**Artificial Intelligence in Medicine**



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# 1. Abstract:

This report goes into different applications of Artificial Intelligence (AI) in medicine. It goes into further detail about the use of AI in the short-term, using it to boost primary care saving the times of GPs from false cases; in the medium-term, using it to diagnose diseases more accurately preventing human error and relieving the stress that medical professionals go through; and in the long-term it can be used to predict future global pandemics and come up with solutions to prevent them from occurring. It also discusses the benefits such as the reducing costs, reducing the number of manual tasks. It also explores the drawbacks of AI, including issues such as needing to create new laws to cover AI, the potential discrimination that it brings forward, people not trusting it and whether computer scientists have the qualifications to design these algorithms for medicine. After taking all these points into consideration, I have concluded that the benefits provided by AI far outweigh the drawbacks, deeming it a necessary change should be adopted.

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# 2. Introduction:

Artificial Intelligence is technology that is based on the human brain and its connection of neural networks. This allow machines to mimic our actions or exhibit behaviours that are associated with the human brain, such as problem solving and the ability to learn. The objective of AI in medicine is to devise ways in which we can analyse large amount of raw data quickly as well as be able to solve problems as humans would be able to. This is of great interest as it can be used to improve current treatments and be able to offer solution to complex medical problems. This report will aim to explore the use of Artificial Intelligence in medicine and will go into detail on the potential benefits as well as the drawbacks regarding the social, legal, ethical and professional issues. We will review the opportunities that it will provide in the short, medium and long terms and conclude as to whether the benefits of AI in medicine outweigh the drawbacks.

# 3. Uses:

## 3.1 Applications:

AI can be used in a multitude of ways:

In the short term we can use AI in medicine to boost primary care. Nowadays, when someone has the slightest medical problem, they are inclined to immediately book an appointment with their GP. This often ends up being a false alarm that could have been resolved by self-treatment. This is where AI comes into effect, as it can be used to automate primary care so that doctors and GPs can focus on more critical cases. This is much easier to achieve in the short term, as we are only tackling common problems, referring others to the GP.

In the medium term, the application of AI is correctly diagnosing diseases takes years of training. Even after all this training, it is a very time-consuming process, and there is a demand for experts in medicine which is greater than the number of experts available. This means that these experts are placed under a great deal of strain, which can have a negative impact on diagnosing patients with serious health problems. By using AI, however, in the next 5 years we can make use of its machine learning capabilities along with its analytical capability and automatically be able to diagnose diseases. This cannot be achieved in the short term, as we need to make sure that we can cover every disease and possibility.

A long-term success caused by the application of AI is its ability to guide population-level disease prevention. Currently we are going through a COVID-19 pandemic, which has affected all parts of the globe and changed our daily lives drastically. By using AI, we can shift away from treating these diseases and instead work on preventing them. AI can do this by analysing data and then determining which individuals are most likely to be at risk. AI also offers solutions that can help to reduce the likelihood that these diseases become widespread and helps to keep these patients out of the healthcare system. However, to achieve this we will need to have access to data from all over the globe, thus needing a global network of communication.

## 3.2 Benefits:

AI provides many benefits in medicine. These range from helping patients/people understand more about their medical history, to helping surgeons carry out operations in more precise and safe manner.

One of the main benefits of AI is the ability of reducing costs. It has the capability, according to Frost & Sullivan, to reduce the cost of treatment by as much as 50%. This is very important, especially to

organisations such as the NHS, who are underfunded. As a result, there is a negative impact on the staff who provide us with essential care, working longer hours for less pay. The implementation of AI means that, by reducing the costs of treatment, more money can be spent into ensuring that all staff are being properly rewarded. This allows for the funding of research into various other potential cures that could help cure diseases or medical problems such as cancer.

Another benefit that AI provides is its ability to reduce the number of manual tasks that a medical professional would have to do. This means that these professionals can then focus on other more important issues. AI can also be used to assist patients in mobility, as normally a patient who has difficulty in moving will need an assistant. When this is coupled with under staffing it becomes difficult to take care of these patients. However, by implementing AI we can introduce robotic systems that are designed to assist patients with labour intensive tasks.

The ability of AI to replicate the human brain allow it to analyse vast volumes of medical data in a very short amount of time. This allows it to deliver insights that may have positive effects on how we deliver healthcare, or even treatments that will work better. Not only does it provide the ability to analyse large amounts of general medical data, but it can also compare the patient’s own medical history to this data, and then can come up with treatments or solutions that are personalised to that patient. This is the best course of action for that individual.

## 3.3 Drawbacks:

### 3.3.1 Legal Issues:

AI has the capability to learn and grow, making it especially hard when the existing liability framework works on dealing with decisions that can be traced back to either incorrect operation or faulty programming. However, as AI has the ability to learn and then adapt, it becomes hard to trace back the problem to human error and thus there is no one to blame. If the law cannot hold someone responsible for the instances when malpractice or serious harm is caused to a patient, then, in some regards, the law has failed to carry out its purpose of protecting us.

### 3.3.2 Ethical Issues:

A major issue that many people have with AI in the medical field is the potential for discrimination. This is since AI will analyse large amounts of data. The data that is being analysed here are not only medical records, but can also be other forms such as: income data, criminal records, social media etc. The ability of AI to look at this data and then predict future medical conditions means that it will all be contained on their electronic health records, which could then be seen by hundreds of medical professionals. This can even be done by employers who can discriminate based on how healthy and productive that individual is and if they will develop any medical conditions in the future.

### 3.3.3 Social Issues:

There is also a negative social aspect to this, where many people are not willing for a computer to decide how they should be treated/ when they should be treated etc. Some people are not comfortable with AI deciding these things rather than a medical professional, who has studied medicine for a long time and has built up lots of experience.

### 3.3.4 Professional Issues:

There is some debate, however, between medical professionals, with some believing that computer scientists are not equipped to create algorithms that can be used in medical applications. They believe that computer scientists do not have the qualifications and knowledge about the fields of medicine they are creating this AI for, which could lead to problems and clashes between the AI and the medical professional.

# 4. Conclusion

Although there are many fears when it comes to the use in AI (such as whether the existing legislative framework is not adequate or the potential discrimination that is caused by it), there are also numerous benefits that will mean that we can decrease the mortality rate and save even more lives. In my opinion, the advancement of AI in medicine benefits us as a society far greater than its detriments, and I believe that, as time passes, we will be able to sort out all problems and fears there are surrounding AI. We will be able to use AI to effectively create a society where another global pandemic can be avoided, making us free from diseases that cause great physical and emotional pain to patients and their families, such as cancer.

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