healthcare and implement a nationwide EHR system by 2014. Meaningful use criteria are being promulgated in 3 stages. Medicare and Medicaid incentive payments will total $27 billion over a 10-year period with $17 billion designated for EHR development. Pharmacists will not receive direct funding or incentives but pharmacy schools may receive grants for incorporating electronic personal health technology into clinical education. The nation’s goal for EHRs is to reduce costs through less paperwork, improved safety, and reduced duplication of testing, and improve health by gathering a patient’s entire health information in a single location. Electronic connectivity through e-prescribing—the paperless, real-time transmission of standardized prescription data among prescribers, pharmacies, and payers—places pharmacists squarely within the healthcare technology team. The Pharmacy e-Health Information Technology (HIT) Collaborative, a group of 9 national pharmacy organizations and associate members, advocates integrating the pharmacist’s role of providing patient care services into the national HIT interoperable framework. The greatest challenge that pharmacists face in the new era of electronic health information is to be recognized by Medicare and Medicaid as eligible providers of medication-related patient care services and as meaningful use contributors to electronic health information.

The primary goals of improving the nation’s HIT infrastructure are to:

- Ensure protection and privacy of healthcare information;
- Improve patient care by reducing medical errors;
- Reduce costs by removing administrative barriers that result in duplicative claims and services; and
- Improve coordination of care among healthcare providers.

To achieve these goals, as much as $27 billion over 10 years was designated in Medicare and Medicaid incentive payments for eligible providers who use EHRs and demonstrate “meaningful use” of HIT. In addition, HIT systems have to be certified as meeting certain technologic standards. A total of $19 billion was designated to implement HIT regional health information exchange (HIE) networks. Of this amount, $17 billion includes the incentive payments to physicians and hospitals to develop personal healthcare records by 2014. The remaining $2 billion is allocated to developing and improving the nation’s HIT infrastructure.

The Congressional Research Service expects that the incentives will promote EHR use in 70% of hospitals and 90% of physician offices by 2019. The Congressional Budget Office has projected that HITECH will reduce federal and private sector spending on health services during the next decade by tens of billions of dollars by increasing efficiency. By October 2011, $1.2 billion incentives had been paid. Preliminary data for 2011 show the use of EHRs growing, but the goals for 2019 are considered ambitious.

Pharmacists will not receive direct funding or incentives for adopting electronic medical record technology. Pharmacy schools, however, are included among the list of approved graduate schools that may receive grants for incorporating electronic personal health technology into clinical education. Stage 1 of the 3-stage meaningful use program launched in 2010 focuses on the integration of electronic healthcare among patients, providers, government agencies, and insurers. There are 25 Medicare and Medicaid meaningful use criteria, of which eligible professionals must adopt 15 professional core objectives to qualify for the incentives (Table 1, page 48). Eligible professionals can receive as much as $44,000 over a 5-year period through Medicare. For Medicaid, eligible profession-
alas can receive as much as $63,750 over 6 years. The first incentives were scheduled for October 2011 based on 2010 performance. By 2015, physicians who are not using certified EHRs could be penalized by Medicare and Medicaid.12

In February 2012, federal officials released the stage 2 guidelines for meaningful use.13 The proposed stage 2 rules, which are undergoing review at this time, require physicians and hospitals to significantly increase their use of electronic health information, as well as better engage patients and improve the transferability of records.13 The meaningful use approach requires identification of standards structured in uniform ways so that EHR systems can deliver the information just as commonly used automated teller machines depend on uniformly structured data.7 If data cannot be captured uniformly, electronic systems cannot communicate or are not interoperable.14,15 Stage 2 meaningful usage will require that at least 60% of patients have their medications and laboratory tests ordered electronically instead of the 30% required by the stage 1 regulations. The government is placing emphasis on having electronic systems that are interoperable or can communicate with each other. Thus, the 2012 stage 2 rules require that systems be able to transfer patient information including a patient’s notes, medications list, allergies, and diagnostic and laboratory test results across platforms. The information should also be available to patients to view their records online as well as download and transfer information. Additionally, patients should be able to communicate with their physicians through a secure, online system or patient portal.13

**Integrating pharmacy health information in U.S. healthcare**

Often the terms electronic medical record (EMR) and electronic health record (EHR) technology are used interchangeably. EHR is defined as “an electronic record of health-related information on an individual that is created, gathered, managed, and consulted by authorized healthcare clinicians and staff.”11 The personal health record (PHR) is defined as “an electronic record of individually identifiable health information on an individual that can be drawn from multiple sources and that is managed, shared, and controlled by and for the individual.”11 The EHR differs from the EMR in that it contains information that is shared among healthcare providers using interoperability standards.9 The EHR is an individual patient’s medical record in digital, interoperable format that includes the patient’s demographics, medical history, allergies, medications, progress notes, laboratory and diagnostic test results, scans, and advance directives. It contains data from many sources and can communicate with various health and medical entities.9

An electronic tool that is initiated by the patient is the electronic personal health record (ePHR).6 In contrast to the EHR, which is generated by healthcare providers, the ePHR can be generated by physicians, patients, hospitals, pharmacies, and other sources but is managed by the patient.11 Ultimately, it is the ePHR that healthcare analysts consider the best electronic tool to address concerns about privacy issues
with electronic health information.\textsuperscript{16}

The nation’s goal for EHRs is to reduce costs through less paperwork, improved safety, reduced duplication of testing, and improve health by gathering a patient’s entire health information in a single location. Additionally, EHRs can compute the information. For example, a qualified EHR not only contains a record of a patient’s medications or allergies but also automatically checks for problems whenever a new medication is prescribed and alerts the clinician to potential conflicts.\textsuperscript{7} The meaningful use of EHRs and HIEs can help clinicians provide higher quality and safer care for their patients (Table 2, page 48).\textsuperscript{11}

For the purposes of the Medicare and Medicaid incentive programs, eligible professionals, eligible hospitals, and critical access hospitals (CAHs) must use certified EHR technology. The federal government has established certification standards consistent with requirements for meaningful use.\textsuperscript{17} Certified EHR technology gives assurance to purchasers and other users that an EHR system or module offers the necessary technologic capability, functionality, and security to help them meet the meaningful use criteria. Certification also helps providers and patients be confident that the electronic HIT products and systems they use are secure, can maintain data confidentially, and can work with other systems to share information.\textsuperscript{15}

The PP-EHR is the pharmacy/pharmacist provider electronic health record. The Pharmacy e-HIT Collaborative, a group of 9 national pharmacy organizations and associate members, continues to work with national EHR certification organizations and pharmacy system vendors to assure that the PP-EHR functionality is adopted with the development of certification criteria to meet the meaningful use of EHR concepts related to pharmacy services.\textsuperscript{18} Members of the Collaborative were involved in working with a joint Health Level Seven (HL7) and National Council for Prescription Drug Programs (NCPDP) work group in the development of the PP-EHR functional profile, an HL7 functional profile that represents “the functional- ity required and desired for a care setting or application, or reflect the functionality incorporated in a vendor’s EHR system.”\textsuperscript{19}

To elaborate further, from a standards perspective, all EHRs follow HL7 functional-

### TABLE 3

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<thead>
<tr>
<th>INTERNET RESOURCES FOR E-PRESCRIBING</th>
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### Each provider type can adopt a standard HL7 EHR functional profile.

#### e-Prescribing: Use, benefits, challenges

Electronic connectivity through electronic (e)-prescribing—the paperless, real-time transmission of standardized prescription data among prescribers, pharmacies, and payers—places pharmacists squarely within the healthcare technology team.\textsuperscript{19} E-prescribing communicates medications history, new prescriptions, changes, refills, and other prescription data. In 2000, the Institute of Medicine recommended that e-prescribing be in place for all prescriptions by 2010. Although short of that goal, by 2010 more than 300 million prescriptions were being routed electronically.\textsuperscript{20} More than half of office-based physicians in the United States are reported to use e-prescribing.\textsuperscript{21} The number of pharmacies connected electronically also continues to increase. According to Surescripts, 91% of community pharmacies in the United States in 2010 were connected for prescription routing compared with 76% in 2008. For independently owned pharmacies, 73% were connected in 2010 compared with 46% in 2008.\textsuperscript{20}

A national survey reported that community pharmacists and technicians were generally satisfied with e-prescribing because of the improved legibility of electronic prescriptions and more efficient processing.\textsuperscript{22} Pharmacists in the survey also noted that refill prescriptions and new prescriptions required less staff time. Prescribing errors were the most commonly cited negative feature of e-prescribing, particularly those which called for a wrong drug or gave erroneous directions.\textsuperscript{22}

In more than 100 interviews with physician practices and pharmacies nationwide this past year, researchers at the Center for Studying Health System Change noted flaws and inconsistencies concentrated in 3 critical areas in e-prescriptions. These include prescription renewals, connectivity between physician offices and mail-order pharmacies, and manual entry of prescription information by pharmacists.\textsuperscript{23} Moreover, pharmacies and physicians report duplicate or conflicting messages. Significantly, short-cut features fail to aid that message and communication fields that complete automatically often require follow-up calls or manual entry by pharmacists to clarify a physician’s orders, verify quantities and sig codes (pharmacy terminology), or provide patient-friendly instructions.\textsuperscript{23}

One barrier to e-prescribing—maintenance of a parallel paper system for controlled substances—essentially ended

Pause&Ponder

According to a national survey, community pharmacists and technicians were generally satisfied with e-prescribing because of the improved legibility of electronic prescriptions. However, are you still following up frequently with physicians to clarify orders?
when the prohibition against e-prescribing for controlled substances (EPCS) was amended in 2010 when the U.S. Drug Enforcement Administration (DEA) issued new regulations that provide practitioners with the option of EPCS. The revised DEA regulations also permit pharmacies to receive, dispense, and archive electronic prescriptions.24 It is important to note, however, that not all states have authorized EPCS, particularly Schedule II controlled substances.

For more information on e-prescribing, please consult the websites listed in Table 3, page 49.

**EHR systems increase efficiency of pharmacy practice, improving patient outcomes**

The Pharmacy e-HIT Collaborative advocates integrating the pharmacist’s role of providing patient care services into the national HIT interoperable framework.24 The Collaborative has issued a 10-goal plan entitled “The Roadmap for Pharmacy Health Information Technology Integration in U.S. Health Care” to promote the inclusion of pharmacists as recognized providers of the CMS HIT strategy (Table 4).18 The Collaborative states that pharmacists have an important role in optimal therapeutic outcomes and safe and cost-effective medication use and that the clinical services of pharmacists are a critical component of the U.S. healthcare system. For example, the ability to report adverse drug events (ADEs) within the EHR and integrate reports on a national level allows for tracking ADEs and early identification of potentially dangerous medication side effects.18

Medication therapy management (MTM), which can optimize therapeutic outcomes for individual patients, is a unique area of contribution for pharmacy.25 Pharmacists are key information providers in MTM, including medication reconciliation and care transitions, medication adherence, medication monitoring, medication safety, and evaluation of medication errors.18

MTM core elements include: medication therapy review; personal medication record; medication-related action plan; intervention and referral; and documentation.18 Sharing components of MTM between providers by means of the continuity-of-care document (CCD) demonstrates the value of meaningful use of the EHR by pharmacists. The MTM core elements service model illustrates how pharmacists can interface with the patient care process (Figure 1, page 51). The process begins with medication therapy review. The patient interview is conducted and a database with patient information is created. Medications are reviewed for indication, effectiveness, safety, and adherence. A list of medication-related problems is generated and prioritized, generating a MTM plan. Intervention and/or referrals involve patient, physician, pharmacist, or other healthcare professionals.

It is estimated that more than half of medication errors occur during patient care transitions.26 The proposed 2012 stage 2 meaningful use objectives require that medication reconciliation be conducted by 65% of care transitions by the receiving providers.18 Therefore, medication reconciliation at transitions of care should be part of the EHR documentation process in all practice settings.18 At a minimum the following information should be communicated electronically to pharmacists at transitions of care: medications list, medical condition, and allergy.

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**Pause & Ponder**

Pharmacists have an important role in optimal therapeutic outcomes and safe and cost-effective medication use. Are pharmacists in your practice setting utilized appropriately to help during transitions of care?
Challenges pharmacists face as EHR systems come into increasingly wider use

The greatest challenge that pharmacists face in the new era of electronic health information is to be recognized as eligible providers by Medicare and Medicaid and by accountable care organizations (ACOs) of medication-related patient care services and as meaningful users and contributors to EHR. As a first step, the Collaborative of pharmacy organizations urges that e-prescribing be adopted in all practice settings. Further, pharmacists should exchange clinical information with each other and other healthcare providers in a bidirectional manner. Pharmacists need to work with pharmacy system vendors to set communications standards and build awareness of the standardized certified pharmacist EHR functional profile. Such alliances support meaningful use and enable pharmacies to support improvements in care, safety, cost, and health outcomes.

A recent example of such collaboration is the announcement by Walgreens that all of the 7,800 Walgreens and Duane Reade pharmacies and 350 Take Care Clinics nationwide will use the Surescripts clinical interoperability network to deliver immunization records to the patient’s primary care provider. Currently, records such as immunization immunizations have been sent to physicians by fax or traditional mail. By using the electronic network, pharmacists and pharmacy healthcare providers contribute to the compilation of more complete medical histories for their patients.

In the 2011-2012 flu season, more than 27,000 certified immunizing pharmacists, nurse practitioners, and physician assistants at Walgreens and Duane Reade pharmacies and Take Care Clinics administered more than 5.5 million immunizations. Surescripts will use a standard format to capture immunization details and send the record to the patient’s primary care physician in whatever form the provider is able to receive it, electronically or via fax or mail. Physicians using a Surescripts-certified EHR, however, will have the option of receiving immunization records via the Surescripts Clinical Interoperability Network.

The pharmacy profession is actively contributing to quality patient care through MTM services that identify and prevent medication-related problems, improve medication use, and optimize individual patient

Figure 1: The Medication Therapy Management Core Elements Service Model

The diagram depicts how the MTM Core Elements (△) interface with the patient care process to create an MTM Service Model.

- MEDICATION THERAPY REVIEW
  - Interview patient and create a database with patient information
  - Review medications for indication, effectiveness, safety, and adherence
  - List medication-related problem(s) & Prioritize
  - Create a plan

- INTERVENTION AND/OR REFERRAL
  - Possible referral of patient to pharmacist or other healthcare professional
  - Interventions directly with patients
  - Interventions via collaboration

- DOCUMENTATION & FOLLOW-UP
  - Complete/Communicate
  - Create/Communicate
  - Create/Communicate

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therapeutic outcomes. As MTM programs continue to expand within the healthcare system, however, the lack of standardization for documentation and billing of MTM services is limiting its use and is a barrier to MTM service delivery for patients.  

To allow for the interchange of electronic information, pharmacists need to champion e-prescribing standards and use current procedural terminology (CPT) billing codes for MTM services. Table 5 (page 50) identifies common code sets.

Pharmacy organizations large and small must recognize that implementing HIT requires designing workflow management to overcome the disruption that arrives with new technologic practices. The negative impact of HIT implementation on workflow, safety and workflow is known and was the subject of a Joint Commission alert in 2008. Stresses placed on healthcare providers and staff when workflow is compromised by new technology systems can produce technology-related adverse events. The USP MEDMARX for 2006 reported that one-quarter of more than 175,000 medication errors involved some aspect of computer technology. For example, an actual increased risk for HIT-related medication errors was reported in a study of a computerized provider order entry (CPOE) system. Examples included fragmented CPOE displays that conveyed erroneous information about patient medications and orders.

To evaluate the effects of CPOE with clinical decision support (CDS) on ADEs, researchers reviewed the medical literature for original investigations, randomized and nonrandomized clinical trials, and observational studies. They found studies that identified the type of computer system used, drug categories evaluated, types of ADEs measured, and clinical outcomes. Of the 543 citations identified, 10 studies met inclusion criteria. These studies were grouped into categories based on their setting: hospital or ambulatory; no studies related to the long-term care setting were identified. In 5 (50%) of the 10 studies, CPOE with CDS contributed to a statistically significant decrease in ADEs (P ≤ 0.05). Four studies (40%) reported a nonstatistically significant reduction in ADE rates, and 1 study (10%) demonstrated no change in ADE rates.

At a study at a 700-bed academic medical center in Chicago, clinical staff pharma- cists saved all orders that contained a prescribing error for a week in early 2002. The investigators classified drug class, error type, proximal cause, phase of hospitalization, and potential for patient harm and rated the likelihood that CPOE would have prevented the prescribing error. A total of 1,111 prescribing errors were identified (62.4 errors per 1,000 medication orders), most occurring on admission (64%). Of these, 30.8% were rated clinically significant and were most frequently related to anti-infective medication orders, incorrect dose, and medication knowledge deficiency. Of all verified prescribing errors, 64.4% were rated as likely to be prevented with CPOE (including 43% of potentially harmful errors), 13.2% unlikely to be prevented with CPOE, and 22.4% possibly prevented with CPOE depending on specific CPOE system characteristics. The investigators concluded that although prescribing errors are common in the hospital setting, CPOE systems could improve practitioner prescribing.

The design and implementation of a CPOE system should focus on errors with the greatest potential for patient harm. Pharmacists in involvement, in addition to a CPOE system with advanced CDS, is vital for medication safety.

**Conclusion**

As members of the electronically connected healthcare team, pharmacists have the unique knowledge, expertise, and responsibility to assume a significant role in electronic health information. And as governments and the healthcare community develop strategic plans for the widespread adoption of HIT, pharmacists must use their knowledge of information systems and the medication use process to ensure that the new technologies lead to better patient outcomes.

**References**

Technology Annual Meeting; Washington, DC, November 16-18, 2011.


TEST QUESTIONS

1. Results from a study evaluating prescribing errors during 1 week in 2002 at a 700-bed academic medical center showed that:
   a. Most prescribing errors occurred at discharge from the hospital.
   b. Of all verified prescribing errors, 64.4% were likely to be prevented with a computerized provider order entry (CPOE) system.
   c. Prescribing errors are uncommon in a large academic setting.
   d. The errors rated clinically significant were most frequently related to antihypertensive medication.

2. The goals of "The Roadmap for Pharmacy Health Information Technology Integration in U.S. Health Care" include:
   a. Ensure federal incentives for pharmacists
   b. Ensure medication standards for hospital formulas
   c. Achieve unique pharmacy coding for pharmacies providing immunizations
   d. Achieve recognition of pharmacists as meaningful users of electronic health record (EHR) quality measures

3. The 15 professional core objectives required for Medicare and Medicaid incentives include:
   a. Record smoking status for adults (aged 20 years or older) only
   b. Record vital signs and chart changes for children from newborn to 20 years
   c. Use a CPOE system
   d. Provide patients with paper and electronic copies of their health information

4. According to Surescripts, what percentage of community pharmacists in the United States are connected for routing prescriptions electronically?
   a. 73%
   b. 76%
   c. 82%
   d. 91%

5. Because of recent changes in Drug Enforcement Agency regulations, which of the following is no longer a barrier to electronic prescribing?
   a. Short-cut features that automatically complete information fields
   b. Pharmacist’s investment in electronic software
   c. Manual prescription information entry
   d. Prohibition against electronic prescribing for controlled substances

6. The results of a review of the medical literature to evaluate the effects of CPOE on adverse drug events showed that:
   a. CPOE with clinical decision support contributed a statistically significant decrease in adverse drug events (ADEs) in 50% of the studies.
   b. Three studies reported a nonstatistically significant reduction in ADE rates.
   c. Four studies demonstrated no change in ADE rates.
   d. No study met the inclusion criteria of computer system, drug categories, types of ADEs, and clinical outcomes.

7. The American Recovery and Reinvestment Act, which was signed into law in 2009, authorizes:
   a. $10 billion designated to implement health information technology (HIT) regional health information exchange networks
   b. As much as $6,750 over 6 years for eligible pharmacists
   c. $27 billion over 10 years designated in Medicare and Medicaid incentive payments for eligible providers who use EHRs and demonstrate “meaningful use” of HIT
   d. As much as $144,000 for eligible physicians over a 5-year period through Medicare

8. In February 2012, federal officials released the stage 2 guidelines for meaningful use including:
   a. Requiring physicians and hospitals to significantly increase their use of electronic health information
   b. Meaningful usage requiring that at least 80% of patients must have their medications and laboratory tests ordered electronically
   c. Requirements for stage 2 meaningful use to be in place immediately
   d. Pharmacy HIT systems become interoperable by 2014

9. The nation’s goal for EHRs is to reduce costs through less paperwork, improved safety, and reduced duplication of testing, and to improve health by gathering a patient’s entire health information in a single location. EHRs accomplish this by:
   a. Being “an electronic record of health-related information on an individual that is created, gathered, managed, and consulted by authorized healthcare clinicians and staff”
   b. Being “an electronic record of individually identifiable health information on an individual that can be drawn from multiple sources and that is managed, shared, and controlled by and for the individual.”
   c. Restricting data from certain defined sources and health and medical entities.
   d. Being generated by physicians, patients, hospitals, pharmacies, and other sources but initiated and managed by the patient.

10. In more than 100 interviews with physician practices and pharmacies nationwide this past year, researchers at the Center for Studying Health System Change noted flaws and inconsistencies concentrated in 3 critical areas in e-prescriptions. These include:
    a. New prescriptions
    b. Volume of electronic prescriptions
    c. Connectivity between physician offices and mail-order pharmacies
    d. Computerized entry of prescription information by pharmacists
CASE A
A primary care physician (PCP) electronically prescribes 5 medications for a Medicare Part D patient post yearly physician visit. Four of the medications were continued from the previous visit. This patient qualifies for a yearly comprehensive medication review (CMR) as defined by the Part D plan’s medication therapy management (MTM) program.

The pharmacist receives the electronic prescriptions, and the pharmacy management system (PMS) alerts the pharmacist that the patient’s prescription drug plan will authorize a CMR using the National Council for Prescription Drug Programs (NCPDP) standardized transaction (an electronic transaction for a payer to request MTM services from a provider). Mail and fax are other ways to receive a CMR request. Under the Part D plan’s business agreement, the clinical pharmacist in charge of the pharmacy’s MTM service programs messages the patient and the PCP that a CMR is needed. The PMS adopted a pharmacist electronic health record (EHR) functionality, and the PMS is certified for the meaningful use of the EHR criteria.

Using the pharmacy’s e-prescribing network, the PMS queries the PCP’s EHR, the patient’s personal health record (PHR), and the state health information exchange (HIE) for the patient’s continuity-of-care documents (CCD), which contain allergies, chief complaints, active medications list, diagnosis, family history, immunizations, functional status, social history, vital signs, laboratory data, etc. The patient schedules a CMR with the clinical pharmacist. The result of the CMR is electronically exchanged with the PCP’s EHR and the medication action plan is electronically sent to the patient’s PHR.

1. Which of the following statements is correct?
   a. Only e-prescribing networks can electronically connect with PMS.
   b. PMS can connect with e-prescribing networks and HIEs.
   c. Pharmacists are not allowed to access patient information through an HIE.
   d. Only physicians can access patient information through an HIE.

2. How is a request for a CMR transmitted?
   a. Electronically using an NCPDP standardized transaction
   b. Fax
   c. Mail
   d. All of the above

3. A PMS can query which of the following:
   a. PCP’s EHR
   b. Personal health records
   c. All of the above
   d. None of the above

CASE B
A patient in a car accident and post hospital surgery was discharged home with a broken arm and leg. The patient’s discharge summary in the form of a CCD, which contains allergies, chief complaints, active medications list, diagnosis, family history, immunizations, functional status, social history, vital signs, laboratory data including electronic x-ray images, was electronically transmitted to the PCP and home health-care agency coordinating the patient’s rehabilitation therapy. An electronic prescription for a Schedule C-II controlled substance was transmitted to the patient’s local pharmacy using an e-prescribing network. Using the pharmacist EHR, which does not have to be confined to the four walls of a pharmacy, the clinical pharmacist electronically queried the patient’s hospital discharge summary and electronically coordinated a pain medication action plan with the PCP and the home healthcare nurse.

1. Which of the following statements is correct?
   a. Controlled substance prescriptions cannot be sent via e-prescribing.
   b. Only Schedule C-II medications can be sent via e-prescribing.
   c. Pharmacies can receive electronic prescriptions for controlled substances from a hospital.
   d. All of the above.

2. In which of the following situations can a pharmacist query a hospital’s EHR?
   a. Pharmacist working in a community pharmacy
   b. Pharmacist working in a chain pharmacy
   c. Pharmacist not working within the four walls of a pharmacy
   d. All of the above.

3. The medication action plan should be discussed with which of the following individuals:
   a. PCP  b. Patient  c. Nurse  d. All of the above

CASE C
An elderly patient asks her local chain pharmacy about getting her flu shot. The pharmacist is not familiar with this patient and notices that the patient displays symptoms of mild confusion. Using the PMS’s EHR, the pharmacist queries the PCP’s EHR and the public health department for the patient’s immunization history, allergy information, and other pertinent information in the form of a CCD. The query indicates that the patient has no known allergies, received a flu vaccine last year, and a pneumococcal immunization the previous year. The pharmacist administers the flu vaccines and electronically transmits the new flu vaccine information to the PCP and the public health department.

1. If a pharmacist is unfamiliar with a patient’s vaccination history, the following may be conducted:
   a. Patient should be asked about their vaccination history.
   b. Using a CCD, a pharmacist can query a PCP’s EHR.
   c. Allergy information is available in a CCD.
   d. All of the above.

2. Which of the following information can be found in the CCD?
   a. Immunization history
   b. Active medications list
   c. Allergy information
   d. All of the above

3. Which of the following statements is correct?
   a. Pharmacists providing immunizations should only electronically transmit flu vaccine information to the PCP.
   b. The public health department should not be notified of patient immunization updates.
   c. Pharmacists providing immunizations should provide vaccine information to the patient’s PCP and the public health department.
   d. None of the above