The authors, in collaboration with the ASHP Section Advisory Group on Pharmacy Operations Automation, developed suggested standard definitions for three terms commonly used in the field of health care information technology: interfacing, integration, and interoperability. Understanding these terms will facilitate health-system pharmacists’ communication with information technology professionals, vendors, and government entities.

Definitions

Interfacing: A method of communication using a standard language that allows different information systems from different vendors to share information.

An interface can be either unidirectional (one-way) or bidirectional (two-way). In the case of a unidirectional interface, information is sent from one system to another, but there is no mechanism to return that information to the originating system. With a bidirectional interface, information is sent from one system to another and vice versa. A pharmacy-specific example of a unidirectional interface is the transfer of information from the pharmacy system to a laboratory system, but there is no return interface to send information on laboratory test results to the pharmacy system.

A pharmacy-specific example of a bidirectional interface is the pharmacy information system (PIS) transmitting medication order information to automated dispensing cabinets or robotic devices and receiving billing information from those systems. Other examples within the health care industry include the synchronization of data between a computer and a handheld...
Interoperability: The ability of two systems to exchange data in a meaningful fashion without human prompting. Interoperability requires cooperation between two or more systems on two levels: syntactic and semantic.

Syntactic interoperability: Agreement on how messages between systems are constructed. Such agreement is achieved when standard messages (e.g., Health Level 7 [HL7] messages) can be used to enable information transfer between systems; this implies that the standard message set is sufficiently well-known and consistent that any receiving system can receive and properly parse the information based on a common understanding of message structure. HL7 admission, discharge, and transfer (ADT) processing has achieved this level of commonality; virtually any system that handles HL7 messaging can handle ADT messages without modification. This level of standardization has not yet been achieved with HL7 order-processing messages.2

Semantic interoperability: Agreement on the meaning of the message content. Such agreement is achieved when the content of a standard message is sufficiently standardized so that the meaning of the message is clear. The use of standard dictionaries such as the Systemized Nomenclature of Medicine (SNOMED) and RxNorm (both available through the National Library of Medicine) is required to ensure that the meaning of information is unambiguous.1

Interoperability requires that systems are individual, separate, and distinct but are able to exchange information in a meaningful fashion. Interoperability may be accomplished by interfaces, by altering the data that support various workflows, or by providing a mediating device to facilitate data coordination; thus, interoperability failures occur within “fully integrated” systems only when that integration is, in fact, incomplete or when some functions within the system remain isolated from the integrated whole. On the other hand, organizations that purchase software from multiple vendors require interoperability in order to achieve the meaningful exchange of information. Health information exchange (HIE) can be defined as the electronic movement of health-related information securely among organizations to facilitate the aggregation of data into a longitudinal electronic health care record. Successful HIE requires the ability to promote the interoperability of disparate systems to allow providers to access all clinical data.2 HIE expands on information interoperability and involves multidirectional flows of information among providers (hospitals, physicians, clinics, laboratories) and other sources of administrative or clinical information provided by consumers, health plans, employers, and local, state, or national organizations.

One example of pharmacy system interoperability might involve a retail pharmacy receiving electronic prescriptions from various prescribing systems (e.g., hospital based, private practice based) and transmitting information (e.g., dosing changes, refill requests) back to those systems.

Another, non-pharmacy-specific example of interoperability is provided by modern electronic banking–finance systems, which allow direct deposits, online bill payments, electronic transfers, and access to automated teller machines anywhere in the world—even those operated by banking institutions at which the user does not hold an account.

Discussion

Pharmacists are hearing the terms integration, interfacing, and interoperability more frequently as hospitals work toward meeting the “meaningful use” standards of the Health Information Technology for Economic and Clinical Health (HITECH) legislation.3 In the ideal situation, all hospital information systems would meet the needs of the departments using them, have no downtime, and allow for the easy communication of data between systems and also to any other health care provider or entity; currently, however, this frequently is not the case, as each department has specific requirements, forcing hospitals to choose between using
an integrated information system and purchasing software from multiple vendors. The HITECH legislation, with its standards on the electronic reporting of data and incorporation of HIE elements into the practice of health care, requires that pharmacists be more cognizant of vendor terminology, especially as it relates to the medication-use process. Being aware of the differences between the specific terms discussed here while implementing new technology will provide more realistic expectations of system capabilities, user options, and support needs.

References