

The background is a dark blue field filled with various white and light blue digital and technical motifs. These include a world map, a large circular radar or sonar-like graphic, a network of interconnected nodes and lines, a bar chart, and a line graph. A white rectangular area, resembling a piece of paper with a torn bottom edge, is positioned on the left side of the image. At the top of this white area, there are two horizontal bars, one grey and one light beige, stacked vertically.

TECHNOLOGY IN THE MODERN HEALTHCARE WORKPLACE

Research report

Yoanna Uzunova (2124312)

Digital Skills and Research
Methods (BMSW4003_LON)

Lecturer: Amitave Banik

A B S T R A C T

Since the beginning of the 21st century, the Kovid-19 epidemic has been the biggest crisis in the world. The extremely rapid spread of the virus has created a need for immediate change in the healthcare sector. The pandemic has strained global health systems and changed the pattern of patient care to maximize efficiency and prevent infecting staff members.

This pandemic has created a huge demand for the necessary health equipment, drugs and requirements for modern work and applications based on artificial intelligence. Intelligent work systems have great potential for providing services for diagnostics, risk assessment, surveillance, telehealth care, disinfection, which is especially important for ensuring the safety of first-line workers.

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INTRODUCTION

The use of Artificial Intelligence (AI) gained attention during the COVID pandemic; there are many examples, including the use of mathematical modelling to understand the disease epidemiology, tracking cases, or even supporting decision-makers in pandemic planning. It's worth mentioning the case of The Center for Systems Science and Engineering at Johns Hopkins University, which created the Coronavirus Tracker platform, unique evidence of the power of AI collecting and analysing large amounts of data to track the pandemic progression worldwide (1).

With 2021 well behind us, COVID-19's presence continues to linger around the world. Of all the industries that the impacts of the global pandemic have forever changed, healthcare possibly has changed the most.

This report looks at some of the latest technologies in healthcare and the benefits that smart technologies offer to patients, staff, and the hospital.

R A T I O N A L E

Digital technologies have been evolving at a rapid pace in recent years. Artificial intelligence (AI) is an intriguing concept and innovation is growing, but how exactly does AI help health?

RESEARCH OBJECTIVES

The object of my research is Digital Healthcare Innovation in hospitals.

- Telehealth technologies
 - Electronic Health Records
 - Infection-Detecting Technologies
 - Three-dimensional printing

RESEARCH METHODOLOGY

In this study, the main source of data was collected mainly using information and data from magazines, articles and other online sources.

L I T E R A T U R E R E V I E W

The Electric Health Record or EHR is a system that works as all one system for the convenience of the physician to keep the entire track record of their patient's health information. Usually, this is computer-based software that has a saved file for each of the patient's health aspects. The best thing about this system is that it helps in increased efficiency and gives instant access to the patient's information.

There are a variety of ways in which these EHR systems get configured. Each of those has its own pros and cons following the medical practice requirements and needs (1).

Here are the major types of electronic health record systems:

- Remotely hosted system- this EHR system moves physician data storage to third parties. This is necessary to get deal with a lot of maintenance, security and backup of all data. EHR systems that are hosted remotely set aside the obligation to maintain data elsewhere, except for one doctor or medical practitioner. This change of responsibility is useful for smaller practices or for one of the medical service providers whose focus is to collect information instead of storing it. This type of system reduces IT problems that can distract the doctor from caring for the patient.
- Remote system, which has three other variants:
 - Subsidized-this system includes the relationship with the body that subsidizes the cost of EHR software. In general, the doctor establishes a connection with a hospital and then monitors the data. Also, a remote system monitors data ownership and antitrust rules.

➤ Dedicated

- A host system that is dedicated means that the physicians' stores EHR on certain vendor servers. Usually, such servers are in specific locations. Moreover, a physician is totally unable to control over most of the aspects of the data storage incorporated with the dedicated system.

➤ Cloud system

- Cloud or internet-based computing system. This is one of the most popular EHR remote system. In this HER system, the physician does not require to store any patient's data onto their own servers. But the vendor stores that in the cloud. So, this means that the data always gets stored anywhere else with security on the internet. Also, it can easily get accessed via the website of the vendor.

Infection-Detecting Technologies

Infection prevention and control (IPC) poses a challenge to hospitals and healthcare worldwide. Rapidly diagnosing infectious diseases is important to provide patients with the most appropriate treatment in a timely manner. Diagnosing infections quickly can also aid with detecting and controlling infection outbreaks, as evidenced with the COVID-19 pandemic. There are many standard infection control procedures in hospitals, ranging from basic hand hygiene to safe management and sterilisation of equipment and adopting medical devices, which reduce the likelihood of infection spread. Bacteria responsible for infections can develop resistance to antibiotics to continue to divide and multiply.

How new technologies are fighting infections (2):

➤ Pulsed UV Disinfection.

- UV disinfection can reach any microorganism. Producing ultraviolet light with high intensity, this energy passes through the cell walls of bacteria. By destroying nucleic acids and destroying bacterial DNA, UV-C kills the microorganism or prevents them from reproducing. This type of disinfection has no residual effect, which could damage those who have contact with the treated surfaces and is relatively easy to perform.

- Unpleasant smells are often the first indicator of a hygienic hazard. We can't spot microorganisms with the naked eye, but we can smell them. With the help of the air sterilizer, the source of the unpleasant smell can be removed. Placed in areas such as toilets, air sterilizers combine UV technology, negative ions, photo plasma and ozone to kill bacteria, viruses, mould, fumes and other impurities; anything that could lead to a potential disease.
- Fogging Machine.
- With the power to destroy C. Dificile, E. Coli, Influenza, MRSA and Norovirus, fogging machines are particularly useful in large clinical settings; especially if there's been an HCAI outbreak. By covering the treated area with droplets, the fogging machine can clean areas that cannot be seen or cleaned by hand.

Three-dimensional printing.

Three-dimensional printing is being used in specialty care such as orthopaedics, paediatrics, radiology and oncology. The technology has supported the development of personalized medicine, allowing a more accurate understanding of the patient's symptoms and treatment, and increased efficiency in the operating room (OR). Three-dimensional printing is using for (3):

- Preoperative planning.
- Three-dimensional printing allows specialists to create reference models using MRI and CT to help surgeons better prepare for surgery.
- ✓ "In 2016, a child in Northern Ireland had two unhealed bones injuries his forearm. The child could not rotate his arm more than 50% and was suffering from increased pain. CT scanning and X-rays showed deformed bones, and the treatment required an osteotomy – a four-hour invasive surgery in which the surgeon reshapes the bones to improve rotation. However, the surgeon, printed a 3D model that changed the diagnosis, the surgical intervention and the recovery of the patient:
 - It was the tight structures between the bones and not the shape of the bones that limited the child's rotation ability.
 - The procedure was completed in less than 30 minutes, instead of four hours.
 - The patient was able to gain 90% arm-range movement four weeks after the intervention.
 - The recovery time, the post-operation pain and the scarring decreased considerably.

Such 3D printing is changing preoperative planning which translates into less time spent in the OR, better surgery outcomes for the patients, faster post-op recovery and lower costs for hospitals" (3).

➤ Customized surgery.

- Due to lower costs for 3D printers and increased availability of CAD / CAM medical software, more and more hospitals are creating their own 3D printing models.
- ✓ "Rady Children's Hospital created its own 3D Innovations Laboratory for printing 3D models, including models that mimic human tissue such as airways, hearts and bones. In 2019, the hospital admitted a 7-year-old child born with a single functional heart ventricle (instead of the normal two). The medical team created a 3D-printed model that detailed every vein, artery and valve of the child's heart, which enabled surgeons to identify the location where blood flow needed rerouting" (3).

3D-printed anatomical models allow surgeons to effectively plan surgery and to find better treatment solutions to treat the patient. The operations are also shorter.

➤ Creating prostheses.

- Ordinary prostheses come in pre-defined sizes, and custom bionic dentures are too expensive. The cost of this production method is significantly lower, and the prostheses are ready in approximately two weeks. 3D printing is a good solution for creating personalized bionic devices that reproduce the movements and grips of the human limb.

Advances in 3D printing technology are expected to have an impact in other medical specialties, such as ophthalmology, regenerative medicine and bio printing.

SECONDARY DATA ANALYSIS

In this study, the main source of data was collected mainly using information and data from magazines, articles and other online sources. In the present study, secondary data were collected from scientists and show their point of views.

CONCLUSION AND RECOMMENDATION

- This study seeks to demonstrate the impact of technological innovation on health care delivery. For this purpose, various literature sources on the topic were reviewed and analysed. They all show the great benefits of using AI in healthcare. No adverse effects were found (further research is needed).

REFERENCES

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