Errors in eHealth: the next frontier for patient safety

Healthcare technology is advancing more quickly than ever before. Five years ago, the thought of diagnosing a cancerous mole using your mobile device was unthinkable. But slowly, the archaic healthcare industry has shifted to adopt digitized solutions. Today, you can talk to an AI-powered chatbot, diagnose your illness and even order a prescription, all from the comfort of your own home.

With technology predicted to replace as much as 80 per cent of a physician's everyday routine, the reliance on technology has never so great. Artificial Intelligence, Telemedine and mHealth are just three areas in heatlthcare that have made dramatic developments. But with these advancements, does it not beg the question: what are the new threats posed to patient safety?

Did you know?

In 2018 a pioneering study found that computer-related preventable errors, including cybersecurity exploits was conservatively estimated to be responsible for 8,800 deaths a year in the United States alone.

To put this into context, this is the equivalent death toll of seven Hurricane Katrinas a year.

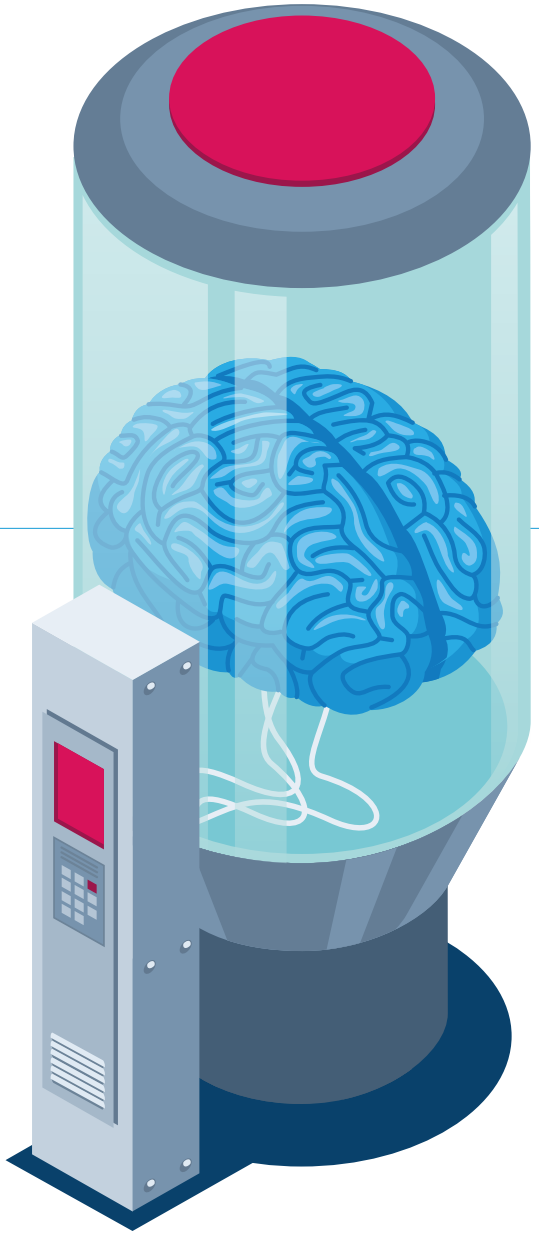
Computer Bugs in Hospitals: A New Killer
H. Thimbleby and M.Thomas et.al 2018

Artificial intelligence

Artificial Intelligence (AI), simply put, is the ability for computer algorithms to approximate conclusions without direct human input.

AI is increasingly raising profound questions regarding medical responsibility. Normally when something goes wrong, the source of the blame can easily be traced. For example, a misdiagnosis would usually be the responsibility of the presiding physician. A faulty medical device which gives an incorrect read, harming a patient would likely see the manufacturer held to account. What would this mean for AI?

With numerous high profile AI mishaps from Google and Facebook to Tesla, experts in the field have started to ask the question "is it Artificial Intelligence or Artificial Stupidity we should fear more?"



AI technology errors can emanate from some fundamental issues:

- There are a wide range of AI-led healthcare tools from patient triaging to AI diagnostics available, but unlike drug development companies, none of these undergo any peer-review and many go no further than preprints or claims on websites.
- The output of AI is only as good as its human input, whether that is the number of CT scans the algorithm has been exposed to, or the fundamental code used to create the programme. When programmers do not understand the nature of disease, there is an increased likelihood for false positive and false negative errors to occur.
- For AI to be provided with human-like decision making capabilities, an environment of unambiguous and predictable parameters should be created. However, this isn't how the real world works, nor the world of healthcare or disease recognition.
- If AI is managing and integrating large data sets, if there is an error, how long until this is identified? In healthcare these consequences can be deadly.

With the wide range of issues AI faces and the broad application within healthcare, it is easy to see how fatal errors have and will occur.

Telemedicine

Telemedicine is the remote delivery of healthcare services, such as health assessments or consultations using video conferencing and smartphones, without the need for an in-person visit.

Telemedicine can be classified into three main categories: remote patient monitoring, store-and-forward and interactive telemedicine, each of them having their own different risk profiles.

Remote patient monitoring

Claim example: A 68-year-old patient, who was living independently, was given a remote patient monitoring bracelet by a family member. The device alerts family members and emergency services in case of a fall or heart arrhythmia and is monitored by an in-house call centre. The patient had a fall in her shower and fractured both arms. The device failed to detect the fall, however the arrhythmia monitor notified the call centre who rang and connected to the patient's device. The call centre tried contacting the patient verbally, but due to the shower running, they were unable to establish communication and the centre presumed she was okay. The patient died from deep dermal burns from the shower after being unable to move, or contact anyone for help.

Store-and-forward

Claim example: A medical imaging company created a mobile application which interrelates with tele-radiologists. In this event, which eventually led to death - a patient experienced trauma due to the delay in image availability. Although both parties were sued, after investigation, it was alleged by the reporting facility that the death of the patient was due to a slow transfer of images from modalities connected to the radiology picture, archiving and communications system.

Interactive telemedicine services

Claim example: The physician tried to access a patient's medical records using a third-party healthcare information exchange. The physician was unable to retrieve the patients' medical records due to the HIE being hit with a ransomware attack and being taken offline (similar to that of All Scripts). Instead, the physician manually completed a health questionnaire via telemedicine, and then prescribed antibiotics to the patient. It transpired that the patient had misinformed the physician that they were allergic to penicillin resulting in death.

mHealth

In the field of dermatology application software has been failing to identify rare and unusual cancers. The recognition of images with scaly, crusted, ulcerated areas and melanomas which do not produce pigment, have been the main driver in false negatives. This has caused delayed treatments and in extreme cases, death.

The reliance on technology for applications can lead to the following fundamental issues:

- Some of these apps advise when to seek professional advice and often miss the signs of a more sinister legion. They also lack clinical knowledge, such as if a person is over the age of 40 and develops a new mole - the typical advice is to have it removed.
- Many of these mobile apps lack published clinical trials, which are put in place to prove systems are safe. They also have little to no input during development from dermatologists and could be using flawed technology.
- The decision making of a dermatologists is often blurred by the quality of the image or video connection. When a misdiagnosis occurs who is to blame, the technology or the healthcare provider?

Claim example: In one case, the FTC brought a suit challenging a mobile device app, for making deceptive claims about the ability to diagnose cancerous moles on an individual's body by simply taking a photograph and inputting other information about the mole. The court held for the FTC, declaring that they misrepresented their product by implying they could detect or diagnose melanoma or risk factors of melanoma.