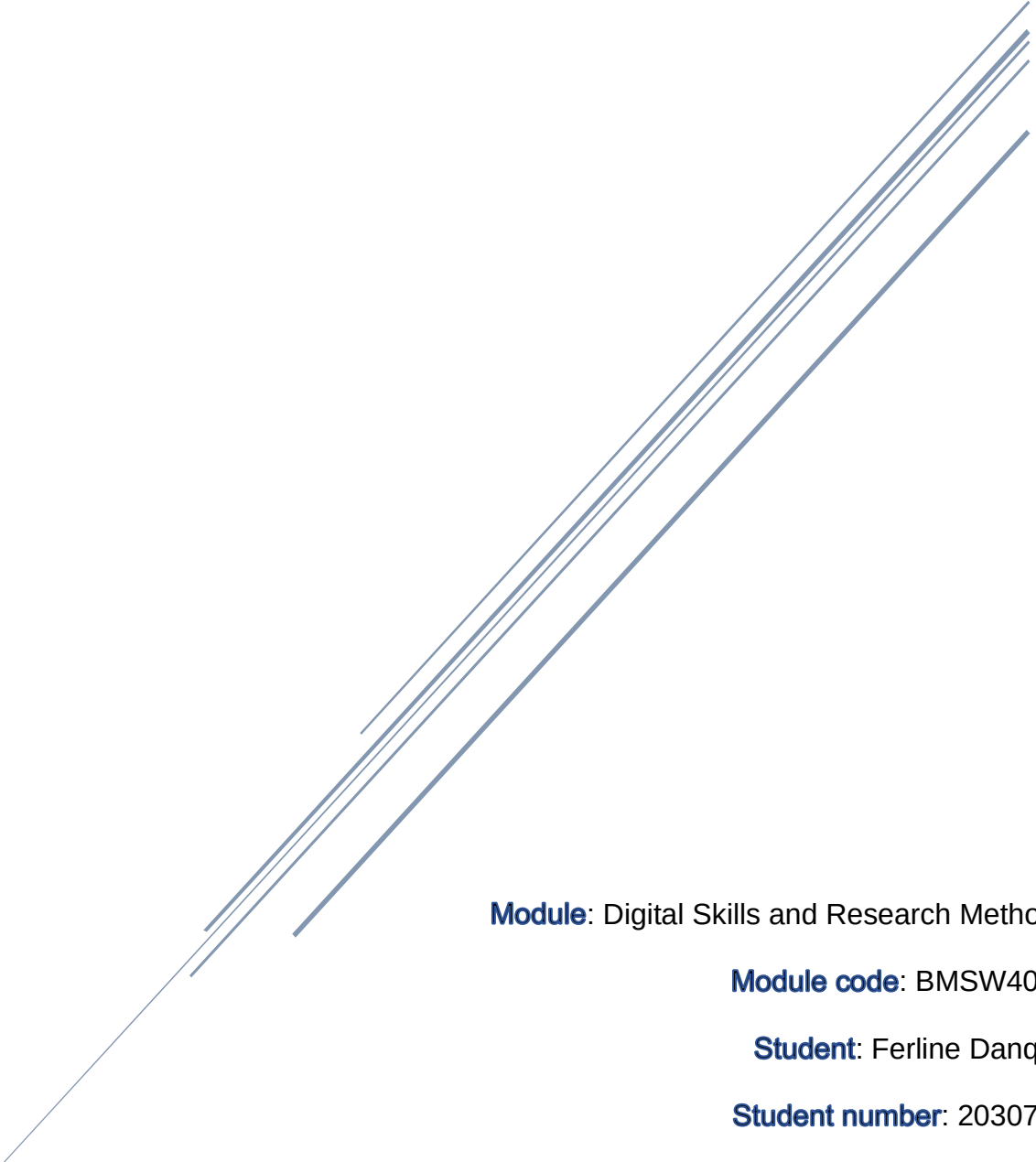


THE USE OF TECHNOLOGY IN THE HOSPITAL



Module: Digital Skills and Research Methods

Module code: BMSW4003

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Introduction

The first scientific technology first came to this world in 1879 as a phonograph and incandescent electric light, invented by Thomas Edison (Britannica, 2021). It was during last decade, 20th century, that the technological development progressed so rapidly that filtered in almost every aspect of our lives. With the help of technology, it was possible to build modern and sophisticated hospitals that could technologically provide care and be one step ahead of eventual illnesses in order to prevent and cure them. (Tabish, 2005)

Currently in healthcare field, technological innovation allows us to live in a completely different era with the introduction of e-health, big data and cloud, telemedicine and mobile applications. There are many benefits that improve and transform health such as the reduce of human errors, the improvement of clinical outcomes, the improvement of practice efficiency, and track data over time (Alotaibi & Federico, 2017).

The healthcare department is divided into primary care, secondary care and tertiary care. The primary care is the first contact that people has when needing healthcare such as GP's, pahrmacies and dentists, the secondary care is usually referred as hospitals and community care and the tertiary care is the one when a specialist is needed. Acording to statistics at the moment there are 1,920 hospitals around all the United Kingdom althouth not all of them are in practice (Statista, 2021).

Rationale

There are many healthcare workplaces where the technology is used such as Care homes, Hospital, GP surgery, Day Centres, Nurseries, Nursing homes, Rehabilitation Centres.

This report contain data regarding the use of technology in hospitals in the UK throughout the years, disadvantages and advantages of their development. Some questions will be answered such as why the advancement of medical technology is good for hospitals.

Objectives

The aim of this research is to explain the different types of technology and medical equipment that Hospitals use in the United Kingdom, the advantages and disadvantages of their improvement and how they improved.

To know better about which digital technologies are used at hospitals, this healthcare workplace were the chosen one for this research report.

Literature review methodology - Hospitals

The technology in the healthcare simplifies patient access to care, in the most appropriate location, while supporting people in managing their own health (NHS, 2021).

Throughout the years the technology in the healthcare sector has increased by the quick use of telephone and online websites to book appointments, to ask for prescribed medications and others.

A hospital is an institution that provides medical and surgical treatment and nursing care for sick or injured people. A modern concept of a hospital comes from a long time ago (around the 300 CE). During the Middle Ages, the hospital establishment had a predominant influence and that influence was the Religion. Throughout the Middle Ages, but notably in the 12th century, the number of hospitals grew rapidly in Europe and with that growth the technology also developed and improved.

Hospitals need improved technologies all the time because this can reduce human errors, improve clinical outcomes, facilitate care coordination, improve practice efficiencies, and track data over time (Alotaibi and Federico, 2017). In the UK from 2017 new digital technologies were implemented these include NHS Apps where a NHS Digital Apps Library with the initial offer including at least 20 apps with categories for Mental Health and Diabetes were launched. It is divided into three tiers of application the NHS approved, NHS connected and the Health apps (NHS, 2021)

The technology in hospitals have improved a lot from artificial kidney machine out of wood, scraps of metal and sausage casing (appendix 1) to better dialyzer (appendix 2), glass syringes (appendix 3) to plastic (disposable) syringes (appendix 4), first electrocardiogram machine (appendix 5) to digital electrocardiogram (appendix 6), wooden stethoscope (appendix 7) to digital stethoscope (appendix 8), mercury thermometers (appendix 9) to digital thermometers (appendix 10), and others.

The artificial kidney machine was first built in 1943 by the physician Willem Kolff. Kolff tried to treat over a dozen patients with acute kidney failure for about two years and only one case was successful which led him to improve its machine in the early 1950s.

The first official dialysis clinic was opened in 1962 by Dr. Belding Scribner and around the 1973, 40% of patients had the opportunity to be treated at home due to the portable dialysis machine also invented by Scribner. Currently, over 90% of dialysis patients receive treatment at dialysis centres. Many more treatment option have become available, including peritoneal dialysis, home haemodialysis and nocturnal in-centre treatment (Robert, 2016).

This device was built out of wood, scraps of metal and sausage casing and now due to the advance of technology is made up of a series of membranes that act as filters and a special liquid called dialysate. This improvement had some advantages such as the less period of days of treatment, and rather than pumping the blood through membranous tubes, the improved dialyzer directed the flow of dialysis solution and blood through alternating layers of membranous material (Fresenius medical care, 2021).

Glass syringes were first made in the 1853 by the physician Alexander Wood which allowed doctors to estimate dosage based on the amount of liquid observed through the glass. An 80 years old woman was his first patient and she suffered from a form of neuralgia. At the same time another person discovered the same medical equipment with different apparatus but did not had time to publish it (The invention that made mass vaccinations possible, 2021).

Nowadays glass syringes are used for syringe pump applications while plastic syringes are more used for the general treatments. There are many advantages of glass syringes such as small volume errors and a high gas barrier which is good for oxygen-sensitive applications. Although, there are advantages there are some disadvantages as well these include the susceptibility of breakage and the fact that chemical interaction between the sample and glass can lead to delamination, whereby the glass corrodes or flakes. The plastic syringes are cheaper and are more durable than glass syringes, are typically free from heavy metals and tungsten and have little to no siliconization (Chemyx Inc, 2018).

The first ever thermometer was created in 1593 by Italian inventor, Galileo Galilei and throughout the years new versions of this device were created like the mercury thermometer that was invented by Daniel Fahrenheit in 1714. More versions of thermometers were created but they were almost unchanged.

Today modern thermometers use some type of electrical sensors to measure temperature but the same numerical scales developed in the 1700's by Fahrenheit and Celsius are still being used (Rubin, 2018). The main advantage of this development is the time that takes to take a reading when using the device. While the mercury thermometers had to wait the mercury to heat and then slowly rise to display the temperature the digital one's provide fast results.

Stethoscopes exists since long time ago, and it was invented by a French physician named Rene Laennec in 1816. It was way different from the modern ones that we have. They were made of long, rolled paper tube to funnel the sound from the patient's chest to the doctor's ear. It was 20 years later that another person developed the first stethoscope with an earpiece for each ear. With the improvement of this device came many advantages these include a quickly assess, diagnose, and monitor of the patients.

Actually, there are even more advanced electronic stethoscopes which amplify body sounds improving further the sound transmitted although it has less mobility with some models, requires batteries more expensive than analogue stethoscopes and It's easier to damage electronic components

The first electrocardiogram was performed in 1887 and it was recorded with a mercury capillary electrometer by Augustus Waller. Before the beginning of the twentieth century a professor improved the distortion mathematically so that he was finally able to register a good representation of the electrocardiogram (ECG). He later further improved ECG recordings with the introduction of a string galvanometer of his design (National Library of Medicine, 2021). This device is used to check if there are any disease related to the heart and because of this many heart attacks were avoided. with the advance of technology, the modern and sophisticate electrocardiogram machine can look for the cause of chest pain, evaluate problems that may be heart-related, such as severe tiredness or shortness of breath, identify irregular heartbeats, help assess the overall health of the heart before procedures, such as surgery; after treatment for a heart attack, or other condition; or after heart surgery or cardiac catheterization and find out how well certain heart medicines are working. (URMC Rochester 2021). It has some advantages such as quick, painless and safe, and cheap in cost. As disadvantages, it does not provide underlying heart problems for patients not having any symptoms and it does not always provide help in accurate diagnosis. (Rf Wireless world n.d.).

Methodology

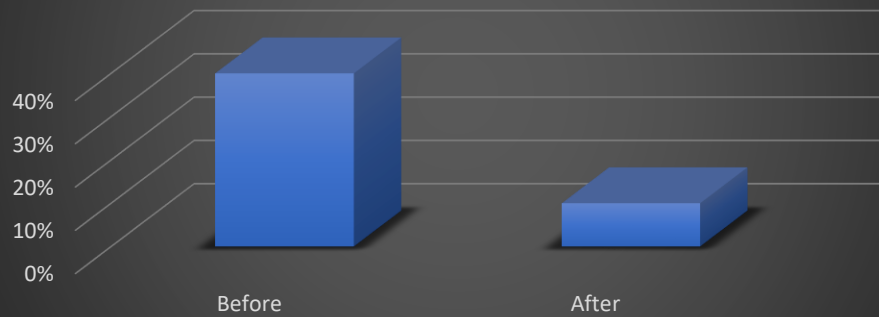
The technology in the healthcare simplify patient access to care, in the most appropriate location, while supporting people in managing their own health (NHS, 2021).

Throughout the years the technology in the healthcare sector has increased by the quick use of telephone and online websites to book appointments, to ask for prescribed medications and others.

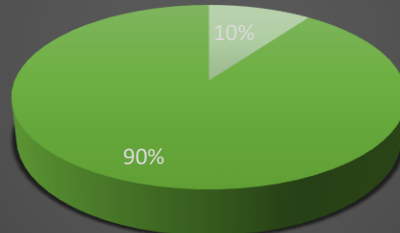
When it comes to how a research was conducted three types of methodology can be used, this include qualitative where it involves the use of non-numerical observation to answer “why” questions, quantitative where that can be counted or converted into numerical form address “how” questions and mixed where there is a combination of qualitative and quantitative research. Because this is a secondary research a mixed research methodology was chosen therefore information was collected from other sources. It also contains data that recorded the evolution of these medical equipment.

Secondary Data Analysis

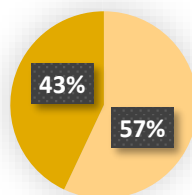
Patients that have dialysis at home in 1973



Improvement of lifestyle using medical equipment



Percentage of people willing to share data online with NHS



Conclusion

Digital systems are the foundation upon which we will build a modern, efficient and responsive health service. Enabling information to flow between care providers within and beyond organisational boundaries, and between care providers and patients, is a key means by which we will achieve a safe, convenient and personalised health and care service. The healthcare department needs new technologies so that patients feel safe when treated there by the reduce of human error and others.

In the UK, the NHS implemented new digital technologies offer including at least 20 apps with categories for Mental Health and Diabetes.

Hospitals were built a long time ago and had a religious influence. They have improved a lot when it comes to new technologies. Many medical devices used a long time a go improved and this had had many benefits on the lifestyle of the patients. Many benefits were seen such as fastest and more reliable results. Some medical devices that improved are the artificial kidney machine which was built out of wood, scraps of metal and sausage casing and now is made of a series of membranes that act as filters and a special liquid called dialysate which led to at least 40% of people feeling confident enough to use the device of treatment at home, the thermometer which had mercury inside that would heat to show the temperature and now is digital and the syringes that were made o glass. The glass syringes are still used nowadays but were replaced by the plastic ones.

In the United States of America 105 of people find useful the use of devices that monitor their heart rate and step count defending that this has the potential to save their lives.

Nowadays people are more susceptible on using apps to shared their data, to book appointments and to monitor their lifestyle. In the UK, 57% of people trust the NHS to share their data while 43% never heard about it or are no willing to share it.

Appendix



Appendix 1



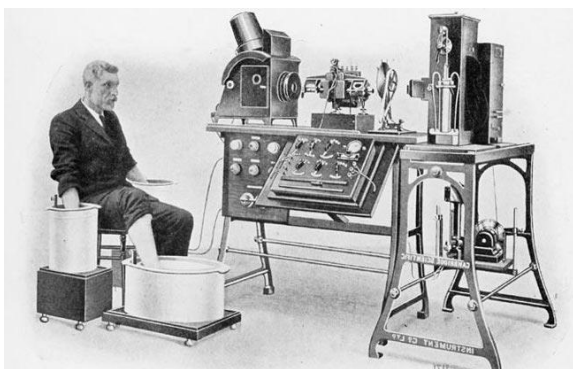
Appendix 2



Appendix 3



Appendix 4



Appendix 5



Appendix 6



Appendix 7



Appendix 8



Appendix 9



Appendix 10

References

Alotaibi, Y. and Federico, F. (2017). *The impact of health information technology on patient safety*. Saudi Medical Journal, 38(12), pp.1173–1180. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5787626/>. (Accessed: 21 August 2021)

Chemyx Inc. (2018). *Syringe Material Types | Stainless Steel, Glass & Plastic Syringes*. Available at: <https://www.chemyx.com/support/knowledge-base/applications/choosing-the-right-syringe-for-your-application/>. (Accessed: 01 September 2021)

England, N. (2017). *NHS England» Harnessing technology and innovation*. [online] England.nhs.uk. Available at: <https://www.england.nhs.uk/five-year-forward-view/next-steps-on-the-nhs-five-year-forward-view/harnessing-technology-and-innovation/>. (Accessed: 31 August 2021)

Fresenius Medical Care (n.d.). *The history of dialysis*. Available at: <https://www.freseniusmedicalcare.com/en/media/insights/company-features/the-history-of-dialysis/>. (Accessed: 01 September 2021)

National Health Service (2021) NHS England, *Digital Primary Care*. Available at: <https://www.england.nhs.uk/digitaltechnology/digital-primary-care/> (Accessed: 28 August 2021).

Tabish, S A. (2005). *Rational Technology in Healthcare*. JK practitioner: A journal of current clinical medicine & surgery. 12. 113-117.

RF Wireless world. (n.d.). *Benefits or Advantages of ECG | Disadvantages of ECG Electrocardiogram*. Available at: <https://www.rfwireless-world.com/Terminology/Advantages-and-Disadvantages-of-ECG.html> (Accessed: 02 September 2021)

Roberts, H. (2016). *A Brief History of Dialysis - Dialysis Patient Citizens Education Centre*. Dialysis Patient Citizens Education Centre. Available at: <https://www.dpcedcenter.org/news-events/news/a-brief-history-of-dialysis/> (Accessed: 01 September 2021)

Rubin, A. (2018). *History of Thermometers - Health Beat*. Health Beat. Available at: <https://jamaicahospital.org/newsletter/history-of-thermometers/>. (Accessed: 02 September 2021)

Statista. (2021). *Hospitals in the United Kingdom (UK) 2012-2017*. [online] Available at: <https://www.statista.com/statistics/949580/hospitals-in-united-kingdom/>. (Accessed: 02 September 2021)

The invention that made mass vaccinations possible. (2021). *BBC News*. 9 Mar. Available at: <https://www.bbc.co.uk/news/uk-scotland-55676034> (Accessed 01 September 2021).

URMC Rochester (2021). Electrocardiogram - *Health Encyclopedia - University of Rochester Medical Center*. Available at: <https://www.urmc.rochester.edu/encyclopedia/content.aspx?contenttypeid=92&contentid=P07970>. (Accessed: 01 September 2021)

W. Douglas Piercey and Scarborough, H. (2019). Hospital. In: *Encyclopaedia Britannica*. Available at: <https://www.britannica.com/science/hospital>. (Accessed: 01 September 2021)

10to8. (2021). *16 Jaw-Dropping Medical Technology Statistics of 2021*. Available at: <https://10to8.com/blog/medical-technology-statistics/> (Accessed 03 September 2021).