

The pharmacist's rise from drug dispenser to care provider

How technology is elevating
the pharmacist's role in
delivering patient care



In many industries, the shift from human to technical systems could result in workforce reductions — but it will also liberate some groups of professionals to expand their roles.

Among these professionals are pharmacists, who are poised to raise their profile from dispensers of medications to care providers, using their expertise to help patients make the most of their medicines and live healthier lives. In the process, pharmacists will play a practical and vital role in furthering the healthcare industry's evolution by helping make patient-centered care a workable reality.

There is great potential in health systems for pharmacists to ensure the most appropriate and effective use of medications. They can use their expertise to select a medication and then monitor its efficacy and whether the patient tolerates it, as well as make changes to the dosage to optimize treatment. For a patient with high blood pressure, for instance, the pharmacist would choose the class of drug and the precise product, ensure that the medication is started at the right dose and monitor the patient's response with respect to blood pressure and any associated effects, such as kidney function.

We expect the relationship between doctors and pharmacists to be collaborative. In some cases, the pharmacist will both diagnose and treat, whereas in others, the pharmacist will provide support as the doctor leads both diagnosis and treatment. As pharmacists are increasingly recognized as the best professional to provide guidance on medication, new models of care will better integrate the pharmacist as a pivotal care team member. Already, pharmacists are working alongside doctors and wider multidisciplinary teams in both hospital and community settings, providing advice to maximize the effective and safe use of medicines.

The opportunity

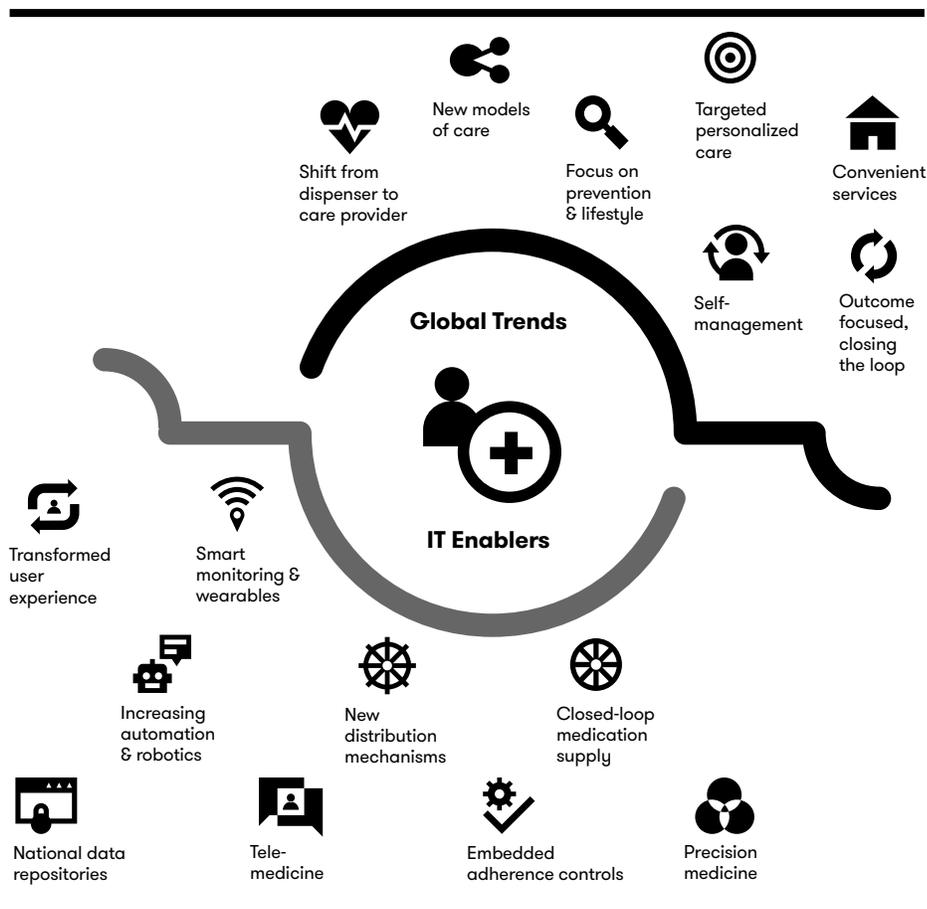
There is no doubt that increased pharmacist input can improve traditional models of patient management. Nonadherence, for example, is estimated to be responsible for 48 percent of asthma deaths, an 80 percent increased risk of death in diabetes and a 3.8-fold increased risk of death following a heart attack.

Failure to collect prescriptions is another manifestation of nonadherence. In the UK National Health Service (NHS), two small studies¹ show that 5.2 percent of items prescribed were not dispensed, although these studies were conducted before prescriptions became free. Even though one pound in every eight of NHS spending is on medicines, up to half of all the medicines prescribed are not used as the prescriber intended.

Traditional models of care are also not well suited to managing people with multimorbidity — more than a single condition. The incidence of multimorbidity is high in older age, affecting between 55 percent and 98 percent of people across studies, depending on definition, age of the population and data source.² Furthermore, people with a long-term condition, particularly a mental health condition, are more likely to develop additional conditions over time.³ Shockingly, the development of multimorbidity in more deprived populations can occur 10 to 15 years before more affluent populations.

In the United Kingdom, the National Institute for Health and Care Excellence (NICE) published a guideline for the management of multimorbidity that has relevance in all markets.⁴ It emphasizes that the best care for people with multiple long-term conditions cannot be achieved by treating each condition individually. There must be a more pragmatic prioritization of interventions agreed upon by clinicians with the active involvement of the patient. This approach may include being prepared to stop or decline medications.

Figure 1. Global trends affecting the role of the pharmacist



In the future, pharmacists will have a key role to play in the provision of “convenient services,” supporting interventions in locations that are most convenient to the patient. As consumer expectations rise, advances in technology are creating new ways to access pharmacy expertise, including telecare and telehealth services and the ability to order medications delivered to your home in prepackaged doses. The role the pharmacist can play in diagnosing and treating minor ailments also improves the accessibility of services and reduces pressure on acute services.

Pharmacists will also have a key role as educators, empowering patients to take responsibility for managing their own health and well-being. This focus will grow, with examples including the role of the pharmacist in smoking cessation and sexual health education. In supporting these initiatives, data can bring great value in helping the industry derive insights and ensure that educational services are targeted where they have the greatest impact on the population, such as demographic groups predisposed to certain conditions.

Technologies enabling the shift

We suggest that the following technology solutions will be important in empowering pharmacists:

- **Mobility.** Mobile applications can be used at the patient's bedside or in community settings to undertake and document appropriate clinical review. This requires seamless connectivity and integration with healthcare systems of record to ensure visibility of the patient's medication and clinical history across the care continuum.
- **Interoperability.** With interoperable systems, care can be vertically integrated such that a community-based pharmacist can be mobilized to support an effective hospital discharge and help avoid costly readmissions. This might involve scheduling a domiciliary visit after discharge to check that patients and/or their caregivers understand a medication and its relevance to their condition and are confident and capable in taking it.
- **Clinical decision support through analytics.** As clinicians work with patients to optimize their care, clinical decision support through advanced analytics will be essential. This will ultimately provide less generic pathway information and more customized recommendations linked to the patient's precise health.

Technology does not stop with these innovations. Pharmacists will increasingly use telehealth solutions — such as receiving physiological measurements from patients who are measuring their blood pressure or blood sugar at home — and will extend to a plethora of home-based information relating to patient activities. A proportion of medications will be available as “smart pills” that encourage patient compliance with medication regimes monitored at a distance.

Increasingly, communication will be multichannel, using either real-time contact via virtual consultation and text or using email or text-type approaches. This requires connectivity in a variety of settings, devices that can readily support communication and sufficient technical competence gained through effective training of pharmacists.

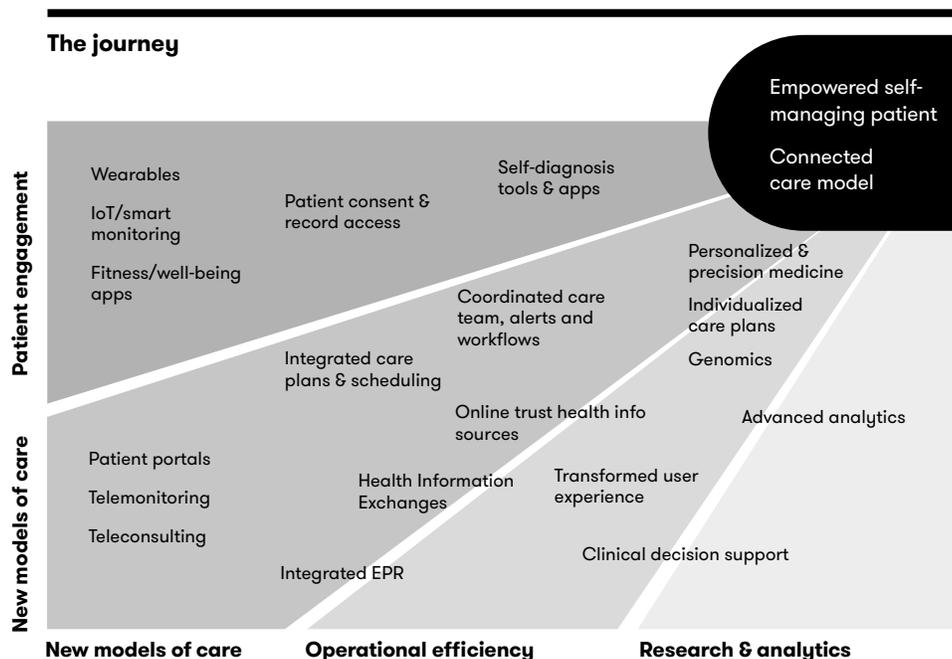
The use of technology will need to be considered in pharmacists' university training, as well as in ongoing professional development. Access to educational materials needs to be “on demand” and is unlikely to be provided through traditional face-to-face education or through journals. Just as people turn to YouTube videos to develop a variety of skills, pharmacists will need dedicated educational platforms that give access to training and help them document their professional development.

Technical platforms for new ways of working

The role of the pharmacist is developing exponentially, with technology solutions providing a platform to support new ways of working.

The increasing prevalence of digital workflows in the pharmacy domain, for instance, is transforming healthcare delivery. Forward-looking health economies are already investing in technology solutions, including robotics and automation, analytics, telemedicine and patient-facing portals. These solutions enable healthcare organizations to drive operational efficiencies, improve the patient and staff experience, deploy new models of care and leverage vast quantities of data to deliver better treatment.

Figure 2. Evolving technologies contribute to new models of care delivery



Three domains will further empower pharmacists in their role as medication experts and as integral members of the patient care team.

Individual care plans: Personalized care and precision medicine

A new field of medical practice — precision medicine — is disrupting the current one-size-fits-all approach of Western medicine and introducing new levels of complexity for professionals engaged in the care process, including pharmacists. Precision medicine proposes a new range of medications and treatments that are the most appropriate for the patient based on genetic, environmental and lifestyle factors.⁵ The pharmacogenomics research field has emerged to deal with the relationship between genomic variations and drug efficacy, discovering that environmental factors and lifestyle also have an important role in drug efficiency depending on the patient’s genomic profile.

In the United States, the National Institutes of Health (NIH) is undertaking an ambitious effort to gather data from diverse participant communities on how biological, environmental and lifestyle differences shape individuals’ health.⁶ The All of Us Research Program is a groundbreaking precision medicine effort with a goal of blending crowdsourcing and clinical data science to pinpoint factors that influence health and disease. DXC Technology is working with the NIH to build the program’s Participant Center, providing expertise and support for the consent, engagement and outreach processes needed to enroll and retain the program’s exceptionally large cohort.

While medical studies typically focus on small cohorts and specific diseases, All of Us is expected to grow to include 1 million or more participants and will explore many health conditions, including multimorbidity. It will be one of the richest databases of medical information ever built across socioeconomic, geographic, racial/ethnic and other sectors. The emergence of electronic health records and mobile health apps, along with advances in genomics and data science, has helped make this massive program possible. The NIH suggests that the program “will enable a new era of medicine in which researchers, healthcare providers and patients work together to develop individualized care.”

In the growing field of precision medicine, pharmacists will be key members of the patient’s circle of care, contributing to the definition of complex therapies for the individual patient (often comprising multiple drugs) in accordance with intricate protocols and patient context. Pharmacists will be supported by a genomic decision-support system that will propose the best approach based on evidence produced by the research community.

While the objective of precision medicine is to take a scientific approach to tailoring medical treatments to each patient, personalized medicine has a complementary role. Its focus is to engage with and deliver information to the patient in ways that enable that person to decide the right next step. Personalized medicine can be considered as the consumerization of care, or the ability to provide actionable information to patients in ways that enable them to improve their own health.

It is now possible to take data about patients from many sources — both clinical and nonclinical — to gain insights into a person’s life and then, with technology as the enabler, provide actionable insights on what that patient needs to do to better manage his or her health. This clearly requires careful consideration with respect to the governance of information and will need a clear consent model, but the potential benefits are considerable.

An ecosystem that includes longitudinal patient care records, customer relationship management (CRM) solutions, genomic decision-support systems and high-performance cloud platforms will support patient-centered care. In this ecosystem, the pharmacist has a pivotal role that includes advising patients on the mobile apps and devices prescribed for them, and designing, delivering and monitoring complex genomic-based therapies.

Care coordination: IoT, smart monitoring and wearables

Care coordination is an approach in which patients are more proactively managed, whether they are at high risk for hospital admission due to their medical condition or because they may have an increased risk of readmission. Care coordination relies on an integrated health and social care record, a clinical call center and a detailed directory of services that can be augmented or mobilized to provide support as needed.

Pharmacists become essential resources in this approach, helping to ensure that patients and their caregivers understand their medication and can take it properly. Care coordination should be an element of a wider approach to population health management that recognizes a wide spectrum — from the “healthy” end of the population that requires information and support to remain well, to people with multimorbidity who require intense coordination and care support to optimize their quality of life and reduce their likelihood of hospital admission. This approach should be supported by high-quality data to support analyses of the population and cohorts within the population. Analytical approaches need comprehensive information governance in place to ensure that data is used with appropriate permissions.

The internet of things (IoT) has already enabled many innovations in the healthcare and life sciences industries, with opportunities limited mainly by regulation and adoption rather than technological challenges. Emerging offers in the market include:

- Monitoring the production environment in drug manufacturing, and measuring and reporting experiment results
- Smart pill bottles or ingestible pill sensors to confirm medication adherence and check vital/clinical signs
- RFID-based solutions in the pharmacy for packaging patient drugs
- Prescription of wearable devices, with pharmacists being asked to provide educational services on how to use them
- IoT-enabled tracking systems in pharmacies to improve inventory utilization and reduce costs by comparing what is being used with how the tray is stocked

From the pharmacist’s perspective, healthcare IoT will provide:

- Real-time automation of supply chain and core business processes to shorten the decision process, ensure timeliness of care delivery and drive continuity, choice and coordination
- Proactive decision making based on intelligence that delivers content and experiences that are personalized and relevant
- Analysis of how a patient interacts with drug-taking processes and reporting these interactions to doctors and specialists to improve the care plan

Improved user experience

For many years, software usability has been a key challenge for clinical users, with vendors striving to design the optimal user interface and system behaviors to deliver a streamlined path through the application. Rarely has this work focused on the user’s specific role and setting or patient context. Consequently, design improvements have focused on screen layouts, mouse clicks and workflows, stopping short of finding more innovative approaches to improve the user’s interaction with the application.

The more effective approach, and one that DXC is pursuing, is to focus on developing a solution that optimizes the clinical user’s experience in a given setting, while being responsive to the specific context and needs of the patient. Leveraging web-based technology, the solution will offer a new user experience that operates as a “system

of engagement,” overlaying the existing systems of record to support the role of the pharmacy in executing “hardened” business processes. For the pharmacy user, these will focus on patient-facing activities, including those associated with interventions, medicines reconciliation/review and education/counseling.

Agnostic to the underlying system of record, the solution will be mobile by design, supporting patient interaction in a variety of locations and accessible for use on multiple device types and sizes. The user interface, based on hardened workflows that are user- and setting-specific, will support the entire workflow from a single screen, where all the information required to support clinical decision making is visible, and the user is guided through well-known and repeatable clinical processes.

The solution harnesses innovation by adopting natural speech recognition and language processing to drive automatic coding and streamline data capture; leveraging machine learning to make recommendations based on previous experience to guide the pharmacist; and delivering coded and structured data for ongoing use by artificial intelligence and analytics solutions. This next-generation solution will maximize the use of new technologies and innovations to enhance the pharmacist’s and the patient’s experiences, as the pharmacist is elevated to being a core member of the patient’s care team.

Figure 3. Component features for an optimum user experience

Guiding principles for enhancing the user experience

-  **Hard workflows.** User- and setting-specific workflows designed to support the end-to-end process in that setting
 -  **Cockpit design.** Specific task-focused, role-based dashboards, frequently mobile, with user session persistence
 -  **Voice.** Untrained natural speech recognition and language understanding with automatic coding
 -  **Location.** UX context influenced by GPS, Wi-Fi AP and beacon location, terminal and user identity
 -  **Content.** Rich in evidence-based content and ready for customer and third-party localization
 -  **Context.** Sensitivity to user, patient and location context; adaptive to role, identity, condition and activity
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Empowered contributors

Technology can free pharmacists from many of their current task-oriented roles while at the same time empowering them to make enhanced contributions to patient care, both as individual clinical experts and as part of integrated healthcare teams. We believe this change will lead to the provision of safer, more effective and more individual care for patients. The pharmacist’s expanding role will also help deliver optimized outcomes for patients — positive health results that are now achievable through modern advances in medicine, integrated healthcare and technologically empowered clinicians.

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End notes

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⁵ Robert Wah, M.D., "Making the connection between personalized care and precision medicine"
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⁶ Robert Wah, M.D., "One of medicine's largest research projects just launched nationally"
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