Critical requirements for health-system pharmacy practice models that achieve optimal use of medicines

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When evaluating and designing practice models to achieve a preferred vision for health-system pharmacy practice, it is instructive to examine the elements of pharmacy practice that are essential to ensure optimal medication use. These elements include leadership, responsibility and accountability for the medication-use process, and the infrastructure of the pharmacy enterprise itself. Identification of priorities for medication therapy management is essential because of the reality of limited resources. A number of work-force issues are critical to the achievement of effective practice models. This article, by examining the literature and describing existing practice models, provides a basis for determining optimal ways to position health-system pharmacists to help patients achieve the best use of medicines.

Leadership

Leadership is an essential element of effective pharmacy practice models. It is important to note that every pharmacist plays a leadership role in his or her daily practice, whether in a designated leadership position or in a patient care role. As White1 put it, both the “big L and little l’s” are essential for optimal medication management.

The pharmacy leader’s engagement and influence on organizational decision-making are essential for a successful practice model. Anderson2 stated that the ability of the pharmacy leader to influence decisions is often related to the individual’s reporting relationship within the organization. The University HealthSystem Consortium (UHC) white paper on the chief pharmacy officer and the ASHP statement on the pharmacy executive describe the importance of the pharmacy leader’s participation in key organizational initiatives to ensure that safe and effective medication management is identified as a key priority within health systems.3,4 This position is also supported by the National Quality Forum as a key safe practice.5

In some organizations such as the Veterans Health Administration (VHA), the role and responsibilities of both the pharmacy chief and assistant chief are explicitly defined.6 A number of multihospital systems have created positions for system-wide pharmacy leaders, which adds a pharmacy voice at the executive level. In one system, the success of a clinical practice model pilot resulted in the establishment of a system director for clinical services.7

The skills and attributes of the individual leader are important considerations. Leadership skills have been identified as a critical requirement for achieving a high-performance pharmacy.8 Key leadership skills and attributes include vision, perseverance, interpersonal skills, building professional relationships, mentoring, seizing opportunities, and a commitment to lifelong learning.9
Responsibility and accountability

Twenty-five years ago, responsibility for medicine-use outcomes was identified as the foundation of pharmaceutical care. Although it is generally understood that pharmacists are responsible for medication use at the patient level, these responsibilities also extend to the systems that comprise the medication-use process. The ASHP policy on the “Integrated Team-Based Approach for the Pharmacy Enterprise” states that coordination of all components of pharmacy is necessary in the development and maintenance of patient-centered practice models.

The importance of this responsibility for the medication-use process continues to be articulated by the pharmacy profession and its leaders. In its long-range vision for the pharmacy work force, ASHP states that “all pharmacists will be responsible for error prevention, patient safety, and patient outcomes related to medication therapy.” Breland stated that the pharmacist is responsible first to the patient. Abramowitz stated that every patient should receive a “comprehensive, multidisciplinary, transferable pharmacotherapy plan” and that the pharmacist is primarily responsible for this plan.

Pharmacy department infrastructure

Fundamental to a pharmacy practice model is an infrastructure that delineates the organization of key functions and responsibilities. The elements of this infrastructure can be found in a number of documents, including ASHP’s minimum standard for pharmacies in hospitals. Based on the ASHP standard and the other consensus-based sources, the essential elements of a pharmacy infrastructure include

- Leadership at the departmental and organizational levels with a focus on quality and performance improvement, financial performance, and workforce development,
- Medication-use policy,
- Core patient care services and services for high-risk populations,
- Distribution services (procurement, storage, compounding, and dispensing),
- Automation and information technology,
- Education, training, and research,
- Medication safety, and
- Ambulatory care services (Table 1).

### Table 1.

<table>
<thead>
<tr>
<th>Essential Element in ASHP’s Minimum Standard for Pharmacies in Hospitals</th>
<th>Related Elements in Other Sources</th>
<th>Synthesis of Essential Elements of Contemporary Pharmacy Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Leadership and practice management</strong></td>
<td>Financial performance, human resources</td>
<td>Leadership focus on quality and performance improvement, financial performance, and workforce development</td>
</tr>
<tr>
<td><strong>Drug information and education</strong></td>
<td>Medication-use policy, education</td>
<td>Medication-use policy</td>
</tr>
<tr>
<td><strong>Optimizing medication therapy</strong></td>
<td>Patient care services, medication safety</td>
<td>Patient care services for all patients and for specific patients based on need</td>
</tr>
<tr>
<td><strong>Medication distribution and control</strong></td>
<td>Medication preparation and delivery, medication safety</td>
<td>Distribution services (medication procurement, storage, preparation, and delivery)</td>
</tr>
<tr>
<td><strong>Facilities, equipment, and information resources</strong></td>
<td>Medication safety</td>
<td>Information systems and technology, medication safety</td>
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<tr>
<td><strong>Participation in drug therapy research</strong></td>
<td>Education and research</td>
<td>Education, training, research</td>
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<tr>
<td></td>
<td></td>
<td>Medication safety</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ambulatory care services and continuum of care</td>
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</tbody>
</table>
This list is not all-inclusive. Because of differences among health systems in terms of size, structure, and resources, the organization and prioritization of these elements will vary.

In multihospital systems, support for this infrastructure often exists at the system level, where specific pharmacists are designated to oversee these functions. In community hospitals, a few individuals may be responsible for overseeing several of these areas; in academic medical centers, specific positions are dedicated to many of these functions.

**Responsibility for the medication distribution system**

Over the past decade, concern about medication safety has created an imperative to evaluate risks associated with each step of the medication-use process. While the focus of clinical pharmacy is at the prescribing and monitoring steps, the foundation of pharmacy practice is procurement, inventory management, storage, compounding, and dispensing—commonly referred to as the medication or drug distribution system. Galt and Narducci described the concept of integrated services, which includes the pharmacist’s responsibility for dispensing as essential to the achievement of a successful practice model.

The creation of positions for pharmacy specialists in medication operations and systems has also been recommended. These individuals would possess expertise across all elements of the drug distribution system, including the use of technology. The delivery of safe, reliable, effective, and efficient drug distribution services requires “pharmacists who understand the application of technologies to support the respective elements of the medication-use process for which they were developed, oversight of technicians who run them, and performance of quality and safety checks to ensure the systems operate safely and efficiently.”

These specialists would also possess knowledge and skills in areas such as management of shortages and recalls, packaging, sterile compounding, infusion delivery systems, emergency preparedness, technician training and supervision, hazardous-waste management, and quality-control systems.

The current state of drug distribution in health-system pharmacy is characterized by significant adoption of automation and ongoing debates about centralized versus decentralized distribution of medications. Currently, 83% of hospitals utilize automated dispensing cabinets for the majority of medications, controlled substances, as-needed medications, or first doses of selected drugs. In addition, 10% use robots for filling 24-hour medication carts, 12.7% use carousel dispensing technology, and some hospitals have begun using robots for compounding i.v. medications. Participants in a recent ASHP leadership workshop acknowledged the importance of dedicated resources to ensure the safe and effective deployment of technology and the importance of having pharmacists with expertise in the core elements of the medication-use process.

Leveraging the technician workforce to support the medication distribution system is essential. Some state boards of pharmacy permit specially trained technicians to check patient medication carts, allowing the redeployment of pharmacists to patient care areas. Technician roles have expanded to include product-recall management, regulatory compliance, quality-assurance audits, medication safety initiatives related to drug distribution, and management of automation and technology. The development of residencies to advance the competencies of technicians should be considered as a key strategy to support the practice model.

Whether the medication distribution system should be centralized or decentralized is an ongoing subject of discussion because the ideal model for efficient, effective, and reliable delivery of medications to patients is still largely “under construction” in most hospitals. The debate carries over to patient care units where nurses want to reduce “hunting and gathering” medications and needed supplies during the medication administration process. From a nursing perspective, medications that can be secured in the patient’s room would be ideal, especially as organizations move toward bar-code-assisted medication administration. This concept poses a number of challenges from a pharmacy perspective related to resources to support secured bedside storage of medications, regulatory issues associated with security and accountability of medications (especially controlled substances), and safety issues associated with the removal of discontinued medications when the patient is transferred or discharged. In addition, with the number of intravenous medications that inpatients often require, the “hunting and gathering” cannot be totally eliminated.

While the ideal distribution system is still evolving and depends on organization-specific characteristics such as bed size, resources, facility design, and the outcomes of nursing–pharmacy dialogue, the medication distribution system is the cornerstone of pharmacy practice models.

**Priorities for patient-centered medication management**

Priorities for patient-centered medication management should be based on (1) the evidence supporting the role of pharmacists in improving patient care and (2) the needs of the population being served. A review of the literature and recommendations from professional organizations revealed a number of resources that can be used to determine these priorities. An analysis of published articles over a 20-year
period on inpatient pharmacist interventions demonstrated that rounds, patient interviews, medication reconciliation, and discharge counseling and follow up improved patient outcomes. Medication therapy services for each patient need to be specifically defined, and specific services should be identified for high-risk and therapeutically complex patients.

Essential pharmacist-provided services, based on agreement by more than 75% of pharmacy directors in the 2008 ASHP national survey on dispensing and administration, included:

- Adjustment of medication dosage based on disease, response, or pharmacokinetic monitoring,
- Review of medication orders before first-dose dispensing,
- Monitoring of responses to therapy based on laboratory test values, progress notes, and observation,
- Daily patient-specific medication profile review,
- Medication reconciliation,
- Round-the-clock pharmacy services,
- Pharmacist consultation and drug therapy management for specific therapies (e.g., pain management, nutrition, anticoagulation), and
- Collaboration with multidisciplinary teams.

The UHC Task Force on Practice Models for Academic Medical Centers recently identified patient care services that should be provided by pharmacists. These services are divided into two categories: services for all patients and services for high-risk patients.

Recommended services for all patients included:

- Medication reconciliation on admission and during changes in level of care,
- Review of all nonemergent orders before administration of the first dose,
- Individualized treatment and monitoring plans,
- Patient education regarding new medications,
- Daily monitoring of patient medication profiles,
- Participation in patient care rounds, and
- Communication of patient discharge information to the patient’s pharmacy and physician.

Recommended services for high-risk patients with more complex therapies included:

- Medication reconciliation for targeted patients before discharge to ensure continuity,
- Patient education for high-risk patients or those with complex regimens,
- Anticoagulation management,
- Resuscitation team participation,
- Antimicrobial stewardship,
- Streamline medication orders,
- Pharmacokinetic evaluation, monitoring, and dosing,
- Parenteral nutrition assessment and recommendations,
- Dosing adjustments based on renal function, and
- Collaborative drug therapy management.

In an effort to better provide patient care services, the pharmacy staff at St. Luke’s Hospital in Kansas City developed a daily list of activities that must be completed by decentralized pharmacists. These include participating in patient care rounds, monitoring aminoglycosides and vancomycin levels, assessing patients’ nutritional needs, following up on computerized medication alerts, and performing medication reconciliation.

The ASHP 2015 Health-System Pharmacy Initiative supports the role of pharmacists in the management of medication therapy for “complex and high-risk medication regimens.” The 2009 ASHP national survey found that 65.4% of hospitals have pharmacists assigned to cover critical care patients, 52.1% have pharmacists assigned to oncology, and 42.3% have pharmacists assigned to pediatrics. Based on an assessment of medication management needs in patient care areas, Providence St. Peter Hospital in Washington State, a 300-bed community hospital, allocated pharmacy resources to high-risk areas such as critical care, oncology, and pediatrics. Evidence supports the role of the pharmacist in improving outcomes in the critical care setting, pediatrics, oncology, transplantation, and, more recently, in emergency medicine. Geriatric patients represent another high-risk population; currently, there is a shortage of pharmacists who are trained in this area.

In recent years, the national focus on quality and safety has resulted in the promulgation of a number of medication-related initiatives that are described in the ASHP Quality Improvement Initiative. These initiatives reflect problems in quality that have been categorized as underuse, overuse, and misuse of health care interventions. Quantifying the pharmacist’s role in reducing overuse, underuse, and misuse of medications could be used as a basis for a strategic plan for quality in pharmacy and the development of a “medication-effectiveness dashboard.”

A growing body of evidence supports the role of pharmacists in reducing drug costs and length of stay and in improving economic outcomes. In one organization, the downsizing of clinical pharmacist staff resulted in increased drug costs that were subsequently reduced when the staff were added back. Responsibility to ensure effective resource management will continue to be an important and explicit element of pharmacy practice, because drug costs make up the majority of the pharmacy budget. Pharmacy departments are accountable for managing the rate of rise of pharmaceutical expenditures. In
organizations facing financial difficulty, increases in drug expenses have resulted in reduced pharmacist staffing levels. Although the pharmacist’s role in ensuring responsible use of medications begins with the selection of drugs for the formulary and subsequent evaluation of the appropriateness of medications prescribed, the pharmacist’s responsibility continues throughout the medication-use process. Establishing resource management priorities is an ongoing pharmacy responsibility based on the advent of expensive therapies, the types of patients receiving care, the pharmacy resources available to influence medication management, and the economic climate and imperatives within the health system.

Profiles of contemporary pharmacy practice models

The 2009 ASHP national survey on monitoring and patient education delineated three types of practice models and their prevalence among hospitals:

- A drug-distribution-centered model (24.4% of hospitals),
- A patient-centered integrated model with clinical generalists who have distributive and clinical responsibilities (64.7%), and
- A clinical specialist model with separate roles for clinical staff and distributive staff (10.9%).

For the future, “83.6% of pharmacy directors envisioned a patient-centered model, 12.3% envisioned a clinical-specialist-centered model, and 4.1% envisioned a drug-distribution-centered model.”

Some organizations use the terms “integrated” or “unit-based” pharmacists to describe the model in which pharmacists, in collaboration with technicians, are responsible for all patient needs, including order review and verification, dispensing, and clinical services. Significant controversy surrounds the patient-centered model versus the specialist model. It has been suggested that more than one model may need to exist within an organization to meet the needs of high-risk populations, such as those in pediatrics, oncology, and transplantation units. The design of practice models must take into consideration the needs of differing patient populations while defining clinical services that should be provided to all patients. Regardless of the model, in most organizations, the pharmacist:patient ratio is generally lower in critical care, pediatric, and oncology areas than in medical-surgical areas. This leads to the question, what are effective pharmacist staffing levels to ensure the safe and effective management of patients?

Staffing effectiveness is a Joint Commission standard and requires that an organization identify “undesirable patterns, trends, or variations in its performance related to the safety or quality of care.” The National Quality Forum has identified a number of nursing quality-of-care indicators that are related to staffing levels (e.g., the rate of falls and decubitus ulcers). Effective pharmacist staffing involves the relationship between staffing and undesirable quality and safety outcomes. This is an important area for examination in practice model deliberations.

A review of available information from pharmacy publications, presentations, and online resources, including the ASHP Practice Model Initiative Pharmacy Spotlights, offers insight into contemporary practice models. Based on these sources, specific pharmacy practice models were profiled (Table 2), highlighting the automation and information technology in place, the role of technicians, the structure for providing clinical pharmacy services, and strategies used to support patient-care activities. Since these snapshots are based on available information from a variety of resources, the descriptions may not be complete, and changes may have occurred since the time that the information was reported. These profiles reveal a number of themes that are relevant to the design of practice models:

- Definition of core clinical services,
- Collaboration of unit-based pharmacists with health care teams,
- Use of specially trained pharmacists for management of drug therapies in high-risk populations,
- A team-based approach to integrate generalists and specialists,
- Technician training and triage roles to support drug distribution,
- Use of residents and students as pharmacist extenders,
- Medication-use technology as a foundation for drug distribution services,
- Use of bar-code technology for drug distribution, and
- Training of pharmacists to ensure clinical competency.

Some organizations have described their approach to changing their practice model. Pickette et al. described the implementation of a standard clinical practice model in a multihospital system. The clinical practice model focuses on patient care rounds and profile review supported by centralized order entry. Clinical practice is supported by optimizing automated dispensing cabinets, the use of scanning technology, and routing distribution-related questions to technicians using an automated telephone tree. The expansion of clinical practice was based on the principle that increased labor costs would be offset by cost savings achieved through clinical pharmacist interventions. Pharmacists designated to provide clinical services received training in therapeutic areas. Daily clinical responsibilities and documentation requirements were defined.
Table 2. 
Profiles of Contemporary Pharmacy Practice Models

<table>
<thead>
<tr>
<th>Organization (Average Daily Census)</th>
<th>Medication Distribution Model (Technology Used)</th>
<th>Practice Model Highlights</th>
<th>Distinguishing Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Community</strong></td>
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<tr>
<td>Columbus Regional Healthcare System (175)</td>
<td>Robot, ADCs (NA)</td>
<td>Unit-based pharmacists provide order entry and clinical services; policy on pharmaceutical care defines priorities for patient care responsibilities</td>
<td>Satellites serve as offices with resources for pharmacy staff; laptop computers support pharmacists on units</td>
</tr>
<tr>
<td>Huntsville Hospital (600–650)</td>
<td>ADCs used for ~90% of patients</td>
<td>Unit-based pharmacists responsible for order verification and clinical services; core clinical services defined</td>
<td>Pilot study led to implementation of unit based model; threefold increase in interventions and cost avoidance of $520/day on 2 pilot units; training of unit-based pharmacists to ensure competency</td>
</tr>
<tr>
<td>Martha Jefferson Hospital (100)</td>
<td>Robot, carousels, high-speed packaging, bar-coding used for dispensing and scanning (BCMA)</td>
<td>Unit-based pharmacists with integrated responsibility for order entry and clinical services; pharmacists dedicated to high-risk areas such as critical care and oncology; core clinical services defined; well-trained technicians play significant role in dispensing</td>
<td>All pharmacists rotate through all areas of practice; plan to have pharmacists involved in ensuring compliance with quality indicators</td>
</tr>
<tr>
<td>Providence St. Peter Hospital (250)</td>
<td>Goal: use ADCs for 85% of medications (eMAR, BCMA)</td>
<td>Decentralized pharmacists provide clinical services with specific responsibilities; centralized order review and entry; triage pharmacy technician to support drug distribution</td>
<td>Quiet area for order entry; focus on staff development to ensure clinical competency</td>
</tr>
<tr>
<td>St. Luke’s Hospital (240)</td>
<td>Carousels, ADCs (BCMA)</td>
<td>Patient-centered model; decentralized pharmacists as part of multidisciplinary teams; Daily Expectations List of core clinical services; technicians manage most drug distribution processes</td>
<td>Scheduling committee to support work–life balance; notebook computers support rounding; pharmacists involved in ensuring compliance with quality indicators; pharmacy residents and students integrated into practice model</td>
</tr>
<tr>
<td><strong>Academic</strong></td>
<td></td>
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<tr>
<td>Johns Hopkins Hospital (752)</td>
<td>Robotics for central cart fill, infusion syringes and high speed packaging; ADCs for selected medications, carousels, plan to convert to 90% ADCs (CPOE, eMAR)</td>
<td>Generalists: &quot;point-of-care&quot; pharmacists review and verify medication orders, support medication distribution, drug information, dosing, rounds, code blue participation</td>
<td>Core clinical services for all patients defined; specialized services for high-risk populations; require technicians to be certified through PTCB; resident on-call program; specialized technical staff serve in supervisory roles; nontraditional program for professional development of existing staff</td>
</tr>
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<tr>
<td>University of Kentucky (^{16}) (420)</td>
<td>ADCs for 80% of adults and 60% of pediatric patients (CPOE, eMAR)</td>
<td>Specialists: support management of high-risk medications, provide consult services, develop and implement order sets, guidelines, protocols, conduct drug-related research and other scholarly activities</td>
<td>Current focus: evaluation of generalist and specialist areas of coverage and roles to create a team-based approach and planning for new services</td>
</tr>
<tr>
<td>University of Michigan (^{14}) (775)</td>
<td>Central dispensing robot for cart fill for adults; carousels; barcode repackaging system; barcode-assisted distribution; ADCs including a cartless model in cardiovascular center (CPOE, eMAR)</td>
<td>Generalists and specialists</td>
<td>Residents on call for 24-hr services; residents and student are an integral part of practice model and act as &quot;proxy&quot; to clinical specialists; pharmacy technician training program felt to be essential</td>
</tr>
<tr>
<td>University of Minnesota Medical Center, Fairview (^{15}) (300)</td>
<td>ADCs-cartless; i.v. robot in beta-testing phase (CPOE, plans for BCMA)</td>
<td>Generalists: unit-based, responsible for order verification, interdisciplinary care, clinical services such as i.v. to oral conversion, renal dosing, drug information, participation on emergency resuscitation team</td>
<td>Patient information organized to support pharmacist evaluation of patients with clinical decision support that identifies patients that need pharmacist follow up</td>
</tr>
<tr>
<td>Rural Fauquier Health (^{11}) (40)</td>
<td>NA (CPOE, eMAR)</td>
<td>Clinical leaders responsible for pharmacist and technician teams; pharmacists have integrated responsibility for order review and verification, clinical services, rounding; decentralized technicians responsible for drug distribution, missing doses, ADCs, &quot;drip rounds,&quot; weight and allergy verification and triage of distribution issues</td>
<td>Current focus: development of core services for all patients, integration of generalists and specialists; development of team-based approach to the practice model</td>
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</table>

**Current teams:** oncology, critical care, pediatrics, cardiovascular and solid organ transplantation

**Current focus:** development of core services for all patients, integration of generalists and specialists; development of team-based approach to the practice model

**Technicians are highly trained; all are certified; mentoring program for staff to support clinical role**

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\(^{1}\)ADC, automated dispensing cabinet, NA = not available, BCMA = bar-code-enabled medication administration, eMAR = electronic medication administration record, CPOE = computerized prescriber order entry, PTCB = Pharmacy Technician Certification Board.
In an academic medical center, the transition from centrally based pharmacy staff to having pharmacist and technician teams on patient care units improved the quality of the medication-use process and nursing satisfaction and resulted in an increase in the number of intercepted errors. The change was facilitated by the implementation of a centralized dispensing robot, automated dispensing cabinets, and an integrated electronic health record. A multidisciplinary team developed the structure of the decentralized pharmacy teams. The pharmacists perform unit-based order entry and provide clinical services while technicians serve as a liaison among the central pharmacy (which dispenses medications), decentralized pharmacists, and nurses. Technicians are responsible for solving distribution-related issues (e.g., missing medications, operational problems with automated dispensing cabinets).

VHA system has one of the most highly evolved pharmacy practice models. The pharmacy program is specifically defined on a national basis and provides a complete spectrum of pharmacy services across the continuum of care. A VHA directive delineates procedures for establishing medication prescribing authority for clinical pharmacy specialists. VHA recently implemented a requirement for technician certification by the Pharmacy Technician Certification Board in order to improve technicians’ skills and enable progression in their career.

An examination of practice models would not be complete without mentioning the essential role pharmacists play in the nation’s 2000 rural hospitals, which often have fewer than 100 beds. A recent ASHP national survey found that patient-centered integrated models are used in 67% of small hospitals. Over 50% of small hospitals have pharmacists assigned to inpatient medical-surgical units for 8–24 hours each day, and approximately 30–40% of small hospitals have pharmacists assigned to high-risk areas, such as critical care, oncology, and pediatrics. The use of telepharmacy to provide extended hours of pharmacy services has resulted in a reduction in medication errors in small rural hospitals.

**Continuum of care**

A number of innovative pharmacist services across the continuum of care have been described. Depending on the resources available in health systems, pharmacists in the acute care setting may provide patient counseling and medication reconciliation. Medication reconciliation is considered a pharmacy priority by academic medical centers, and some organizations have engaged pharmacy students and technicians in this role. Integrated health care systems such as Kaiser Permanente, VHA, and academic medical centers generally have pharmacists involved in medication therapy management across the continuum of care, including ambulatory care clinics and home care services.

In an academic medical center, postdischarge medication review and telephone follow-up by a pharmacist were found to reduce the hospitalization rate and total health care costs. Similarly, Schnipper et al. reported a lower rate of preventable adverse drug events 30 days after discharge associated with medication review, patient counseling, and telephone follow-up. Williams et al. reported a reduction in admissions as a result of adding a pharmacist and pharmacy students to a family medicine inpatient service that was responsible for following patients when they were admitted to the hospital.

A systematic review of research on the pharmacist’s impact on outcomes revealed that the majority of studies have been conducted in outpatient settings. A recent 10-year evaluation of the effect of medication therapy management provided by Fairview Pharmacy Services found improved clinical outcomes and costs savings. Additionally, 38,631 drug therapy problems were identified, a significant number of which were due to underuse. Specifically, 28.1% of problems were attributable to the need for additional medication, and 26.1% were associated with a subtherapeutic dosage. There was also a 55% improvement in patients’ conditions during this time period. In this model, medication therapy management services are provided via clinics as well as retail pharmacies.

The new federal health care reform bill supports the development of delivery models that include medication therapy management services to improve quality, prevent readmissions, and reduce costs. The emerging model of the medical home presents pharmacists with an opportunity to provide medication therapy management services as part of a multidisciplinary team. Collaborative practice acts, which exist in approximately 46 states, support this role.

Given the evidence supporting pharmacist’s value across the continuum of care, the new opportunities for engagement, and the fact that patients spend most of their lives outside the confines of a health system, the design of a pharmacy practice model should ensure that the role of the health-system pharmacist extends beyond acute care as much as possible.

**Work-force issues and imperatives**

Health care work-force issues have been an area of focus in recent years because of shortages across the health professions, changing patient demographics, and the need for new care delivery models. The ASHP Long-Range Vision for the Pharmacy Work-Force and the Council on Credentialing resource paper on the role, responsibilities, and functions of pharmacists and pharmacy technicians serve as a foundation for the creation of a work-force agenda.
for practice models. Here is a summary of work-force issues and imperatives that have a bearing on pharmacy practice models:

1. **Shortage of pharmacists.** Although the Pharmacy Manpower Project has found that the shortage appears to be slightly less than in previous years, there is still a shortage of competent pharmacists in a number of key areas, such as oncology, pediatrics, transplantation, and geriatrics; leadership; informatics; medication operations and systems; and sterile compounding.

2. **Ensuring competency.** A competent work force is essential to ensure the optimal use of medications. Medication management must also be specifically addressed for high-risk populations. Further, pharmacy practice must integrate the five core competencies for health care professionals identified by the Institute of Medicine: delivery of patient-centered care, working as part of an interdisciplinary team, use of evidence-based medicine, applying quality improvement approaches, and use of information technology. Competency also requires a commitment to lifelong learning.

3. **Pharmacists desire for work–life balance.**

4. **The need for highly trained and certified technicians.**

5. **The importance of professionalism.**

6. **The essential role of residencies.** Residencies aid in the development of highly competent practitioners; allow residents to serve as pharmacist extenders in order to expand services to patients; foster innovation; support the training of pharmacy students, pharmacy staff, and other health care providers, including those in various stages of training; support recruitment; and foster the development of professional values.

7. **Importance of interdisciplinary patient care.** A team approach to patient-centered care is a key priority on the national agenda as well as for pharmacy practice. As part of the interdisciplinary team, pharmacists need to play a leadership role in medication management, regardless of their title or role in the health system.

### Enablers and barriers

In the deliberation of critical elements of optimal pharmacy practice models, it is important to recognize key enablers and barriers, some of which have already been addressed. Examples of additional enablers include:

- Evidence supporting the positive impact of pharmacists on patient outcomes,
- Professional organizations that recognize and support the role of the pharmacist in patient care, including the Society of Critical Care Medicine, American Academy of Pediatrics, American College of Physicians–American Society of Internal Medicine, Society of Hospital Medicine, and National Quality Forum,
- The Joint Commission’s recognition of the importance of the pharmacist’s review of medication orders,
- The increasing number of board-certified pharmacy specialists,
- The increasing number of pharmacy students who want to pursue residencies,
- VA’s pharmacist scope of practice and established process for prescribing authority,
- Closed-loop systems that use barcode technology from receipt of medication to patient administration, and
- A national focus on quality and safety.

Examples of barriers to an optimal pharmacy practice model include:

- Lack of “pharmacy-sensitive” metrics to determine effective staffing levels,
- Pharmacy’s designation as an “ancillary service” diminishes the pharmacist’s role as a clinical provider and focuses instead on drug distribution services,
- Opposition from some physician organizations,
- Pharmacy leadership shortage,
- Financial constraints in health systems resulting in reductions in pharmacy staffing levels,
• An insufficient number of pharmacists who possess knowledge and skills to assume advanced clinical roles,7,27
• Lack of pharmacist staffing resources,27
• Pharmacists’ resistance to change,27
• Lack of pharmacists with needed training,27
• Lack of automation to support change,27
• Lack of hospital leadership support,27
• Lack of qualified technicians,27
• State pharmacy practice acts limit pharmacist’s role (e.g., only a handful of states allow technicians to check technician-filled medication cassettes, prescribing is not a universally accepted practice in pharmacy),
• Insufficient professional orientation among pharmacists,
• Operation of information systems and technology requires the investment of significant pharmacy resources and has resulted in pharmacists becoming “servants of technology”, often focused on transactions rather than patient care,23 and
• Regulatory agencies that perceive pharmacy’s role primarily as production oriented rather than patient oriented.

Conclusion

The pharmacy practice model represents the integration of people, products, processes, and systems with the fundamental goal of leveraging intellectual capital to ensure the optimal use of medications. Examination of evidence, the collective vision of pharmacy professional organizations, and descriptions of existing practice models provide support for the critical elements of the pharmacy enterprise that are essential to achieving this goal. It is anticipated that practice models will evolve as the electronic health record and medication-use technology mature, allowing pharmacists to further utilize their knowledge and skills in the care of patients. Health care reform will bring new challenges in terms of health-system financing and new opportunities for delivery models that support medication therapy management. It is imperative that pharmacists continue to demonstrate their unique contributions to quality and safety in all settings, push traditional boundaries that limit their scope of practice, and work collaboratively with health care teams to ensure optimal medication use for patients.

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