ASHP Statement on the Pharmacist's Role in Clinical Informatics

Position

ASHP believes that pharmacists have the training, knowledge, background, and responsibility to assume a significant role in clinical informatics.

Background

Healthcare organizations continue to invest a significant amount of financial and human resources in health information technology (HIT) initiatives, including advanced clinical systems, electronic health records, business intelligence and analytics tools, and applications that deliver the highest levels of patient safety and value. This growth has not only led to a considerable demand for HIT workers but, more importantly, has identified the need for a work force with training and skills to create a successful and safe interface between HIT and the healthcare delivery system. This work force must understand healthcare, information and communication technology, and the people, processes, and culture of an organization. The intersection of these skills has commonly been described as the discipline of biomedical and health informatics, more recently termed *clinical informatics*.[1] Evidence continues to emerge regarding the value that a well-trained individual in clinical informatics can bring to an organization faced with implementing highly complex and transformative HIT systems.[2,3]

Pharmacy informatics has grown to be an integral discipline within the clinical informatics domain, centered on the effective management and delivery of medication-related data, information, and knowledge across systems that support the medication-use process. Pharmacists' professional identity, education, training, and experience with medication management make them ideal candidates to play a significant role and fill a critical need in pharmacy informatics. Their firm understanding of core pharmacy operations, clinical practice, the medication-use process, standards, and regulations and their long history of utilizing technology to support medication management provide the essential components for effectively transitioning into this role. Despite the growing number of formally trained pharmacy informaticists, the path and skills required for a career in informatics have varied considerably, emphasizing the need to build core competencies and grow the number of available programs.[4-6] The American Board of Medical Specialties (ABMS) recognition of clinical informatics as a physician subspecialty will likely play an important role in evolving pharmacy informatics beyond its current state to one with a clinical edge, centered on analytics and delivering information and knowledge at the point of care. This ABMS decision may also impact the development of a standardized, interprofessional educational road map for individuals seeking a career in pharmacy informatics.[7-9]

Roles and Responsibilities

Pharmacists who practice clinical informatics must collaborate with other healthcare and information technology professionals to promote the safe, efficient, effective, timely, and optimal use of medications. They contribute to the transformation of healthcare by analyzing, designing, implementing, maintaining, and evaluating information and communication systems that improve medication-related outcomes and strengthen the pharmacist–patient relationship. The role of pharmacy informaticists revolves around their knowledge of pharmacy practice, safe medication use, clinical decision-making, and the improvement of medication therapy outcomes, combined with their understanding of the discipline of informatics and HIT systems.[10] Their primary roles and responsibilities must encompass five broadly defined categories:

- Data, information, and knowledge management: managing medication-related information while promoting integration, interoperability, and information exchange.
- Information and knowledge delivery: delivering medication-related information and knowledge throughout the clinical knowledge life cycle, from the point of knowledge generation through cataloging, embedding knowledge into the workflow, and measuring the usage and effectiveness of that knowledge.
- Practice analytics: developing point-of-business analytic solutions for improving decision-making.
- Applied clinical informatics: applying user experiences, research, and theoretical informatics principles to improve clinical practice and usability.
- Leadership and management of change: leading and participating in the procurement, development, implementation, customization, management, evaluation, and continuous improvement of clinical information systems.

Data, Information, and Knowledge Management. Pharmacy informaticists play a key role in maintaining the data, information, and knowledge assets across all systems that support medication management. They are instrumental in ensuring data quality and safety, minimizing data-quality risks, and affirming medication-related data, information, and knowledge management best practices.[10,11] Data quality and information management best practices encompass

- Providing the appropriate level of data governance and stewardship,
- Adopting standard human- and machine-interpretable formats,
- Utilizing controlled terminology for integration and interoperability,
- Ensuring that data are accurate, accessible, complete, consistent, current, timely, precise, at the appropriate level of granularity, reliable, relevant, conforming, and understandable across all data-quality management domains,
- Ensuring the consistent use of maps to internal and external standards and reference data,

- Ensuring that system architecture supports data interchange,
- Ensuring that data, information, and knowledge are audited, measured, and evaluated for effectiveness,
- Ensuring that data, information, and knowledge assets are validated, integrated, normalized, consolidated, and routinely optimized,
- Developing infrastructure for knowledge, metadata, and terminology management,
- Ensuring that information is readily and rapidly understood and accessed within the workflow,
- Ensuring that information and knowledge are centrally managed, collaboratively developed, and easily disseminated and maintained,
- Ensuring that information and knowledge are platform independent, and
- Developing tools to effectively maintain and manage data, information, and knowledge.

Maintenance roles and responsibilities include

- Corrective maintenance: taking the corrective and educative steps required to correct problems with the utilization of a clinical information system or technology.
- Customized maintenance: modifying features already in production systems that require updating or modification for user needs; customized maintenance is essential in clinical information systems, as healthcare is constantly changing (e.g., new drugs, new treatment guidance, new procedures).
- Enhancement maintenance: improving the performance of applications and people associated with the use of tools.
- Preventive maintenance: taking steps in advance to reduce the risk of a problem, including testing before a new release or system upgrade.[12]

Information and Knowledge Delivery. Healthcare delivery is inherently complex and knowledge dependent, and it is becoming ever more challenging for providers to absorb and assimilate the growing volume and granularity of knowledge needed for safe and effective patient care. The clinical knowledge available is often conflicting, misaligned, and not readily identified or available at the point of care. To serve the needs of any clinical encounter, relevant patient-centered knowledge must be accessible to the person supplying care at the right time in the workflow. Such knowledge can be delivered proactively (before decisions are made), interactively (as decisions are made), or asynchronously or passively as reference information that can be searched online. Pharmacy informatics plays a key role in supporting and overseeing the core processes involving information and knowledge delivery throughout the clinical knowledge life cycle. This role includes knowledge discovery and creation, knowledge application and delivery, and knowledge asset management.

Knowledge Discovery and Creation. As technology-driven transactions for results, ordering, documentation, task completion, communication, and patient monitoring continue to grow, so will the amount of data. Pharmacy informatics plays a key role in analyzing these data for the purposes of understanding performance, evaluating processes, and reporting, predicting, and harvesting new information to create new knowledge for improving outcomes.

Knowledge Application and Delivery. Pharmacy informatics is responsible for leveraging knowledge at the right time and place within a provider's workflow to improve caregiver effectiveness, work satisfaction, patient satisfaction, and the quality of care. Pharmacy informatics must continue to evolve to optimize the use of clinical decision support and develop tools that reduce information overload and provider burden. Pharmacy informatics is responsible for looking beyond the traditional means of delivering knowledge by analyzing process and outcomes data from existing applications to develop and implement new solutions for embedding knowledge into the workflow.[13]

Knowledge Asset Management. Pharmacy informatics must play a significant role in managing and supporting a healthcare system's technology-enabled medication information and knowledge assets. This role would include assisting with authoring, encoding, cataloging, versioning, updating, disseminating, and maintaining an inventory of medication-related information and knowledge. Despite the emergence of commercial content-management systems and groupware, pharmacy informatics must provide the appropriate level of oversight and governance for these activities and play a role in the development of future knowledge asset–management systems that support end-to-end knowledge engineering.

Practice Analytics. The healthcare industry has historically generated large amounts of data driven by financial, regulatory, compliance, and patient care–related activities. These data have primarily been stored in hard copy form, making them difficult to process through traditional database management tools. Paper records have also limited opportunities for the effective exchange of information with other healthcare systems and for providing actionable insight on reducing costs, improving performance, and making decisions. The recent infusion of financial incentives and regulation involving HIT from the American Recovery and Reinvestment Act[14] has fueled the implementation of technologies across the United States, contributing to an exponential growth of available and usable healthcare data. Healthcare organizations are looking for every opportunity to transform and leverage data into information that provides concise, timely, descriptive, predictive, and prescriptive insight into their business and clinical data. Business intelligence (BI) and business analytics (BA) processes and technologies are enabling health systems to improve their performance and maintain their competitive advantage while creating an additional demand for clinical informatics professionals. Pharmacy informatics plays a significant role in all efforts surrounding medication management–related BI and BA activities. Pharmacy informaticists' understanding of basic software and database design, ability to grasp the big picture, and functional knowledge of detail, coupled with their analytical skills, create opportunities to develop evidence-driven answers for practice improvement and performance questions, such as

- How are pharmacists performing in relation to cost, quality, and service?

- How can pharmacists improve performance and safety within and outside of their service lines?
- How can pharmacy practice identify patients who are at risk for readmission?
- How can pharmacy practice identify patients requiring medication therapy management services?[15,16]

Pharmacy informatics roles and responsibilities in BI and BA must include

- Ensuring data are standardized, structured, and modeled to support a data-driven BI and BA culture,
- Creating effective analytics tools that allow for multiple formats and layers of analysis, from summary reports on individual patient encounters to an entire population of patients,
- Developing, maintaining, and ensuring the quality of clinical, operational, and financial dashboards, scorecards, screening tools, and surveillance tools to guide the achievement of treatment and strategic goals,
- Driving analytics to the frontline by creating greater end-user accessibility to BI and BA tools, and
- Monitoring the effectiveness of tools and information to deploy or further develop point-of-care or analytical systems.

Applied Clinical Informatics. Pharmacy informatics plays a key role in delivering informatics research principles and best practices to the bedside. Through informal and formal partnerships with the research community, pharmacy informaticists must work collaboratively with members of various disciplines to improve the effectiveness, efficiency, and safety of systems that support medication management. They must actively participate in relevant associations and workgroups in the clinical informatics field to maintain their current skills and play a significant role in the following activities:

- Acquiring professional perspective: understanding and analyzing the history and values of the discipline and its relationship to other fields while demonstrating an ability to read, interpret, and critique the core literature.
- Analyzing problems: analyzing, understanding, abstracting, and modeling a specific biomedical problem in terms of data, information, and knowledge components.
- Producing solutions: troubleshooting and effectively analyzing problems to identify and understand the spectrum of possible solutions and generating designs that capture essential aspects of solutions and their components.
- Articulating the rationale: defending the specific solution and its advantage over competing options.
- Implementing, evaluating, and refining: implementing the solution (including obtaining necessary resources and managing projects), evaluating it, and iteratively improving it.
- Innovating: creating new theories, typologies, frameworks, representations, methods, and processes to address clinical informatics problems.
- Working collaboratively: teaming effectively with partners within and across disciplines.
- Educating, disseminating, and discussing: communicating effectively to students and other audiences in multiple disciplines in persuasive written and oral forms.

Leading and Managing Change. To ensure that HIT systems support safe and effective medication use, pharmacy informaticists are expected to lead as well as manage the risks and changes associated with the development, implementation, safety, and use of systems that support medication management. Their knowledge and skills in comprehending and evaluating organizational culture, managing change, working effectively in interdisciplinary teams, communicating, synthesizing user requirements, and articulating HIT needs within the context of broad strategic goals allow them to play a significant role in

- Leading health-system, professional, industry, regulatory, standards-setting, and governmental organizations to sound conclusions regarding the use of technology in medication management,
- Leading and managing the evaluation and communication of the potential risks of a newly implemented technology and developing plans to mitigate potential hazards,
- Translating user requirements into safe and effective system designs,
- Implementing project management best practices, and
- Attaining key leadership roles within the healthcare technology industry, professional practice associations, and healthcare technology organizations.[4,10,11]

Conclusion

As the scope for the development and complexity of systems that support medication management continues to grow, so does the need for individuals to lead, manage, and evaluate them. Pharmacy informaticists are uniquely qualified and possess the necessary skills to fulfill this need. Their knowledge of pharmacy practice and safe medication use, combined with their understanding of informatics concepts, methods, and tools, provides the framework for effectively leading and participating in the procurement, customization, development, implementation, management, evaluation, and continuous improvement of clinical information systems.

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