

**KEY ISSUES ASPECTS RELATED TO ARTIFICIAL INTELLIGENCE IN
PHARMACEUTICAL CARE SCIENCE AND HEALTH CARE SECTOR
SERVICES IN THE WORLD**

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РЕЗЮМЕ

Метою дослідження було вивчити та проаналізувати ключові аспекти проблем, пов'язаних зі службами штучного інтелекту в секторі охорони здоров'я в усьому світі. Цифрова охорона здоров'я значною мірою формується експертами поза сектором охорони здоров'я та пропонує можливість для міждисциплінарної співпраці для закладення основи цифрової медичної освіти. Фармація та освіта вчених-фармацевтів мають базуватися на потребах, щоб відповідати поточним і постійно мінливим вимогам цифрової охорони здоров'я. Ці вимоги мають відображати потреби всіх представників усіх галузей промисловості та кар'єрних рівнів у фармації та фармацевтичних науках, від клінічних фармацевтів до відкриття ліків. цифрова медицина. На даний момент цифрова медична система містить чотири основні компоненти: інертний датчик, вбудований в інертну таблетку, немедикаментозний датчик (патч), який носить пацієнт, мобільний додаток і веб-панель керування. Під час взаємодії з шлунковим соком записаний датчик активується та підключається до переносного датчика, який

надсилає сигнал на мобільний пристрій, де його можуть переглядати пацієнти або пізніше медичні працівники та доглядальники через захищені мобільні та хмарні програми. Величезна кількість медичних даних дає змогу ширше використовувати штучний інтелект і машинне навчання у фармацевтичній практиці для вирішення важливих питань, пов'язаних із керуванням і адмініструванням ліків. Аналізуючи тенденції у великих наборах даних, можна виявити індивідуальні ризики несприятливих подій, поведінкових проблем, моделей відповідності тощо.

Фармацевт — це професійний експерт, який може доповнити досвід спеціаліста з обробки даних для створення послуг. Розуміння термінології та концепцій, що використовуються в штучному інтелекті, допоможе фармацевтам взаємодіяти з дослідниками даних і конструктивно співпрацювати для розробки моделей, які покращують догляд за пацієнтами. Цифрові системи охорони здоров'я також можуть розширити можливості та залучити пацієнтів, зробивши їх співтворцями медичної допомоги. Спільне прийняття рішень між медичними працівниками та пацієнтами вимагає довіри, партнерства та прозорості у взаємних стосунках. Медичні працівники стають супутниками на шляху пацієнта до здоров'я, демонструючи співчуття та людяність, щоб підтримувати благополуччя пацієнта. Велика кількість даних про здоров'я дає можливість використовувати більше штучного інтелекту та машинного навчання в аптечній практиці для вирішення важливих проблем, пов'язаних із управлінням та використанням ліків. Розуміння термінології та концепцій, що використовуються в штучному інтелекті, допоможе фармацевтам конструктивно працювати з дослідниками даних для розробки моделей, які покращують догляд за пацієнтами.

Ключові слова: перспективи, штучний інтелект, сервіс, фармація, медицина, охорона здоров'я.

Introduction. A large amount of health data provides the opportunity to use more artificial intelligence and machine learning in pharmacy practice to solve important problems related to the management and use of medicines. Trend analysis on large data sets can reveal the risk of adverse events in individual patients, behavioral aspects, compliance profiles, etc. A pharmacist is a professional expert who can extend the knowledge of a data scientist to create services. Understanding the terminology and concepts used in AI will help pharmacists to work constructively with data scientists to develop models that improve patient care. Digital health systems can also empower and engage patients as co-creators of care. Joint decision-making by healthcare professionals and patients requires trust, a sense of partnership, and transparency in their interactions. Healthcare professionals become partners in the patient's journey to health, but still provide empathy and a human touch to support patients' well-being [1-2].

The International Federation of Pharmacists defines telemedicine as “the use of information and. Communications Technology (ICT) Delivery Telepharmacy is a

relatively recent development in the healthcare sector, enabling the delivery of quality pharmaceutical services in rural and remote areas. It drew a lot of attention during the COVID-19 pandemic. Digital health technologies save lives, improve health and well-being, expand access to health care and help build effective health systems and healthy populations. As healthcare challenges increase and the population ages, digital health may be key to addressing many unmet healthcare and service needs [3-4].

Digital health is a key priority for public policies and health organizations involved in implementing digital health and improving digital literacy standards. The World Economic Forum pointed out that “few sectors have the potential for such profound digital transformation as healthcare [4-5].

Recent technological advances have revolutionized clinical practice from disease prevention to diagnosis, monitoring and treatment, generating unprecedented public interest and commitment to self-care and health [6-7].

The aim of the study was to examine and analyze the prospects for the use of artificial intelligence in pharmacy, medicine and health services. Digital health has been around for a long time with technologies focused on e-health (electronic health records), the rapid growth of technology in recent years has led to exciting new areas of digital health, including mobile health applications. and wearable technologies. Telehealth and telemedicine, artificial intelligence, advanced robotics and genomics. Digital health also includes other digital health uses such as the Internet of Things, advanced computing, and big data analytics. While they can provide significant benefits, there are also risks, especially in terms of health disparities, data privacy, and the limitations of artificial intelligence. Digital health is a broad term and its definition will change as new medical technologies emerge.

While digital health has been around for a long time with technologies focused on e-health (electronic health records), the rapid growth of technology in recent years has led to exciting new areas of digital health, including mobile health applications. and wearable technologies. Telehealth and telemedicine, artificial intelligence, advanced robotics and genomics. Digital health also includes other digital health uses such as the internet of things, advanced computing, and big data analytics. While they can provide significant benefits, there are also risks, especially in terms of health disparities, data privacy, and the limitations of artificial intelligence. Digital health is a broad term and its definition will change as new medical technologies emerge [8-9].

Digital health is largely shaped by experts outside the health sector and offers the opportunity for cross-disciplinary collaboration to lay the foundation for digital health education. Pharmacy and pharma-scientist education must be needs-based in order to meet the current and ever-changing demands of digital health. These requirements should reflect the needs of all members of all industries and career levels in pharmacy and pharmaceutical sciences, from clinical pharmacists to drug discovery.

digital medicine. Currently, the digital medical system contains four main components: an inert sensor embedded in an inert tablet, a patient-worn non-drug (patch) sensor, a mobile application, and a web-based control panel. Upon interaction with gastric juice, the recorded sensor is activated and connected to a wearable sensor which sends a signal to a mobile device where it can be viewed by patients or later by healthcare professionals and caregivers via secure mobile and cloud applications. The vast amount of medical data enables more use of artificial intelligence and machine learning in pharmaceutical practices to solve important questions related to drug management and administration. Analyzing trends in large data sets can reveal individual risks of adverse events, behavioural issues, compliance patterns, and more. A pharmacist is a professional expert who can complement the expertise of a data scientist to create services. Understanding the terminology and concepts used in artificial intelligence will help pharmacists interact with data scientists and collaborate constructively to develop models that improve patient care. Digital health systems can also empower and engage patients, making them co-creators of care. Shared decision-making between healthcare professionals and patients requires trust, partnership and transparency in mutual relationships. Healthcare professionals become companions in the patient's journey to health, while demonstrating empathy and humanity to support the patient well-being [10-12].

Software based on BR. It can also record other behavioural and physiological parameters such as physical activity, heart rate, skin temperature, sleep, and digital therapy. Aspiring pharmacists, pharmaceutical scientists and healthcare professionals. Students are getting more and more involved in the era of digital transformation. Their participation in digital health education processes is an important opportunity as they support the adoption and promotion of these digital health technologies. Several studies have been conducted to understand the digital health skills, knowledge, and competencies of pharmacy students. With much of the research being conducted in countries like the US, UK, and Australia, the global state of digital health in pharmacy schools is not fully understood [13-14].

The COVID-19 pandemic has accelerated digital health. Industries like healthcare have the potential to be profoundly transformed by digital technologies. Recent technological advances have revolutionized clinical practice from disease prevention to diagnosis, monitoring and treatment, generating unprecedented public interest and commitment to self-care and health. The COVID-19 pandemic has accelerated the transformation of digital healthcare, which will impact healthcare services in the long term. Important lessons can be learned from this digital transformation of healthcare [8-10].

Many digital health technologies are highly dependent on healthcare

professionals understanding and using them appropriately. There is a clear need for increased attention, concerted action and investment in education, training and skills development to ensure healthcare professionals understand and use digital health to achieve the intended benefits. Universities and educational institutions offer digital medical education, with most programs focusing on certification models. There is a lack of digital medical education and training, and a nationally or professionally oriented initiative could be an impetus for inclusion in education [11-12].

The profession of pharmacist is historically linked to information technologies. Therefore, he has the ideal skills and abilities to offer patients more digital health services. Realizing the full potential of digital health requires a pharmaceutical workforce that is confident, capable, agile and digitally savvy. Pharmaceutical staff can only keep pace with the digital transformation of the healthcare system with better training and further education [13-14].

Digital health is largely shaped by experts outside the health sector, providing opportunities for interdisciplinary collaboration to develop the foundations of digital medical education. Education in pharmacy and pharmaceutical sciences must be needs-based to meet the current and changing demands of digital health. These requirements should reflect the needs of all members in all sectors and career levels of pharmacy and pharmaceutical science, from clinical pharmacist to drug discovery [15-16].

Aspiring pharmacists, pharmaceutical researchers and healthcare professionals. Students are most involved in the era of digital transformation. Their participation in digital health education processes is an important opportunity as they support the adoption and promotion of these digital health technologies. Several studies have been conducted to understand the knowledge, skills, and competencies of pharmacy students in digital health. Since most research is conducted in countries such as the US, UK and Australia, the global state of digital health in pharmacy schools is not fully understood [17-18].

Aim of the research was to study and analyze the key issues aspects related to artificial intelligence services in healthcare sector globally.

Methodology. The main question of this article was to research and analyses the key issues aspects related to artificial intelligence services in healthcare sector globally. We have searched and analyzed PubMed, Web of Sciences, Clinical key, Tomson Reuters and Google Scholar mostly, using search terms bases, including the words to research and analyses the perspectives of artificial intellect in service of pharmacy, medicine and public health. Then, each article was discussed and an abstract of the total information gathered during the process was provided, aiming at easy understanding of the public. To establish these outcomes, over two hundred articles were investigated. We brought together all published data to comprehensively examine the effects in a systematic review, to define the roll out of the study of the research and

analyses of the key issues aspects related to artificial intelligence services in healthcare sector globally.

Results and discussion. An electronic medical record (EMR) is a digital version of a paper patient record. Electronic health records are real-time patient records that make information easily and securely accessible to authorized users. While the EHR contains patient and patient records, the EHR system is designed to go beyond standard clinical data collected in a healthcare provider's office and can include a broader view of patient care. patients. Electronic health records can: contain a patient's medical history, diagnoses, medications, treatment plans, vaccination dates, allergies, x-ray images, and lab and test results; provide access to evidence-based tools that healthcare providers can use to make decisions about patient care; as well as supplier workflow automation and optimization [19-20].

An electronic medical record (EMR) is a digital version of a paper patient record. Electronic health records are real-time, patient-accessible records that make information easily and securely accessible to authorized users. While EHRs contain patient and patient records, the EHR system is designed to go beyond standard clinical data collected in a healthcare provider's office and can provide a broader view of patient care. patients.

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One of the key features of the EHR is that health information can be created and managed by authorized healthcare providers in a digital format that can be shared with other healthcare providers across multiple healthcare organizations. health. EHRs are designed to share information with other health care providers and organizations such as laboratories, specialists, medical imaging centers, pharmacies, emergency rooms, and school and occupational clinics, in order to that they contain information from all clinicians involved in patient care [23-24].

One of the key features of HR is that health information can be created and managed by authorized healthcare providers in a digital format that can be shared with other healthcare providers across multiple healthcare organizations. health. EHRs are designed to share information with other healthcare providers and organizations such as laboratories, specialists, medical imaging facilities, pharmacies, urgent care facilities, and schools and clinics in workplace, so that they include information from all physicians involved in patient care [25-26].

Pharmacists provide patient care across the continuum of care and must actively participate in the electronic health record, researching and documenting information.

The use and implementation of the EHR is driven by funding and policy changes, and pharmacists should be part of development and implementation teams. As medical information technology develops rapidly and EHRs are developed and deployed in healthcare environments, meeting the workflows and information needs of pharmacists in EHRs is essential to optimize quality of drug therapy and patient outcomes. Although pharmacists use many different advanced functions in the EHR, three main applications are described in the literature: documentation, medication matching, patient assessment and follow-up [27-28].

Pharmacists provide ongoing medical care to patients and must actively participate in electronic health records, information retrieval, and documentation. The use and implementation of the EHR is driven by changes in funding and policy, and pharmacists need to be part of development and implementation teams. As health information technologies proliferate and online medical records are developed and implemented in the healthcare environment, it is essential that pharmacists' workflows and information needs are met in online medical records to optimize the quality of care, medication and patient outcomes. Although pharmacists use many different advanced features of electronic health records, three main areas of application are described in the literature: documentation, medication matching, and patient assessment and follow-up [29-30].

Electronic Prescribing and Electronic Delivery Electronic prescribing is the ability for a prescriber to electronically send an accurate, error-free, and understandable prescription directly to a pharmacy from the point of care. It is an important element in improving the quality of patient care. Electronic dispensing is defined as the electronic retrieval of a prescription and delivery of the drug to the patient as specified in the associated electronic prescription. Once the medication is delivered, the dispenser reports information about the dispensed medication(s) via software. The benefits of both technologies include increased patient safety, reduced medication costs, better access to patient prescription records, and improved pharmacy workflow [31-32].

Electronic Prescribing and Electronic Delivery is the ability for a prescriber to electronically submit an accurate, error-free, and understandable prescription directly from the local pharmacy. This is an important element in improving the quality of patient care. Electronic dispensing means receiving a prescription electronically and dispensing a drug to a patient as specified in the associated electronic prescription. Once a drug is dispensed, the dispenser provides the program with information about the dispensed drugs. The benefits of both technologies include increased patient safety, reduced drug costs, better access to patient prescription records, and increased pharmacy efficiency [33-34].

A blockchain is a growing list of records, called blocks, linked together and protected by cryptography. A blockchain can serve as a "public and distributed ledger"

or "common ledger" that can record transactions between multiple parties in an efficient, verifiable, and permanent manner. Once blockchain enters the pharmaceutical environment, various activities of pharmacists can be further automated, such as managing patient records, distributing patient information, and managing reimbursements [35-36].

A blockchain is an ever-expanding list of records, called blocks, linked to each other and protected by cryptography. A blockchain can be an "open and distributed ledger" or a "shared ledger" that can record transactions between multiple parties in an efficient, verifiable, and permanent manner. As blockchain enters the pharmaceutical realm, various activities of pharmacists can be further automated, such as patient record management, patient information dissemination, and reimbursement management.

An online pharmacy is an online store that sells medicines and can function as independent internet sites, "AGUs", which are associations between pharmacies. From a consumer perspective, online pharmacies seem to offer a lot of potential value, but not necessarily in price. For patients at home, the possibility of ordering and delivering drugs at home is obvious. For those who live in remote areas and for consumers who have little time and energy to go to the pharmacy, ordering online has clear advantages. There are also people who seek personal products and prefer anonymity [37-38].

Wearable medical device refers to technology that the user can properly place on the body and control important aspects of health according to today's standards. These devices can collect data through non-invasive monitoring of physiological parameters or detection of the substrate of body parts in a minimally invasive manner. These technologies may pave the way for pharmacists to monitor drugs to improve clinical outcomes and patient safety [39-40].

A bot (also known as a web bot or internet bot) is a software application that uses steps or scripts to automate a task. Chatbots use natural language recognition (NLU) services through the many toolsets available. At NLU, chatbots focus on using a conversational interface, allowing the user to interact in a natural way. After adding clinical discovery and medical content to the bot structure, the resulting virtual personal health assistants can interact with the user on topics related to well-being, perceived health, questions about diseases, and information about medical interventions. Bots can help optimize adherence by answering medication-related questions, informing the patient about what to expect during the first few weeks of medication, or reducing the likelihood that a medication will not be taken as prescribed [41-42].

A bot (also known as a web bot or internet bot) is software that uses steps or scripts to automate a task. With the various tools available, chatbots use natural language recognition (NLU) services. NLU-enabled chatbots focus on using a conversational interface that allows the user to interact using a natural form of conversation, intended health, disease problems and care measures. Bots can help

optimize adherence by answering medication-related questions, telling patients what to expect during the first few weeks of medication, or reducing the chance of taking another medication than prescribed [43-44].

Currently, the digital drug system contains four main components: an inert sensor embedded in an inert tablet, a non-drug sensor (patch) worn by the patient, a mobile application (app) and web control panel. When interacting with gastric fluid, the swallowed sensor is activated and connected to a wearable sensor, which sends a signal to a mobile device where it can be viewed by patients or later by healthcare professionals and caregivers via mobile apps and in the secure cloud. . software-based. It also has the ability to record other physiological and behavioral parameters such as physical activity, heart rate, skin temperature, sleep and digital therapy [45-46].

Digital therapy (DTx) is a new treatment modality that uses digital systems such as smartphone applications, digital sensors, wearable devices, certain virtual reality or artificial intelligence devices as prescribed therapeutic interventions approved by authorities for prevention, treatment management or medical therapy. requirements. DTx products have a number of different potential roles, including modifying drug use, changing patient behavior independent of drug use, and treating a disease or influencing a patient's underlying physiological response. Many also have the option [47-48].

Remote Patient Monitoring (RPM) uses digital technology to collect health data from people in one location, such as a patient's home, and electronically relay the information to healthcare providers in other locations for evaluation and recommendations. Local pharmacy services have traditionally been product-related, but pharmacists have skills in medication management, disease assessment, and patient counseling that can contribute to an RPM improvement program [49-50].

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Online/remote (patient) counseling and telemedicine/telehealth/virtual care: Telepharmacy has many recognizable benefits, such as easy access to health services in disadvantaged, remote and rural areas, economic benefits, patient satisfaction due to effective patient education. and minimal shortage of local pharmacists and pharmacy services.

Online/Remote (Patient) Consultation and Telemedicine/Telemedicine/Virtual Care: Telepharmacy has many distinctive advantages, such as easy access to healthcare services in disadvantaged, remote and rural areas, economic benefits, patient

satisfaction through effective patient guidance and minimal shortage of local pharmacists. and pharmaceutical services [51-52].

Artificial intelligence (AI) is an area of computer science that aims to emulate human intelligence through computer systems. This mimicry is achieved through iterative tuning of complex patterns, usually at a speed and scale beyond human capabilities. AI has the potential to have a profound impact and shift our focus from providing medicines to providing a wider range of patient care services. Improved budgeting, lower transaction costs and greater overall organizational efficiency will be seen as positive outcomes of AI data analytics. AI aims to revolutionize pharmaceutical care by connecting different pharmaceutical datasets, data platforms, medical and analyze pharmaceutical records, develop holistic treatment plans o Report adverse events or non-compliance with treatment regimen. In addition, AI can help automate repetitive pharmacy tasks, such as checking prescriptions or reviewing profiles of polypharmaceuticals (e.g. signaling overconsumption or interactions) [53-54].

Artificial intelligence (AI) is a branch of computer science that aims to mimic human intelligence using computer systems. This mimicry is accomplished by combining complex, repetitive patterns, often at a speed and scale beyond human capabilities. AI can have a powerful impact, shifting our focus from delivering medicines to providing a broader range of patient care services. Improved budget, reduced operating costs and improved organizational efficiency are seen as positive outcomes of AI data analysis. or report adverse events or non-compliance. In addition, AI can help automate repetitive tasks in the pharmacy, such as B. checking prescriptions or displaying polypharmacy drug profiles (alert eg. overdose) [55-56].

Big data can be defined as digital data generated in large amounts and with great variety, accumulating at high speed and resulting in very large data sets for traditional data processing systems.³¹ Scientific data can be defined as a set of principles fundamentals, driving the fundamental extraction of information and insights from data.³² The pharmaceutical side of healthcare is saturated with data. Healthcare providers and pharmacy workers regularly collect and share vast amounts of information from patients to ensure they receive the care they need. While this data has traditionally only been used to ensure the right prescription is given to the right patient at the right dose, key stakeholders recognize that the information can also be used to improve several other important areas of pharmaceutical practice. The use of data is particularly impacting pharmaceutical practice in managing health plan expenditures, monitoring consumer prescription drug use, and directing research and development efforts [57].

Mobile apps can help people manage their own health and well-being, promote healthy living and provide access to useful information when and where they need it. These tools are adopted almost as quickly as they can be developed. Mobile apps allow

pharmacists to stay abreast of disease status patterns, maintain adequate pharmaceutical stocks, access drug information systems, view patient health information, and use tools to calculate individual drug doses and accurately convert between units of measure. Mobile devices can also help pharmacists, turning smartphones into point-of-care diagnostic devices like otoscopes or blood pressure monitors. Mobile apps can also help patients manage disease states, improve therapy adherence, and capture important medical histories [58-59].

The coronavirus (COVID-19) pandemic has been a powerful impetus to accelerate technology deployment. In the age of digital health technologies, the focus of new models has shifted to virtual visits, virtual care, remote monitoring of patients and websites, and chatbots (for risk assessment, screening, screening). This pandemic has demonstrated the usefulness of digital health. solutions and represents an opportunity to integrate these solutions into our healthcare systems. More than ever, digital technologies and remote assistance have been integrated into our daily lives and, above all, into health. As a result, the digitization of healthcare practices is increasing exponentially. As part of its National Health Plan for COVID-19, the Australian Government has accelerated the delivery of electronic prescriptions. Australian pharmacists can offer a range of paid services (medical tests, diabetes check-ups, home medication reviews and home medication management reviews) via telemedicine. The impact of digitization on health has been significant and is expected to be even greater in the future. To appreciate this, a broader perspective must be taken. Achieving broader health system goals, including quality, access, efficiency and equity, is the goal against which new digital health services must be measured [59-60].

Decisions to introduce new digital health services at different levels of the health system are best based on evidence of their effectiveness in relation to health system goals. These goals in a broader sense remain unaffected by the digitization process. Management must be designed and adapted to adequately capture all relevant changes [61-62].

Many digital health technologies are highly dependent on their acceptance and proper use by healthcare professionals. This can lead to new medical professions as well as existing healthcare professionals acquiring new skills and competencies to work with new digital healthcare services. Co-creation in the development of new digital health services may make sense to increase acceptance and ease of use in practice. The experience of professionals using the technology is also critical to monitor and incorporate into any assessment. When digital health technologies are well understood, designed and deployed, healthcare professionals can coexist with them, which can provide some relief for spend more time with patients or perform salvage tests [63-64].

Digital health systems can also empower and engage patients and make them co-

creators of care. This joint decision-making by physicians and patients requires trust, partnership and transparency in their interactions. Healthcare professionals become collaborators in the patient's journey to health, providing empathy and a human touch to support patient well-being.

Client Interventions: Clients are community members who are potential or current users of health services, including health promotion activities. This group also includes caregivers of clients using health care. **Interventions for health professionals:** Health professionals are members of the medical team who provide health services. **Health system interventions or resource managers:** Health system and resource managers are involved in the management and oversight of public health systems. Interventions in this category reflect management functions related to supply chain management, health care financing, and human resource management. **Data Services Interventions:** Data services consist of cross-functional capabilities to support a variety of data collection, management, use, and sharing activities.

In many countries, pharmacists were among the first healthcare professionals to adopt all four pillars of information systems listed above to optimize pharmaceutical care services. Managing thousands of medications in stock, checking drug interactions, and facilitating sequencing by analyzing substitution rates are just a few of the reasons pharmacists are often used to working with computers as physicians adopt electronic prescribing systems. Pharmacists have a structured mindset that comes from a rigorous educational track. They like to analyze data and support decision tools derived from reliable data systems[65-66].

The profession of pharmacist is undoubtedly a profession that has a certain technical aura. Therefore, it has the perfect predispositions and skills to offer patients more digital health services.

Some of the key areas where digital technologies will impact the pharmaceutical industry can be summarized as follows: Integrating wearable data into decision-making: As more and more wearable devices are able to monitor an increasing amount of health data and well-being, the well-being of patients. , the patient, these data can be used as digital biomarkers in pharmaceutical decision making. Digital biomarker data can be described as objective and quantitative data collected by wearables, wearables, and even devices or implanted devices to track digestive health. Consider smartwatches with proven ECG apps that can help the pharmacist determine the effectiveness and safety of cardiac procedures. Or a meditation device that provides data about a patient's state of mental relaxation, which may help improve the effectiveness of potential migraine treatments. There are many examples where pharmacists can ask how they can use this data to improve their services by predicting outcomes, adverse events and patient satisfaction. Once pharmacists have access to this data, they can interpret patients' vital signs in real time and communicate them to their

primary care physician or specialist to optimize pharmaceutical care as needed. Nowadays, such access should be possible, but not universal [67-68].

Use of health apps: As healthcare moves to phone-based access models, patients will have access to an increasing amount of digital biomarker data 24/7. The global interoperability of these data is increasing due to the increasing standardization of health data. This, along with computers becoming faster and mobile phones becoming more powerful, will make the patient's mobile environment a hub of care information. As with wearable devices, pharmacy information and communication technology systems should ideally connect to these patient environments, exchange patient informed consent data, and turn it into valuable tools for care delivery . BR Finally, this becomes important as digital therapy (DTx) becomes more and more integrated into the standard of care. DTx provides patients with evidence-based, high-quality software-guided therapeutic interventions to prevent, manage, or treat a wide range of physical, mental, and behavioral conditions [69–70].

Automated robots to support robotic dosing processes, packaging systems to create individualized doses, and chatbot information technology to answer frequently asked questions are examples of robotics that can improve the efficiency of the pharmaceutical process. Robotics can also reduce dispensing errors, leading to avoided hospitalizations, deaths and costs for health systems [71-72].

Many pharmacy schools and faculties do not offer digital medical education. Similarly, only a small proportion of the students and professionals surveyed received digital health education or training as part of their continuing education. Interviewed students and teachers mistakenly believe that digital medical education and e-learning are considered interchangeable terms. Digital medical education has a long way to go to create a ready and flexible pharmacy education that can cope with the rapid changes in digital healthcare. Integrating digital health into a higher pharmaceutical education program is an important strategy for improving digital health [73-74]. Much remains to be done to make pharmaceutical education ready and flexible to keep up with the rapid changes in digital healthcare. About half of the teachers agreed that their students have the skills to deliver digital health services and that their individual schools can easily identify and add new digital health literacy skills to the curriculum as they become available in practice. Although this discovery shows the potential for overall progress Because it can promote health awareness and lifelong learning, pharmacists are more likely to receive digital health education through continuing professional development if they have already taken a digital health course in school. The most common digital health education reported by schools and colleges was a lack of previous experience, followed by a lack of resources [19-20].

The answers of the specialists showed that they are not familiar with new digital

health technologies such as blockchain technology, bots, digital medicine and artificial intelligence. One of the biggest gaps in digital medical education is the skills and knowledge to use technology to solve existing clinical problems and improve care. Practitioner expectations for the clinical benefits of digital health in practice have remained low. This may be due to the fact that, from the point of view of the scientist, the introduction of digital health tools into clinical care was one of the concepts that were least often included in pharmaceutical education. Existing digital health courses seem to be more focused on teaching administrative and functional skills to facilitate business processes and improve operational efficiency [21-22].

Pharmacists, pharmaceutical schools, educators, students and professionals have indicated that they should support national organizations, schools, workplaces and student associations in providing advice, training, infrastructure and educational resources for digital health.

Training in the implementation of digital health tools was a key need cited by students and professionals alike. The lack of supportive policies, the availability of digital health tools and data, and technical limitations have been identified as the biggest challenges in implementing digital health in practice [74-75].

This report is the first of its kind global study of digital health in pharmaceutical education that examines the readiness and responsiveness of pharmaceutical education and identifies gaps in knowledge and skills among pharmacist professionals. We believe this report will encourage further research and development in this area to expand digital health among the pharmaceutical workforce [23-24].

Digital health is a top priority for political and health organizations involved in implementing digital health and raising digital literacy standards. Recent advances in technology have revolutionized clinical practice, from prevention to diagnosis, monitoring and treatment of disease, and have led to unprecedented public interest and participation in self-care and health [25-26].

The COVID-19 pandemic has accelerated the digital transformation of healthcare, with a lasting impact on healthcare. There are important lessons to be learned from this digital healthcare transformation. New digital health technologies must be people-centred, of high quality, evidence-based and effective, work for both providers and consumers, be sustainable, inclusive, fair and reliable so that they can be integrated into practice [27].

Many digital health technologies rely heavily on their use and proper use by healthcare professionals. It has become necessary for healthcare professionals to equip themselves with digital health literacy in order to deliver new and evolving models of healthcare services.

Pharmacy traditionally uses information technology. As such, he has the ideal skills and competencies to deliver more digital healthcare services to patients.

According to the World Health Organization (WHO), digital health is “a field of knowledge and practice related to the development and use of digital technologies to improve health.” Technology and digital transformation are rapidly changing information ecosystems and the design of healthcare systems. The use of various digital technologies, such as artificial intelligence and machine learning, offers enormous opportunities to improve healthcare services, access to healthcare, healthcare workforce and health outcomes. health is a broad term and its definition will change as new medical technologies emerge [30–31].

Conclusion

Digital health is a broad term and its definition will change as new medical technologies emerge. While digital health has been around for a long time with technologies focused on e-health (electronic health records), the rapid growth of technology in recent years has led to exciting new areas of digital health, including mobile health applications (mHealth) and wearable technologies.

Digital health also includes other digital health uses such as the Internet of Things, advanced computing, and big data analytics. While they can provide significant benefits, there are also risks, especially in terms of health disparities, data privacy, and the limitations of artificial intelligence.

Many digital health technologies rely heavily on their use and proper use by healthcare professionals. It has become necessary for healthcare professionals to equip themselves with digital health literacy in order to deliver new and evolving models of healthcare services.

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SUMMARY

Aim of the research was to study and analyze the key issues aspects related to artificial intelligence services in healthcare sector globally. Digital health is largely shaped by experts outside the health sector and offers the opportunity for cross-disciplinary collaboration to lay the foundation for digital health education. Pharmacy and pharma-scientist education must be needs-based in order to meet the current and ever-changing demands of digital health. These requirements should reflect the needs of all members of all industries and career levels in pharmacy and pharmaceutical sciences, from clinical pharmacists to drug discovery. digital medicine. Currently, the digital medical system contains four main components: an inert sensor embedded in an inert tablet, a patient-worn non-drug (patch) sensor, a mobile application, and a web-based control panel. Upon interaction with gastric juice, the recorded sensor is activated and connected to a wearable sensor which sends a signal to a mobile device

where it can be viewed by patients or later by healthcare professionals and caregivers via secure mobile and cloud applications. The vast amount of medical data enables more use of artificial intelligence and machine learning in pharmaceutical practices to solve important questions related to drug management and administration. Analyzing trends in large data sets can reveal individual risks of adverse events, behavioral issues, compliance patterns, and more.

A pharmacist is a professional expert who can complement the expertise of a data scientist to create services. Understanding the terminology and concepts used in artificial intelligence will help pharmacists interact with data scientists and collaborate constructively to develop models that improve patient care. Digital health systems can also empower and engage patients, making them co-creators of care. Shared decision-making between healthcare professionals and patients requires trust, partnership and transparency in mutual relationships. Healthcare professionals become companions in the patient's journey to health, while demonstrating empathy and humanity to support the patient well-being. A large amount of health data provides the opportunity to use more artificial intelligence and machine learning in pharmacy practice to solve important problems related to the management and use of medicines. Understanding the terminology and concepts used in AI will help pharmacists to work constructively with data scientists to develop models that improve patient care.

Key words: perspectives, artificial intellect, service, pharmacy, medicine, public health.

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**RESEARCH OF ETHICAL ASPECTS THAT ARISE IN CONNECTION
WITH THE SALE OF MEDICINES VIA THE INTERNET AND
ELECTRONIC PLATFORMS**

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РЕЗЮМЕ

У статті висвітлюються етичні ризики, пов'язані з можливістю придбання неперевіраних та підроблених лікарських препаратів, які можуть призвести до серйозних наслідків для здоров'я споживачів. Також досліджується аспект безпеки та конфіденційності даних споживачів при здійсненні покупок в електронному форматі, а також проаналізовано відповідальність електронних платформ за контроль якості продукції, а також за запобігання поширенню небезпечних препаратів через їхні сервіси.

Ключові слова: етичні аспекти, лікарські засоби, Інтернет, електронні платформи, споживач.