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ARTIFICIAL INTELLIGENCE; AS AN INNOVATIVE EFFECTIVE INSTRUMENT IN HEALTHCARE; TELEMEDICINE, PUBLIC HEALTH, AND PHARMACY-A SYSTEMATIC REVIEW

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Abstract

Background: Artificial Intelligence (AI) is useful in the health sector by contributing to the way in which healthcare is conducted, which is why it seeks to integrate healthcare systems with large-scale data. AI is

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powered by electronic data and the management of complex data in devices that favors the implementation of interventions. **Purpose:** To promote the application and knowledge of Artificial Intelligence in the healthcare field as a powerful instrument based on innovative knowledge parallel with modern trends in health and care. **Method:** A systematic review was conducted by targeting the databases such as Google Scholar, Scopus, Web of Science, Research Gate, Science Direct, ProQuest, Springer, PubMed, Science Direct, JSTOR, Embase, and EBSCO host, ERIC by using Keywords as technology, artificial intelligence, deep learning, technology, health, healthcare, medicine, education, and disease. Only English literature was targeted from 2017 to 2022. **Results:** Total of 16,022 articles was find out while 15 were selected finally. Findings revealed that AI reflects by various ways of technology and machine-based practices such as mobile applications, computers, internet, and robotic devices. This was also found that such innovations based on AI produced fruitful results in the public health, personal care, medical clinical practices, and pharmacology related fields. As the human errors reduced and work productivity increased. It was found that human resources such as training education, and insight to the use of technology-based devices are also required. To bring improvement still, various challenges and barriers are there in healthcare. This demands the conjunction of these challenges with other social agents to bring improvement in care and health. **Conclusions:** AI is a great innovation in healthcare. As could bring more fruitful changes according to the modern trends, demands, and requirements as per human dynamics. As human care could be facilitated through the innovative mechanism, information, communication, and technology-based grounds. For this, it is recommended to manage all modern challenges in medicine, public health, and pharmacy through IA.

Keywords: artificial intelligence, public, health, technology, pharmacy, medicine.

INTRODUCTION

The development of science and technology facilitates the use of machines and intelligent persons with artificial intelligence (AI) that simulate human thought under machine-cognitive-deep learning or by reinforcement. (Agbo et al., 2019). AI is useful in the health sector by contributing to the way in which health care is conducted, which is why it seeks to integrate health care systems with large scale of data. Computers learn and process data that model the factors that affect the determinants of health, aid in decision making, and implement personalized practices. (Aceto, Persico, & Pescapé, 2020) Computer science provides methods, algorithms and tools that discover new knowledge from extraordinarily complex data in combination with human interaction in inter-disciplinary work. And make efficient use of data through an artificial neural network of learning models that constitute the AI on computers or machine learning devices. That makes it easy to address clinical situations after generating, recognizing, processing, interpreting, classifying, storing, and retrieving data. (Aceto, Persico, & Pescapé, 2018) The AI is powered by electronic data and the management of complex data in devices that favors the implementation of interventions. That seeks to improve health care in actions supported by technological means with savings in avoidable medical care expenses or due to poor therapeutic adherence. Thomas Bayes (1701-1761) establishes the theoretical bases based on probabilistic inference by facilitating AI with learning algorithms in applications. In 1943, the machine learning approach to the artificial investigation of neurons in models arose by knowing the processing of information in the biological brain, hence the name of artificial neural networks or machine learning algorithms with computational support to analyze large volumes of data. Data. (Ritschl, 2018).

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Takenobu Kamada (1991) proposes the concept of systems biomedicine by integrating the areas of bioscience-medicine with computer science in algorithms or predictive mathematical models with linear-logistic regressions, decision trees and neural networks deep into mobile and interconnected devices that compile and store data. (Kamada, 1991) In the 2000s, the AI model advances with free modeling of the mammalian visual cortex, technical advances, and faster hardware making it possible to train neural networks layered with feature detectors on data sets and deep learning models with voice recognition on Android devices in Google, Facebook, Microsoft, Apple and Amazon business actions contributors to social processes, and that amplifies the operations of machine learning, cognitive, deep and reinforcement methods when integrating and interpreting data sets of various scenarios.

In 2017, the FDA announces that the rigor of data security and reliability must be ensured through processes that guarantee current systems and under safe use. Large Scale Data autofocuses optimize learning behavior from gaming-derived experiences and then increases the learning capacity to support the decision-making system at scale. (Price & Nicholson, 2017). The AI is classified in the general AI that is an advanced AI capable of solving any type of task (multitasking) to date the great results of the AI have been achieved with the narrow AI, the narrow AI that is a specific AI for a certain domain of application and the super AI that is a futuristic AI that will be able to surpass human intelligence in all its manifestations. (Manne & Kantheti, 2021)

AI is related to machine learning, computer science, and mathematical statistical theory when the truth is hidden in a place not easily accessible to the human brain and machine learning based on tools and methods uncovers hidden patterns in the data. Software programs based on data instead of programming rules that encode specific sets of instructions allow the computer to be trained with large amounts of data using algorithms that give it the ability to learn and identify complex relationships or patterns that contribute to making decisions. Precise decisions. (Price & Nicholson, 2017).

According to Konyushkova et al. (2020), the machine learning is classified into:

a. **Supervised**: Algorithm with processed or labeled data (predictive value) that identifies hidden patterns in data such as facial recognition: the machine uses examples of a face or no face. The algorithm learns to predict whether the image is a face or not; It is used in data exploration and the generation of new hypotheses.

b. **Reinforced**: Unlabeled images (descriptive value), no outcome data, associations, patterns, or knowledge among a set of input data are described.

c. **Semi-supervised:** Contemplates a mixture of the above with labeled or unlabeled data, the algorithm finds labels according to a measure of similarity with one of the given groups.

Deep machine learning uses the multi-level representation learning methods of deep artificial neural networks in hidden inputs or outputs that emulate the functionality of the

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brain. Artificial neural networks work by building layers upon layers of simple processing units by interconnected neurons with many differential weighting connections, the networks are trained using backpropagation algorithms: the machine alters the internal parameters by calculating the representation in each layer a from the representation of the previous layer. (Saravanan, & Sujatha, 2018) In superficial machine learning neural networks have a single hidden layer or support vector machines, in deep there are neural networks with many hierarchical layers of non-linear information processing, the superficial one does not work well with raw data as it requires human information for configuration and maintenance; in the deep it is unsupervised once it is set in motion learning from complex patterns even from high dimensional raw data with little guidance. (Moglia et al., 2021) Representational machine learning comprises a set of methods in which the machine is fed raw data and discovers representations, thus the perceptron is a bio-inspired algorithm that performs binary classification and extracts features using data-based learning. Disciplinary integration enables systems biomedicine that brings together biosciences, medicine, and computer science in a comprehensive approach that encompasses humans, disease states, drug discovery, and medical care. (Kalousis & Hilario, 2003) Given the relevance of the topic for the various processes that affect the health of people in different contexts, particularly due to the COVID-19 pandemic, the objective of the work was to encourage the practical application of artificial intelligence as a potential health tool. (Siemens, 2005) Through the construction of new knowledge that facilitates the mechanisms that promote the use of means to generate changes in the way of conducting healthcare through actions with technological and AI support. The result of the findings considers the premise of George Siemens' theory regarding the learning relationships that occur between the decision-making process, the use of data, human interaction with technologies, and AI in highly digitized environments. (Mukherjee & Hasan, 2020)

Purpose

This study was conducted with the goal and purpose to promote the application and knowledge of Artificial Intelligence in the healthcare field as a powerful instrument based on innovative knowledge as parallel with modern trends in health and care.

Research Question

What is known about artificial intelligence as a potential tool for use in healthcare?

METHOD

Research Design

A systematic literature-based search view was conducted under the qualitative research technique in which the findings of the selected electronic documentary sources were obtained, analyzed, interpreted, and compared.

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Targeted Data

Documents (scientific articles, conferences, reviews, expert opinions or comments, book chapters) in English were selected from the databases: Scopus, Google Scholar, Research Gate, Web of Science, ProQuest, Springer, PubMed, Science Direct, JSTOR, Embase, EBSCOhost, ERIC with the help of the Keywords technology, artificial intelligence, deep learning, technology, health, healthcare, medicine, education, disease.

Inclusion and Exclusion Criteria

Exclusion Criteria

The following inclusion criteria were considered:

a. Relevance of the content when matching the research question; the title, abstract, introduction, and conclusions of each document were reviewed.
b. The scientific quality, so that the article corresponds to an indexed journal, of a frequent publication, of a recognized base, of prominent authors in the field, cited by other authors, or of an academic event concerning the subject.

Exclusion Criteria

The exclusion criterion was temporality. The period of the last five years or before was established only at the discretion of the author due to the importance of the content for the purposes of the investigation.

Study Process

The selected material was reviewed, the content was compared, and the textual information that allowed generating the respective citations and references was obtained. The information was analyzed, and the document was prepared in sections (summary and potential applications in health by area of interest: public health, medical, pharmaceutical) that reflect the author's interpretation of the subject. The pertinent considerations were made, and the ethical principles of all scientific research and the rigor in the use of information are maintained.

Search Syntax:

A key element regarding the search of the research is known as Syntax is the basic identifiers of evidence that prevail in the database to give appropriate, accurate and seducing research. These are exceedingly small letters that explain verbs and proverbs and provide appropriate reserve recording for the literature search (Marcos-Pablos & García-Peñalvo, 2018).

Syntax 1: Artificial intelligence
Syntax 2: Promote the application of artificial intelligence in the healthcare field.
Syntax 3: Promote the knowledge of artificial intelligence in the healthcare field.
Syntax 4: Artificial intelligence as a potential tool for use in healthcare
Syntax 5: Knowledge parallel with modern trends in health and care

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Step 3: Literature Search

After the process of inclusion and exclusion criteria definition, the next process is to search literature based on different databases to identify appropriate, necessary, and relevant research content form the selected search engine and database for the appropriate Collection of data (Roy et al., 2021). Systematic literature review uses the search engine, which was selected including Google Scholar, Scopus, Web of Science, Research Gate, Science Direct, EBSO, ProQuest, Springer, PubMed, Science Direct, JSTOR, Embase, EBSCOhost, and ERIC. Whereas the search engines that are appropriate to search and use these databases include Google Chrome, Maxton, Torrent, and Microsoft Edge. Search engines and databases have several amounts of a huge number of data research include.

Database Statistics

No	Database	Syntax	Year	No of Research
1	Google Scholar	Syntax 1	2018	1,768
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
2	Scopus	Syntax 1	2018	789
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
3	Web of Science	Syntax 1	2018	1,091
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
4	Research Gate	Syntax 1	2018	1,009
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
5	Science Direct	Syntax 1	2018	1,450
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
6	EBSO	Syntax 1	2018	967
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
7	ProQuest	Syntax 1	2018	659
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
8	Springer	Syntax 1	2018	678
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	

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		Syntax 5	2022	
9	PubMed,	Syntax 1	2018	1,090
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
10	Science direct	Syntax 1	2018	1359
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
11	JSTOR	Syntax 1	2018	1578
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
12	Embase	Syntax 1	2018	1124
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
13	EBSCOhost	Syntax 1	2018	1178
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	
14	ERIC	Syntax 1	2018	1287
		Syntax 2	2019	
		Syntax 3	2020	
		Syntax 4	2021	
		Syntax 5	2022	

After scrutinizing and collecting all the data that is necessary for every search from the database and engine to the application of methodological and explanation regarding the waist application and importance.

Retro to the selection of data from this database there is a need of scrutinizing the selection and generation of appropriate research that are necessary and important to write for the interventions. After this stage for selection of the study based on the previously defined criteria is finally selected.

Conducting the review

Step permits the researcher to execute the research plan and start gathering the relevant data and information. It is the second and the most important after mind mapping and rehearsal, it's time for action.

Selection of studies based upon the previously defined criteria

Scrutinizing effective appropriate and necessary research pass the fourth step of inclusion identification of the research screening of The Eligible research criteria also mentioned and obeyed to identify the included research. The identification process also mentions the recorded identify the database search which was approximately 16,022 find the coding and extract the whole content the remaining research left 15 studies only

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which are mentioned below The search after passing the inclusion and exclusion criteria remains to the only 15 peer-reviewed articles that demonstrated and Express on the Research Design, method, variable expression, value representation, population stratified, sampling technique, etc. A systematic literature review is based on the research nitrates that is represented below this

RESULTS

16,022 published documents were consulted and 15 were selected, the table provides the details of compliance with the inclusion criteria, and authors from industrialized countries prevail.

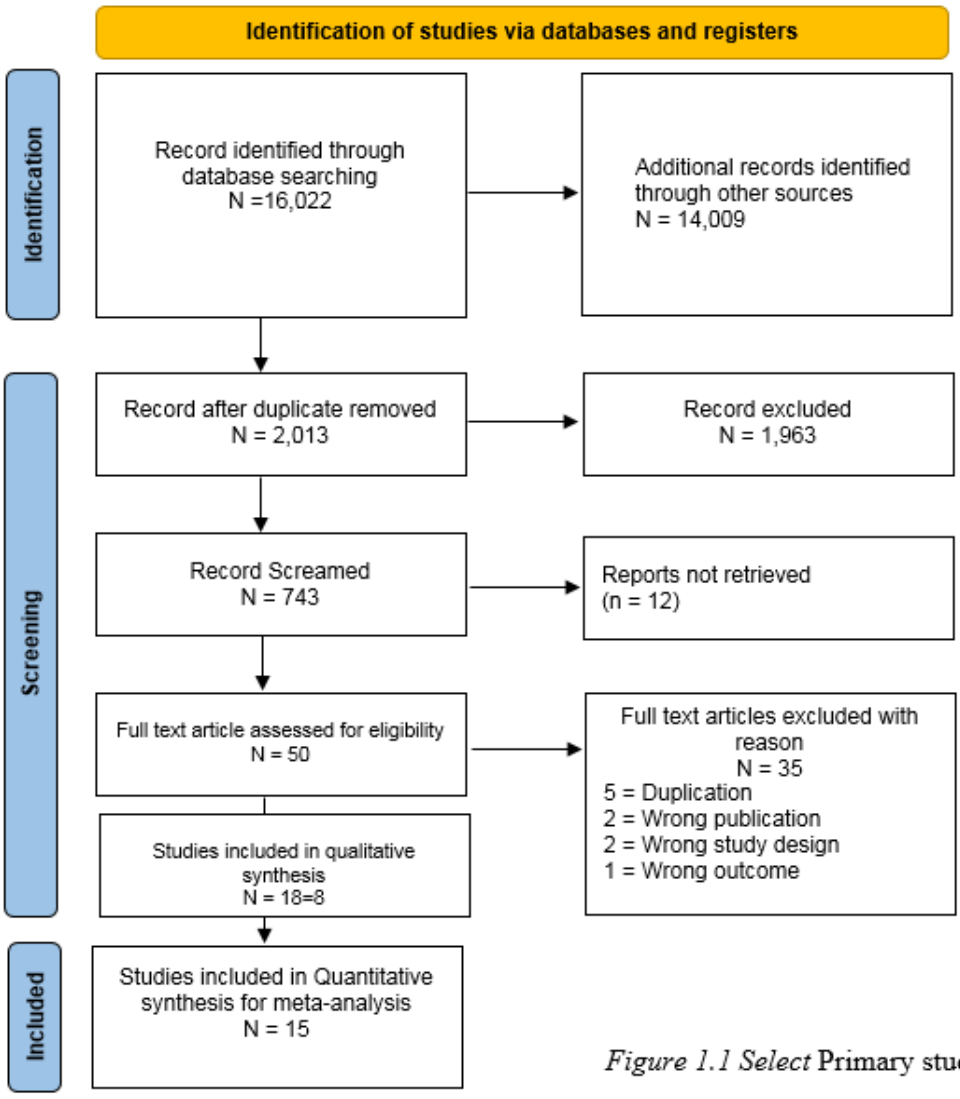

Figure 1.1 Select Primary study

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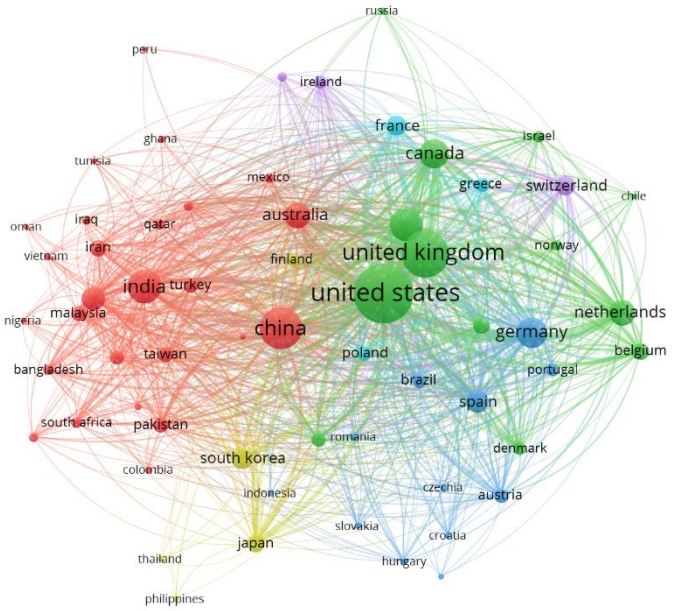

Results indicate that the total 15 articles after the screening identification of the legibility Inclusion criteria from 16,022 total articles. These articles were selected from the USA: United States of America; UK: United Kingdom, UAE: United Arab Emirates and KSA: Kingdom of Saudi Arab. The article was related to AI: artificial intelligence; ML: machine learning; DL: deep learning; EHR: electronic health records. This indicated that most of the researchers were conducted from these can country with to the research.

The bibliographic view indicates that countries are from the respective countries. Moreover, the countries indicate the effectiveness of different countries to the research relation.

Potential applications of artificial intelligence in health

Most of the selected documents show interest in the potential of AI applications in health and the use of data through algorithms thanks to the support of technologies (information, communication, informatics, computing) (Aithal, 2019), unfortunately few applications show easy development, most prevail in experimental research phases to achieve clinical applicability after overcoming the various challenges that limit immediate or massive use.

Among the applications found, the following stand out by area of interest:

Public and general health

Computational modeling for the identification and selection of relevant characteristics in various phenomena of interest is proposed, which are combined with data in models of modest complexity, coming from precision medicine that helps establish disease prevention and treatment strategies. The implementation of health care practices with

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assistance and use of computational techniques is visualized. (Panch, 2019; Yang et al., 2020)

Applications of interest in related disciplines are developed with the support of behavioral interviews through text messages, progress reports sent by mail, visits with video support, image processing, voice and audio or text recognition and voice, the use of social networking software, machine vision software using cameras, phones, robots and autonomous cars, content filtering or searching for face identification and handwritten text on social media. (Baclic et al., 2020) Web site recommendation systems, e-commerce, sales forecasting, weather forecasting, consumer products with cameras and smartphones, object identification in images, speech transcription into text, video games , the replication of painting styles, the composition of classical music, the search to find relationships in elements in the news, publications or products that interest users; selection of relevant search results; robot assistants, the use of portable sensors, the use of platforms for interdisciplinary work. (Blasimme & Vayena, 2019; Baclic et al., 2020; Gunasekeran et al., 2021)

Useful material is built from the data people upload to the virtual cloud, which includes billions of data points in molecular, clinical, cellular, organic, phenotypic, imaging, social media, and other chemistry. (Malandraki-Miller & Riley, 2021; Choudhur et al., 2022) Intelligent surveillance systems in food and environment are studied. It seeks to follow 2020 up on outbreaks with the support of social networks and lifestyle. The modeling of neurodegenerative diseases is studied. Support is provided with social networks oriented towards disease care which are working in KSA like: Mawid, Seha, and Patient like Me, Breast Cancer Alliance, and Multiple Research in clinical trials. (Aldhahir et al., 2022; Alanzi et al., 2022; Zanad et al., 2022)

Medical applications

P4 medicine applications are proposed: predictive, preventive, personalized, participatory with systems medicine and biomedicine. The use of genetic and electrophysiological data with the support of bioinformatics is pursued. (Pack, 2016). Applications exist in the fields of bioinformatics at the translational molecular level, medical imaging, pervasive detection, medical informatics, and biostatistics for various purposes in cancer care, neurology, and cardiology. (Noell, Faner, & Agustí, 2018).

Various applications are developed using telehealth with real-time and interactive two-way communication between patients and healthcare providers. With deep learning technology in modern biomedical use is made of electronic health records, images, sensors, and text materials. With the support of AI integrated with biosensors and related tests, it is intended to diagnose cardiovascular diseases in the early stages, as well as predict the survival rates of people with colon cancer. Computational diagnosis and precision medicine are proposed with high performance technologies related to genomics, transcriptomics, proteomics, and metabolomics. (Love et al., 2019; Kassem et al., 2021)

The maximum use of digital devices that measure physical parameters is projected: heart rate, body temperature, weight, respiration, management - quality of sleep and

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stress, nutritional habits, and physical activity. The use of biomarkers with images, data and genotype biobanks is investigated. (Alzeidan et al., 2017; Abdulsalam et al., 2021; Zhang et al., 2020, Shahbal et al., 2022)

Telemedicine applications are conducted with videoconferences, prediction with diagnostic means that project the length of hospital stay, readmissions - mortality; there is modeling of biological and psychological diseases; the use of portable skin-environmental sensors, portable or implant-assisted devices, continuous monitoring of vital signs, medical care services referred on social networks by other users of the services. (Melstrom et al., 2021)

The clinical application of deep learning is practiced in image-intensive fields: radiology, radiation therapy, pathology, ophthalmology, dermatology, and image-guided surgery. (Naylor, 2018) Biology and medicine are combined to generate data from social media, online video or physiological signals from skin-implanted sensors and other intensive sources, data from wearable devices, drug analysis, and genomic analysis. The automatic classification of skin lesions and the detection of arrhythmias are studied. The combination of informatics, images, and data mining with genomics, epigenomics, metabolomics is investigated. The use of computer systems that read mammograms independently is studied. (Naylor, 2018; Beyer et al., 2020)

Automated deep-learning algorithms are practiced in breast cancer metastasis detection. Deep learning algorithms are applied in diagnosis with electromyogram (EMG), electroencephalogram (EEG), electrocardiogram (ECG) and electrooculogram (EOG). Machine learning and Medical Information Mart models are conducted in the management of stays in intensive care units. (Rastogi, Chaturvedi, & Gupta, 2020; Klaib et al., 2021)

Machine learning approaches are studied with supervised methods for the detection of pulmonary nodules on chest X-rays, with risk estimation models of anticoagulant therapy, implantation of cardiomyopathies with cardiomyopathies, use in the classification of cerebrovascular accident and the mimicry of stroke, modeling of CD4+ T-cell heterogeneity, prediction of outcomes in infectious diseases, detection of arrhythmias with electrocardiograms (ECG), design and development of in silico clinical trials. (Rastogi, Chaturvedi, & Gupta, 2020; Klaib et al., 2021)

The use of predictive bladder volume sensors in the prediction of epileptic seizures and other neurological disorders is investigated. The application of regional anesthesia assisted by artificial intelligence and robotics is developed. Better pregnancy control results are trained with the help of artificial intelligence and machine learning. Hospitals that work highly connected to the Internet stand out. Cervical cancer detection is being studied by identifying pre-cancerous changes. (Ahmed, Barua & Begum, 2021; Hossain et al., 2021)

Radiology is developed with image analysis and using probability of disease as a basis for deciding which images should be interpreted first by the medical radiologist, retinal images are examined to determine which patients have a vision-threatening condition and should be referred to an ophthalmologist, bone age is estimated on radiographic

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examinations, treatable retinal diseases are diagnosed by optical coherence tomography, vessel stenosis and other metrics are quantified on cardiac imaging. (Hosny et al., 2018)

The use of artificial intelligence in predicting changes in depression and anxiety with digital interventions is investigated. Healthcare institutions and organizations that offer specific services are mentioned, such as: Deepmind Health cooperation Moorfields Eye Hospital NHS Foundation, Watson Oncology (IBM), Publink for digital billing, Medical Sieve in radiology imaging, Deep Genomics genetics and medical records, atomize which develops new therapies, Artery with an artificial intelligence-assisted cardiac imaging system, and voice-controlled chatbots. (Zaudere et al., 2014; Strickland, 2019)

Telemedicine and Pharmacy

Tele pharmacy is developed in hospitals and in distant communities with review, monitoring, dispensing, verification of sterile and non-sterile compounds, as well as medication administration, evaluation, counseling, and patient education. Chemoinformatic is investigated in drug development, adverse reaction prediction, biomarker identification, and drug discovery. (Hosny et al., 2018)

Safe drug robot is applied with chat messaging of drug use while breastfeeding and emergency care to Zipline by medical drones. Single cell unit sequencing and flow cytometry technologies are used to support drug discovery and development. Deep learning algorithms are investigated in the prediction of drug release, pharmacokinetics, and pharmacodynamics in in vitro models. (Rastogi, Chaturvedi, & Gupta, 2020; Klaib et al., 2021)

Computational models are applied in drug development with thermodynamic proxy models, simulation of drug solubility in human intestinal fluid, prediction of stability in liver microsomes, autoxidation, CYP2C9 metabolism sites, permeability in human skin, blood-brain barrier penetration, and estimates of skin concentration levels after dermal exposure. Unsupervised learning is studied in the review of failed clinical trials using spironolactone, enalapril, and sildenafil treatments compared with placebo to identify the subclass of patients who may benefit from specific therapies. (Paul et al., 20121; Love et al., 2019; Kassem et al., 2021)

DISCUSSION

There is a tendency to think that AI is (specific or narrow AI) in telemedicine consultations, although the evidence shows a variety of actions that include diagnosis, treatment, prevention, rehabilitation, disease investigation, evaluation and continuing education or other activities of daily life. A particular AI is capable of diagnosis, treatment, prevention for a single type of disease, while a general AI should be capable of addressing any type of disease. Therefore, despite the variety of actions, it remains specific. Ahmed, Barua & Begum, 2021; Hossain et al., 2021)

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Tele pharmacy uses telecommunications with videophone systems, software, automated dispensing machines, and a pharmacist at a distant site provides two-way video educational consultation to ensure medication administration and counseling. In Australia and the United States there is evidence of the impact of tele pharmacy services in reducing the number of reported adverse drug events, the annual cost of adverse drug events (2 billion USD), hospital stays, avoided deaths or the possibility of reviewing medications at home, greater patient satisfaction and accessibility to health services that encourage the efficient use of resources. (Rastogi, Chaturvedi, & Gupta, 2020; Klaib et al., 2021)

The activities with AI have a high technological component with a dizzying advance that promises to become an instrument of the different machine learning approaches generating opportunities for improvement in the various care practices, health care and greater participation of professionals, providers health services and the general population. However, it has not been easy due to the multiplicity of prevailing challenges, such as the human resource that requires academic preparation and updating training in clinical practice to generate mechanisms oriented towards the best health results. (Saravanan, & Sujatha, 2018; Moglia et al., 2021)

While in developed countries the trend is to promote the use of AI with the use of digital images, digitization of records, adaptability, and integration of deep learning to promising mechanisms that streamline the routine work of health professionals; in developing countries progress is slow due to the presence of other needs that limit it. It is necessary to empower people towards the development of AI and venture into these fields without depending on improvements in the basic technology of deep learning. (Guo & Li, 2018).

Panch Szolovits and Atun (2018) indicates that in certain clinical fields the application of deep learning has occurred more quickly due to the conditions (digitization, high volume of data) that allow it, as occurs in: radiology, radiotherapy, pathology, ophthalmology, dermatology and surgery guided by images; while in others progress has been paused due to limitations and in others it has not even started. (Saravanan, & Sujatha, 2018)

In this post-millennium era, there is the potential to work with computers and robots mediated by AI that complements the health workforce during a crisis due to shortages of personnel due to population aging and physical exhaustion due to high demand. Of chronic care. Situation that deserves to highlight the potential of health care with intelligent and healthy aging as people grow to advanced ages, self-sufficiency, and control despite chronic diseases with assistance support from AI. (Mukherjee & Hasan, 2020)

A health system must be efficient to manage the availability, accessibility, acceptability, and quality of health workers despite the lack of workers, a force that is also aging, so it is an additional challenge for AI to fill these gaps. There are people with attitudes of reluctance to work with AI due to the fear that at some point machines could replace the human being since the technologies could conduct up to half of the human activities and 60 percent of the occupations have 30 percent of automatable activities. (Maddox,

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Rumsfeld, & Payne, 2019) However, the integration of data from conventional sources with that generated in applications of new technologies with AI, becomes an opportunity to transform health care supported by technology facilities (communication, information, computing, and informatics). Technological and information technology development throughout history has facilitated the accumulation of a large amount of data from various sources and with advances in AI, data can be used in clinical applications with electronic records and deep learning. (Saravanan, & Sujatha, 2018; Moglia et al., 2021)

Technological innovation combined with automation or technological miniaturization makes it possible to increase health production due to the availability of massive data sets that come from applications, medical devices, and mobile digital health record systems or connected devices. The personnel who occupy managerial positions must be aware to invest, acquire, train, and maximize the available resources at a reasonable cost that allows the use of AI for health; With a view to reducing ineffective traditional activities, diversifying intervention strategies in health centers or communities with the support of different social actors. (Kalousis & Hilario, 2003; Maddox, Rumsfeld, & Payne, 2019) Intensive work can be maximized with cooperative educational or research networks to share, and link others with biorepositories or in the convergence of a unified data format such as Fast Healthcare Interoperability Resources in which patients receive training, adequate training to control the access to data and consent to the construction or execution of models, text tools in HTML or in hypertext markup language on the web that can be indexed and accessed with the use of computer search engines. (Maddox, Rumsfeld, & Payne, 2019)

Challenges in the Healthcare field

There are challenges regarding the use of AI that require attention, making it difficult to match rapid technological advances with immediate application processes, the legal and regulatory frameworks that regulate the use of AI, coupled with the high initial investment costs that in some cases They not only require effort - time, but also consensus and visionary decision-making. (Gerke, Minssen, & Cohen, 2020). Hence, health personnel require clarity regarding the achievement of maximum health benefits with AI through the control and management of challenges such as:

a. Adequate management of heterogeneous data that has high uncertainty and dispersion due to the lack of universal reference points, integration, harmonization of formats, processing, analysis, and knowledge transfer. (Aung, Wong, & Ting, 2021).

b. Pursue the use of models through a variety of methods that merit not only greater credibility but also interpretability. (Aung, Wong, & Ting, 2021).

c. Greater control of ethical, legal, social, security, privacy, political, economic, technological aspects related to historical - cultural - technical barriers, the need for extensive sustainable computing resources, a constant monitoring system; as well as the fail-safe design, to ensure that it does not cause damage; all this with a greater degree of transparency, efficiency and scientific evidence regarding reproducibility, usability and reliability. (Gerke, Minssen, & Cohen, 2020).

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Recommendations and Suggestions

The utility that could represent the use of AI facilitated with the use of technologies under an innovative multidisciplinary approach in favor of adequate provision of health care services, medical care, decision making, Large Scale Data analysis, training of the human resources in undergraduate/postgraduate health, exchange of information for diagnosis - treatment - disease prevention, research, evaluation, active participation of the population, intersectoral work and continuous education of the social actors involved in the management of digital health (patients, workers, other members of the health system). (Gerke, Minssen, & Cohen, 2020; Aung, Wong, & Ting, 2021).

Implications

Applications with AI would help in the processes of design, implementation, monitoring and evaluation of health policies, training in educational processes in formal - non-formal spaces that merit adequate regulations and a change towards education in accordance with scientific advances, feedback of users following the use of powerful computing tools, access to massive open online courses that transform the practice of higher education and all this; in order to promote the health of individuals and communities. (Kojima, Liljas & Iliffe, 2019)

The existence of a vast range of technologies opens opportunities for the development of a variety of mechanisms, techniques, algorithms, tools, procedures after the use of AI devices; as well as other technological resources that facilitate the processes of health care for people in various contexts in an innovative, modern, dynamic, and creative way in keeping with contemporary times. An agile way of solving problems that previously had complexity as the main impediment could be visualized, such is the case of the care of people with mental disorders in which applications with AI allow the identification of symptoms, early diagnosis, and implementation of effective interventions with a pharmacotherapeutic approach. (Stead, 2018)

It is not surprising that the use of AI technologies entails an implicit challenge for the different knowledge sciences, since it entails the development of knowledge, skills and abilities under a framework of values that requires interdisciplinary teamwork, multidisciplinary, transdisciplinary at an agile pace in accordance with the ideal context, with the necessary means through prior preparation that is nourished by a dynamic, continuous and bi-directional process from the development spaces of people in different environments. (Ahmad, Khan & Haque, 2018)

AI is a useful tool that facilitates the work of caring for people by using machine learning applications from the management of large data sets in a person-centered process with the appropriate and beneficial use of technological support with a view to towards the solution of simple or complex, individual, or collective problems to improve health care and reduce clinical errors, care costs, as well as favor increased productivity, improve the work environment and cybersecurity. (Kojima, Liljas, & Iliffe, 2019).

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Conclusion

AI is a significant, powerful, and useful tool in the healthcare field. As this brought a revolutionary positive change and innovation in the entire health system. Three of the most significant areas such as medicine, public and personal health and pharmacology are direct beneficiaries of this innovation. Healthcare entered a new phase through IA. As globally, AI has the future and need to invest more and provide more attentions.

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