Re-envisioning the Pharmacist’s Role in the Era of Digital Health—CPhA’s Inaugural Digital Health Conference

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Introduction

Digital health is rapidly evolving and promises to transform how health care is delivered and consumed. To explore advances at the intersection of health and technology and how pharmacy can embrace emerging modalities moving forward, the California Pharmacists Association (CPhA) hosted a Digital Health Conference on October 12 and 13, 2019, in Garden Grove, California.

This conference provided an opportunity for pharmacists to gain a deeper understanding of the digital health ecosystem, explore opportunities, and share perspectives for leveraging digital health products to improve patient care. This commentary provides an overview of new and emerging digital health technologies, and a summary of the conference. It is not a comprehensive or systematic review of the field of digital health, rather its scope is limited to the key concepts and perspectives shared at the conference by presenters and participants. Table 1 provides information summarizing what is already known about this subject and what is added by this commentary.

During the conference, pharmacists were introduced to definitions and concepts in digital health, discussed opportunities and challenges related to integration of digital health into existing health care infrastructures (including legal and regulatory frameworks, pharmacy practice models and payment), and explored educational needs to prepare pharmacists for their evolving roles. As digital health technologies are being integrated within the healthcare system, this conference aimed to focus on opportunities specific to pharmacy.

| Table 1. Summary of the Article |
|--------------------------------|
| What is Already Known About this Subject | What this Article Adds |
| • Digital health is a rapidly evolving field in health care. | • Pharmacists are well-positioned to play a pivotal role in advancing the integration of digital health products and services to optimize patient care. |
| • Some digital health products are already widely available and used by consumers. | • Pharmacists need to provide leadership to advance professional opportunities in the digital health space. |
| • There are many unanswered questions about how to optimize the use of digital health products and services in the delivery of health care. | • Educational opportunities are available, but more are needed to ensure that pharmacists are prepared to embrace evolving digital health roles. |

Definitions and Concepts in Digital Health—An Introduction for Pharmacists

Digital health is an umbrella term that encompasses a wide range of products at the intersection of health and technology for prevention, diagnosis, treatment, and management of health and diseases. The digital health landscape comprises several categories, including:

- Mobile health (mHealth), including wellness and fitness trackers, and smartphone apps that support various aspects of health such as medication adherence, sleep, fitness, and nutrition.
  - These devices are sometimes referred to as the “internet of things,” which can be described as the interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data.
- Health information technology (HIT), including electronic medical record systems, electronic prescribing and order entry, and consumer health IT applications.
- Devices, sensors and wearables, which include wearable wireless devices, biometric sensors, diagnostic products, sensor-enabled medications.
- Digital therapeutics, which deliver evidence-based therapeutic interventions to patients that prevent, manage, or treat a medical disorder or disease, and may receive regulatory approval.
• Personalized health care, including patient-reported outcomes, predictive analytics, and clinical decision support.

• Telehealth, including telemedicine virtual visits, remote patient monitoring, and remote care programs.

Examples of core technologies in digital health and their definitions, such as artificial intelligence, machine learning, and cloud computing that were reviewed during the conference are shown in Table 2. Digital health products can be used by pharmacists to transform the care they provide and improve outcomes with the aim of contributing to a healthier society. Digital health products are designed to support proactive, continuous care and engage patients to be informed, active participants in their care.

Some digital health products are already widely available and used by consumers. Presenters noted that there are more than 300,000 health-related apps available in the app store for download. Consumers can use these apps for a wide range of functions, including tracking fitness goals, diet, sleep, medication use, tobacco cessation efforts, and data related to specific disease states or health conditions. Many of these apps can be linked with wearable devices such as fitness trackers to gather data related to actual patient behavior. While much is still unknown regarding the effectiveness of health apps themselves, preliminary data shows that these apps can spur healthy activities and self-management behaviors that can result in a range of benefits.

Of note, digital therapeutics are considered distinct from other digital health products in that they have clinical evidence that demonstrate their benefits. Digital therapeutics are a specific category of digital health products that may be used alone or in addition to pharmaceutical products for the prevention, management and/or treatment of various health conditions. In some cases, digital therapeutics are available only through an authorized prescriber and are regulated by the FDA under

| Type of Technology          | Description                                                                                                                                                                                                 |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wearable Health Technologies| Devices, such as fitness trackers, that can be worn by consumers to track information related to self-management of their health.                                                                                 |
| Cloud Computing             | The delivery of computing services (including servers storage, databases, networking, software, analytics, intelligence, etc.) over the internet, rather than a local server, to offer faster innovation, flexible resources, and economies of scale. |
| Artificial Intelligence     | Technology that uses algorithms and software to approximate human cognition in the analysis of complex data. Machines can perform tasks in ways that are “intelligent” and can adapt to different situations; examples include visual perception, speech recognition, decision-making. |
| Machine Learning            | A branch of AI based on the idea that machines can be built to process large amounts of data and learn on their own using algorithms and statistical models relying on patterns and inference.                     |
| Robotics                    | A field of technology that deals with the design, construction, operation, and application of robots. There are many uses in health care, such as providing physical assistance and fostering patient engagement through socially assistive robotics. |
| Digital Therapeutics        | Digital therapeutics (DTx) deliver evidence-based therapeutic interventions to patients that are driven by high quality software programs to prevent, manage, or treat a medical disorder or disease. They are used independently or together with medications, devices, or other therapies to optimize patient care and health outcomes. |
the “software as a medical device” framework. The first prescription digital therapeutic received FDA clearance in 2017 based on data demonstrating improved outcomes of abstinence and treatment retention in patients with substance use disorder.

Data collected on patient adherence and biometrics will guide medication management, allowing the pharmacist to conduct more targeted patient consultations. Personal health data can also be used to support the delivery of precision medicine, which individualizes the care that patients receive based on personal factors, including their genomic profile, environment, and lifestyle. Additionally, other types of digital health products that provide data analytics and automate certain functions can allow health care providers to operate more efficiently and devote more time to direct patient care.

Digital health products can also be used to nudge patient behavior, particularly when interventions can be delivered through widely-available tools such as apps on smartphones. Learning algorithms may be integrated into these apps to track how individuals respond to prompts and determine the most effective approaches for activating and sustaining behavior change. The development of digital interfaces that increase consumer and patient engagement in improving their health creates opportunities not only to foster change at the individual level, but can also be applied more broadly to improve population health.

Telemedicine represents another strategy that allows technology to be used to improve access to care and deliver services conveniently and efficiently. In some cases, patients are provided with devices that allow them to video chat with their provider. This technology allows the provider to better assess the patient’s physical condition compared to an audio-only call without the need for an in-person appointment.

Digital Health and the Evolution of Pharmacy Practice

Presenters discussed how digital health technologies can be leveraged by the pharmacy profession to improve outcomes for patients. Generating data is not enough to improve patient care. The data must be presented in an actionable manner – interpreted and applied in a manner to augment clinical decision-making and patient self-management in order to achieve desired outcomes. In addition, pharmacists can play a key role as “translator”, assisting patients with understanding data from various apps, wearables, devices and assisting in interpreting the data in the context of the patient’s health conditions and medication-related needs and supporting patients with self-management of their health.

Currently, pharmacists can use data collected from wearables and associated apps to assess the status of a chronic condition and work with the patient and his or her health care team to identify challenges and develop and implement strategies to address them. For example, a pharmacist who offers educational services to patients who have diabetes can work with patients to use continuous glucose monitors to make determinations about how to adjust insulin doses. There are also platforms emerging that automate this process.

Presenters observed that, as digital health products and services mature, pharmacists may need to evolve their practices and roles in order to effectively integrate digital health products and solutions, including developing new business models that compensate pharmacists for applying their expertise to the application of this information to the patient’s care. Tasks that do not require clinical judgement will increasingly be delegated to pharmacy technicians and repetitive tasks that can be automated can be addressed with robotic solutions.

As more tools increase the ability to track and communicate an ever-increasing array of variables, pharmacists’ roles in interpreting and applying this information to clinical decision-making is growing. For example, patients with heart failure may weigh themselves with scales that are designed to identify weight gain and possible fluid retention and transmit this data via a Bluetooth connection to an app on a smartphone. The app sends a message to the patient’s health care team for evaluation and potential interventions under certain conditions, such as if the patient gains a certain amount of weight within a certain timeframe.

Today, pharmacists can use point-of-care testing to screen for health conditions and initiate treatment for certain conditions through collaborative practice agreements (for example, in some states, pharmacists can dispense antibiotics under a collaborative practice protocol in response to a positive response on a rapid strep test). Presenters suggested that, in the future, pharmacists may be able to expand the types of collaborative practices and services that they provide through the use of digital health solutions, including those that utilize pharmacogenomics to guide the delivery of precision medicine. For example, in the future, a pharmacist might be able to prepare and dispense a 3D-printed medication that contains the specific dosage that the patient needs based on a pharmacogenomic analysis. However, pharmacists must be proactive in order to establish these activities as roles for pharmacists.

Presenters stressed the potential for digital health products to disrupt the delivery of health care and encouraged pharmacists to act as innovators who embrace technology and seek out roles as leaders in determining how it will be integrated in pharmacy practice. As digital health products “democratize” health care by making it much easier to address patient needs with readily-available tools, pharmacists will need to advocate for their profession to ensure that other stakeholders are aware of the value they can provide and the types of services they can offer. Incentives must be aligned so that pharmacists receive compensation for various interventions that provide value and improve outcomes.

During interactive sessions in the conference, participants indicated that there is a need for pharmacists to advocate to legislators and regulators to communicate the needs of health care providers around digital health products, and ensure that other stakeholders are aware of the services pharmacists can offer and the value they provide. Participants recommended advocating to the Centers for Medicare and Medicaid Services (CMS) for the creation of International Classification of Diseases (ICD) codes intended to reimburse health care providers, including pharmacists, for time spent analyzing data and various other services related to digital health products. Of note, CPhA adopted policy supporting digital health integration in pharmacy practice during the 2019 House of Delegates.
Examples of Current Applications of Digital Health

The capacity of technology to process information has exceeded that of the human mind, explained presenters. To capitalize on technological developments, pharmacists and other health care providers increasingly rely on technology to augment their knowledge and skills. This paradigm shift in the approach to work, sometimes referred to as the fourth industrial revolution, is producing changes in the roles pharmacists perform in practice.

Machine learning and data science tools analyze available data and produce actionable information that can be scaled to be applied to large populations to improve the delivery of cost-effective care. Presenters shared specific examples of these tools that are in use in various pharmacy practice settings today (Table 3).

To provide participants with a sampling of the current digital health landscape, a product theater and exhibitor showcase provided participants the opportunity to engage with real world examples of innovative products and services. Select products and services related to medication management and pharmacy were presented (Table 4).

Key Issues in Digital Health Integration for Pharmacy Practice

Presenters indicated that, although digital health offers great promise for the future of pharmacy and health care delivery, it also poses many questions regarding how to regulate and optimize its use. FDA’s approval process for health care products (such as medications, biologics, and devices) is based on a robust body of data from the product’s clinical development program, which includes data from randomized, controlled clinical trials. The creation of this body of data is a years-long process. Digital health products are generally developed using a much more rapid process, and frequently undergo changes to the product, such as software updates. Thus, the timeline for digital health product development does not align well with the timelines used for developing many other health products. Further, it is difficult to determine how substantial an update would have to be to alter the efficacy of the product. The process for determining when changes to user interfaces could potentially impact the safety and efficacy of a product and require testing must be clarified.

Health care system regulators and stakeholders are challenged to create a process that is agile enough to take advantage of innovation while also ensuring appropriate controls are in place to assure safety and efficacy. Presenters observed that, in addition to questions about product approval processes, questions about the time and costs associated with digital health product development will also influence decisions about regulatory oversight of product use, including how product upgrades (e.g., software or operating system updates) are regulated after an initial approval.

Another key question influencing the future of digital health that was discussed during the conference is how to ensure that relevant data is accessible at the point-of-care remains a challenge. Issues around ownership of data and the fragmentation of the health care system complicate efforts to assure that providers have access to data. Cyber security and patient privacy and willingness to share data with providers and payers are issues that will need to be addressed as interoperability solutions are implemented.

Preparing Pharmacists for their Emerging Roles Leveraging Digital Health Technology

The conference culminated in a roundtable for pharmacists to discuss their perspectives on strategies and tactics to effectively integrate digital health into current practice and to shape the future of pharmacy practice. There was agreement that, although digital health products and services offer many opportunities for improved care, the human touch remains critical to effective care delivery and these new tools will augment, rather than replace, personal interventions. Participants envisioned a future in which pharmacists have leading roles advancing digital health integration and applying digital health solutions to optimize patient care.

Presenters observed that pharmacists can leverage their role as the most accessible health care provider and medication expert by recommending digital health products and interpreting and applying the data they generate to the care of patients. Digital health products provide visibility into ongoing aspects of a patient’s health status and treatment in a manner not previously available. Key roles for pharmacists may be: identifying products that are appropriate for patients alone or in combination with medication or other therapy, determining when the addition of a digital health product will enhance the cost-effectiveness of treatment, serving as a translator to the patient to help them understand the data and its application in self-management of their care, and using the results to target interventions or develop intervention strategies. Specifically, pharmacists can access and utilize data from digital health platforms to identify and resolve medication-related problems, provide patient education and counseling, and overall augment their effectiveness in comprehensive medication management.

As digital health products become integrated within existing health care infrastructures and utilization management programs, pharmacists will also be able to apply their skills to navigate these systems. For example, some payers have initiated the development of digital health formularies. This step will improve accessibility of these products and presenters observed that pharmacists’ extensive experience navigating formularies and other such utilization management tools can translate to the use of these tools for digital health.

Conference participants recognized that there is a need to increase awareness among pharmacists about opportunities that are provided by the rapidly growing number of digital health technologies, and increase awareness among other stakeholders about the skills that pharmacists have that can be augmented with digital health solutions. Pharmacists need to be included in emerging value-based payment models to create viable practices with business models that support pharmacist-provided services. Furthermore, pharmacist job satisfaction may increase with the move away from the repetitive elements of dispensing roles that can be automated to roles that call upon their clinical expertise and patient care skills.
| **Practice Setting** | **Activity** | **Application to Patient Care** |
|----------------------|-------------|---------------------------------|
| Pharmacy Benefit Manager | Using machine learning algorithms to screen prescriptions and patients to identify those who are non-adherent and those who may require more complex interventions. | This information is used to target which patients will benefit most from interventions to address adherence, and clinical care teams that include pharmacists can then focus their efforts on these patients. Proven outcomes associated with these programs include improved adherence and reduced total cost of care. |
| Inpatient Pharmacy | Machine learning is in use to analyze patient variables to determine which patients might be ready for cost-effective medication switches—for example from intravenous to oral formulations. | This process allows organizations to determine which patients should be evaluated by a pharmacist for therapeutic alternatives and has been found to save money and improve patient satisfaction. Other applications of machine learning include diagnostics and therapies, such as interpreting electrocardiograms. |
| Specialty Pharmacy | Artificial intelligence and machine learning are being used to increase the speed and accuracy of benefit verification. | The process verifies a patient’s eligibility for prescribed therapy, determines the patient’s benefits, reviews benefit coordination, and provides a quality review and guidance to the patient’s provider. This program has demonstrated benefits for stakeholders, including reducing the administrative burden of utilization management on prescriber. |
| Virtual Pharmacist Platform | The “virtual pharmacist” platform that combines data science with clinical expertise to actively monitor and analyze relevant patient health data. | The platform consistently aggregates and analyzes data from numerous sources including medical and pharmacy claims, lab results, EMR data, lab data, quality and risk data, along with a tailored patient-facing questionnaire to generate a complete picture of the patient’s health. Algorithms detect, flag, prioritize clinical issues to generate actionable medication recommendations based on the latest available clinical guidelines. Clinicians then review the proposed care plan changes and deliver tailored, actionable recommendations to patients and their care teams. The virtual pharmacist continuously measures the clinical and economic outcomes associated with the delivered recommendations, using actual cost and utilization data. |
| Example                                                                 | Details                                                                                                                                                                                                 |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A medication management app for supporting patient adherence that can be used by patients, family/caregivers, and providers. | Features include reminders to take medication, recording when medication is taken, potential drug interaction alerts, and ability to share information with family/caregivers and health care providers. High levels of patient engagement and persistence have been seen with use of the app, including clinical data demonstrating an improvement in adherence. |
| A digital medicine for monitoring medication adherence and health patterns. | The product includes an ingestible sensor which is co-encapsulated with medication, wearable sensor patch, patient mobile app, and provider portal. When the medication is taken, it sends a signal to the patient’s wearable that confirms the medication was ingested. The wearable then sends a signal to an app, which tracks the patient’s medication usage. This information can be used by the patient and care team to observe health patterns, guide patient care and support optimization of therapy. |
| A personal health care assistant robot that works in conjunction with a cloud-based platform that supports patient self-management of their health and allows health care providers to review patient progress and address challenges. | The robot delivers tailored conversations to patients based on their unique personalities and circumstances to guide patients in self-care management of chronic conditions and during transitions of care. It gathers and communicates data about patient progress to their health care providers and can connect them to their providers when needed. Crucial pieces of data that can be used to improve patient care and outcomes are collected, including the dosing and timing of medication use, as well as data about patient daily activities and nutrition. Health care providers can review this data to determine how various activities are affecting patient treatments and outcomes, and work to identify and address medication-related problems. |
| An app-based platform that connects pharmacists with patients in need of enhanced medication services based on the pharmacist’s clinical skills and the patient’s specific needs. | Pharmacists who provide clinical services are available on demand to address patient needs and are paid for delivering these services. Patient care opportunities are sorted based on how well they align with the pharmacist’s skills. The pharmacist can reserve the work and then work to connect with the patient within defined timelines. The platform is based solely on clinical services; no products are dispensed. |
To support the integration of digital health within the broader pharmacy profession, participants called for vertical integration of digital health technologies and their role in medication therapy optimization within all clinical therapeutics education. Thus, when there is an available digital health solution for the management or treatment of a disease state, that solution should be integrated in the discussion of other available modalities (e.g., medication, lifestyle modification) for the disease state. They noted that this would be appropriate within colleges of pharmacy as well as continuing education programs. Some platforms discussed during the conference are already integrating digital health information in this manner. For example, there is an interprofessional mental health care e-community that helps patients and providers, including pharmacists, to be informed and engaged to improve mental health. This platform includes several webinars that address digital health, including how to implement technologies into the management of patients with mental health conditions. Additionally, there are an ever-increasing number of digital health conferences, webinars, and importantly, professional association educational offerings designed to prepare health care providers to increase their knowledge in applying digital health solutions in patient care.

Participants acknowledged a need to address educational gaps for pharmacists regarding digital health. For pharmacists who want to develop expertise in the ever-expanding area of digital health, participants recommended that colleges of pharmacy offer educational programming in digital health, as well as introductory and advanced pharmacy practice experiences (IPPEs and APPEs) focused on digital health. For example, a digital health company could develop IPPE or APPE programs for student pharmacists. A digital health residency program or fellowship was suggested as a potential future option.

Pharmacist entrepreneurs who have technology skills may play key roles in the creation of the digital health space for pharmacists. There are numerous opportunities for pharmacists to work with digital health companies (and the pharmaceutical industry more broadly) and could lend their expertise, as domain experts, to a range of departments such as product design, business development, strategic alliances, and medical affairs. Pharmacists’ inclusion throughout the product lifecycle processes will ensure that the needs and skills of pharmacists are considered when designing products and will allow pharmacists to serve as an access point for broader dissemination, utilization, and patient support.

Identifying useful communication channels will contribute to pharmacists’ awareness and knowledge, and ultimately contribute to their success with effective digital health integration. Participants recommended creating a forum, such as a special interest group, to allow technologically savvy pharmacists to connect with other stakeholders to foster partnerships. In response to participants’ interest, CPhA recently launched a Digital Health Corner as part of its monthly e-newsletter and plans to continue to offer an annual digital health conference. Other selected sources of digital health information for pharmacists include the Digital Therapeutics Alliance (dtxalliance.org) and Digital Medicine Society (www.dimesociety.org).

Looking to the Future

As the integration of digital health technologies in care delivery continues to rapidly evolve and the number of available products and services continues to experience dramatic growth, it is predicted that digital health will become ubiquitous. At the same time, the practice of pharmacy is increasingly focused on the delivery of direct patient care services, setting the stage for an alignment of pharmacists’ skills with the patient care needs that can be effectively addressed by leveraging digital health products. Further, presenters and participants called for enhanced educational opportunities for pharmacists related to digital health technologies, including the addition of digital health to the curricula of schools and colleges of pharmacy, and integration throughout continuing education offerings to prepare pharmacists to integrate these products/services.

Presenters called upon pharmacy leaders to advance opportunities for pharmacists by developing the necessary infrastructure and advocating for the profession. They cited a need for leadership to integrate digital health products and services in innovative and effective business and practice models to optimize therapeutic outcomes and contribute to a healthier society.

Presenters at CPhA’s Digital Health Conference 2019

| Name                          | Title/Position                                                                                     |
|-------------------------------|---------------------------------------------------------------------------------------------------|
| Timothy Aungst, PharmD        | Associate Professor Pharmacy Practice, Massachusetts College of Pharmacy and Health Sciences Founder, TheDigitalApothecary.com |
| Aaron Black                   | Chief Data Officer, Inova Translational Medicine Institute                                        |
| Yoon Kim, PharmD, PhD         | Co-Founder and CEO, Arine Health                                                                  |
| Daniel Kraft, MD              | Faculty Chair of Medicine, Singularity University Founder and Chair, Exponential Medicine         |
| Jeff Mesaros, PharmD, JD      | Senior Legal Counsel, CVS Health, Chair, Florida Board of Pharmacy                                |
| Jake Nichols, PharmD, MBA     | President and CEO, Professional Recovery Associates                                                |
| Komal Patel, PharmD           | Clinical Pharmacist, Catalia Health                                                               |
| Kevin Rodondi, PharmD         | Professor Clinical Pharmacy, School of Pharmacy, UC San Francisco                                |
| Rajiv Shah, MD                | Founder and CEO, MyMEDS                                                                           |
| Brad Tice, PharmD, MBA        | SVP Pharmacy Practice, Aspen RxHealth                                                              |
| Parisa Vatanka, PharmD, CTTS  | Chair, Digital Health Conference                                                                 |

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