

The Future of Post-Covid-19 Health Services using Metaverse Technology

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ABSTRACT

Background: The development of the metaverse technology of the next generation of the Internet, which consists of a virtual environment, Augmented Reality online which is decentralized and stable and can be widely used in the health field. Due to the growth of Metaverse technology in various fields and the importance of using it in healthcare, this study was conducted to review and identify areas of application of metaverse technology in healthcare.

Purpose: The purpose of this study is to analyze the writings that examine the metaverse in health care.

Methods: In this scoping review, an electronic search is done through publish or perish to get an overview by combining keywords related to the topic without a time limit. Two authors independently collected data by data extraction tables.

Results: The 50 articles found through the initial search, nine studies were eligible for inclusion in the review. Most of the studies (55.55%) were published in 2021, and South Koreawas the country with the most research (44.44%). The main services for using Metaverse include educational services, intervention services, and communication services. Also, medicalimaging is the most practical aspect of the Metaverse used in healthcare.

Conclusion: The use of Metaverse in various health fields is growing rapidly. It is now widely used in other fields, such as medical intervention and health care provision; in medical imaging, it has many applications due to fundamental changes in the nature and quality of imaging.

Keywords: health, metaverse, virtual services

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BACKGROUND

The pandemic causes rapid changes in technology because all must be able to survive without being affected by the pandemic conditions. The outbreak caused by COVID-19 seems to force the entire world community to change habits from physical interaction to more digital interactions. This condition causes all activities to be carried out online. With social distancing conditions like this, of course people will spend more time with social media and anything related to information technology. (Chen & Zhang, 2022).

In the midst of the current corona pandemic, exposure to the virus can easily infect health workers. This is of course a high risk to the health of doctors and other health workers. Currently, technology has begun to emerge that can help the community and also medical personnel to reduce the curve of patients infected with COVID-19. Various forms of health technology that are already present to help the community are online consultation services and chatbots. During the coronavirus pandemic, the demand for medical action and consultation has far outstripped doctors available and capable of diagnosing disease. The emergence of chatbots will be implemented to support the increasing demand for medical practitioners. (Garavand & Aslani, 2022).

Simultaneously, the chatbot is also capable of building algorithms built to make diagnostic assessments capable of diagnosing, providing medical recommendations and raising cases to human doctors in the event of a serious situation. This has actually happened, but this change of course creates conditions where the community seems to be asked to make habituation to access news, information, and also all the necessary needs through cyberspace. Therefore, people want information that is fast-paced and easily accessible. (Yang et al., 2022).

During a pandemic, Health Services providing all types of health care requires face-to-face interactions between doctors and patients. Some health services that do not require patients to attend, have to go to a health center and see their doctor. The principle of service is social distancing for patients and doctors and limits the provision of services to patients. The emergence of digital health services based on digital and Internet tools has affected the doctor-patient interaction. Digital healthcare solutions are on the verge of unprecedented change due to augmented reality (AR) and virtual reality (VR) technologies. Metaverse is a hypothesis of the next generation of the Internet consisting of a decentralized and stable 3D virtual reality environment. (Yang et al., 2022) Thomason stated in 2021 that the health care system has long been unsustainable under the stress of chronic disease, rising costs, an aging population, inadequate health personnel, and limited resources. Digital health is directly changing care and is an important factor for change in the health department. The latest technology in facilitating health care is a metaverse phenomenon. Metaverse has features that make it the next generation of the Internet. Due to the three-dimensional space of this technology, real users of the presence are associated, and the possibility of interaction and cooperation in the context is provided. Standardization is a vital feature of Metaverse. Tools and features are built according to standards so that different Metaverses can interact with each other. Metaverse has significant potential applications in the field of health care. For example, some of the most important applications are remote monitoring of patients requiring intensive care, access to data, better understanding of clinical outcomes (such as blood sugar and heart rate monitoring), and virtual follow-up of patients with COVID-19. Metaverse is operated as a virtual reality and augmented reality technology in cyberspace. It has great potential to improve surgical accuracy and therapeutic applications, facilitate social distancing, and more and more. Metaverse's main advantages in healthcare and patient care can be placed in the following categories including virtual reality evolving role in medical training, Metaverse digital therapy applications,

augmented reality in surgical procedures. (Wu & Ho, 2022).

OBJECTIVE

The purpose of this study is to analyze the writings that examine the metaverse in health care.

METHODS

Research design

This study adheres to the principle of content analysis, which focuses on the findings of various studies that have been published in various scientific journals. The research method used is a literature review by Fauzi & Pradita (2018).

Data source

Data were collected from the results of the content analysis of metaverse articles. All articles are taken from journals using Publish or Perish (PoP) software, which is a platform for bibliometric analysis with the Google Scholar search engine. There are a total of 50 metaverse journals associated with health care. Henceforth, all articles reviewing the metaverse were collected from each of these journals. The articles analyzed in this study were published online before October 2022. Of the hundreds of articles collected, there are 50 articles that examine the metaverse. All articles were analyzed in this study.

Research Instruments

The instrument used for this research is a content analysis guideline which contains related aspects observed (Table 1). There are seven main aspects examined for content analysis in this study. These aspects include (1) the number of publications per year; (2) the type of research; (3) type of services research subjects; (4) application metaverse (5) platform actions.

(6) outcome from research. methods. Exceptions, categories in aspects (2), (4), and (5) were not determined initially because there was no previous research that could be referred to determine what should be included in the category and the possibility of categories being too generalized. may appear when content analysis on some articles is performed. In addition, categories in aspects (1), (6) were determined prior to data collection. The categories are shown in Table 2, which was adapted from (Fauzi & Pradipta, 2018). In addition, aspect (2) is divided into two sub-aspects, namely general research type and qualitative research design.

Table 1

The Features of included studies

No	Author, year	Type of services	Application	Platforms	Outcome
1	Donghua chen 2022	The Health Metaverse framework	medical information standards, medical and social data fusion	Telemedicine	challenges in technology upgrades, gamification of medical service, protection of patient privacy, and prevention of people from escaping from reality.
2	Tzu Chi Wu, 2022	the virtual environment provides opportunities for highly immersive and interactive experiences	Big data, Internet things 5G	Acute medicine clinic	The demand for and development of metaverse are different in diverse subspecialties owing to patients with varying degrees of clinical disease

3	Tan Tin 2022	To serve the urgent need, it is important for the eye community to continue to innovate, invent, adapt, and harness the unique abilities of virtual health care technology to provide better eye care worldwide.	In health care and ophthalmology,	Telemedicine	On the other hand, the implementation and adoption of these emerging virtual health care technologies will require multipronged approaches virtual clinical settings, user-friendliness of the technologies and clinical efficiencies while complying to the clinical,
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Data analysis health economics, regulatory, and cybersecurity standards

Each article is classified into certain categories based on certain aspects that meet the specified categories. The decision is based on the information shared by the authors in the abstract, methods, and discussion sections. Furthermore, the data that has been collected is presented in the form of a bar chart.

RESULTS

After analyzing the data using the Covidence application, 3 journals were found, all of which were carried out during 2022. Research that focuses on health services uses metaverse. studies designed in four countries, including South Korea had four articles (44.44%), and the UK, which had two articles (22.22%). The US has two articles (22.22%), and China has one article (11.12%). Most of the research was conducted in 2021. This time trend shows a significant growth in conducting research on the Metaverse in the health field over the last few years. The main services that use Metaverse include education, intervention, and communication services. Based on this number, any service has several categories. (Garavand & Aslani, 2022).

DISCUSSION

Researchers have been considering the use of Metaverse in health recently for many years. Most of the research is published in 2021. With this growing trend, it is likely that we will see more use of this new technology in healthcare in the years to come. (Chavannes & Bai, 2022). Therefore, health system policy makers should consider expanding the infrastructure required to deploy Metaverse in different areas. However, the study results indicate that many countries have not explicitly researched the Metaverse in health or have not published the results of possible studies. It is recommended that other research be conducted at different levels and in other countries to assess this technology more accurately. Metaverse is a step beyond education as a level above augmented reality. Beyond capabilities, augmented reality can facilitate education for medical students by providing a three-dimensional environment

that is closer to reality. In this context, there are possibilities beyond augmented reality, which is only a simulation of reality, and act more strongly in conveying emotions that are closer to reality. Therefore, it is suggested that in medical education, special attention is paid to the use of Metaverse, and that is why the authorities are planning to use this technology. (Almarzouqi et al., 2022) One of Metaverse's most valuable uses is imaging. In the method, the specialist has prepared a 3D image of the desired limb or arm using the metatarsal capabilities, which the specialists can interpret much more quickly. This technology also needs more attention and usage in this field. These images are sometimes high volume, and sending them may be interrupted, so usability dependence on them is a faster platform than the Internet with the ability to transfer more shaping and radiological images at a higher usable speed. One of the main challenges in providing healthcare remotely is managing communication between providers and recipients. Metaverse can provide conditions that enable more effective and interactive communication through the ability to understand people's emotions more deeply. It is a consideration for people to understand each other and the work being done; Metaverse provides the feeling of being closer to people at a distance by creating a space that is similar to the real environment. The results of the study indicate that one of the areas where Metaverse is used is dentistry, which teaches students and professional dentistry, and oral health education. By providing the ability to deliver 3D digital images, this technology in dentistry can provide the basis for improving the delivery of dental interventions and being responsive to the future needs of this part of the healthcare sector. It is suggested that special attention should be paid to the use of Metaverse in the dental field, including diagnostic and therapeutic services and educational services. More research should be done in this area as a new field of research. (Resin, 2022).

CONCLUSION

Metaverse technology, if accompanied by real innovations to meet people's perceptions and expectations, will revolutionize healthcare performance very soon. Ultimately, institutions must understand how to create this technology safely for patients and meet the needs of the human pack. Also, the Metaverse's potential in educational topics could create a revolution in student medical education and public health. While augmented reality technology has limitless prospects in healthcare, it must be developed in a way that transcends the human relationship between patient and doctor. (Thomason, 2022) The use of Metaverse in various areas of healthcare is growing rapidly. It is now used in other fields such as medical intervention and health care. Metaverse in Medical images has many potential applications due to fundamental changes in the nature and quality of imaging.

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