

We need to talk about the hospitals of the future

Now, more than ever before in recent history, the UK is looking at its hospitals with an increased scrutinised eye. The current COVID-19 pandemic has only heightened the urgency felt that the NHS and the hospitals that they operate need funding poured into them as a service vital to our survival as a society.

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In response to the pandemic that has sadly claimed hundreds of lives so far in the UK, makeshift emergency hospitals are being built across the country including a conversion of London's ExCeL centre (predicted to be the largest in the UK) as well as similar hospitals being prepared in Birmingham, Manchester and many more around the country.

Dyson is making ventilators as they are a key piece of life-supporting equipment for treating the most severe symptoms of COVID-19. These actions are much needed but beg the question, why aren't hospitals of all places prepared for a pandemic or at least large scale medical emergencies? Hospitals are the oxygen and heartbeat that keep society going which rings even more true with an increasingly ageing population. How can these spaces be prepared for the worst and, importantly, how can we take lessons learnt from this pandemic into how we design and build hospitals of the future?

The history of hospitals

Before the launch of the NHS in 1948, hospitals were ironically a dangerous place. With unsanitary conditions and as a hotbed for infections, hospitals were for the poor or the last resort for many. Most would rather be treated at home.

What is thought to be Britain's first hospital was discovered to be in Winchester, Hampshire and dates back to between AD 960-1030. Up until that uncovering, the majority of historians believed that Britain's hospitals dated to after the Norman conquest of 1066. Aside from this, one of the more widely known earliest British hospitals is Harbledown, Canterbury, founded by Lanfranc, archbishop of Canterbury in 1070.

How our healthcare system has changed

We're all aware that the birth of the NHS in 1948 revolutionised healthcare in the UK. Launched by the then minister of health, Aneurin Bevan, the NHS was the first time British citizens had free healthcare. It wasn't until 1962 that the NHS Hospital Plan was created to erect hospitals in areas with a population of around 125,000. Though it became clear that the cost and time to build these hospitals was underestimated and really, we're having the same cost and time issues in healthcare today.

In 2018, the BBC reported that the amount spent on healthcare has increased 12 times since the NHS was first created and bed numbers have been drastically cut (primarily because more services can be offered in the community and patients are spending less time in hospital).

Last year, FullFact found that hospitals across the nation are spending more money than they are bringing in, putting extreme pressure onto NHS services. They reported that UK public health spending is the equivalent of about 7% of GDP, up from being 3% of GDP in 1955. In 2018, the government announced an additional £20.5B in funding for the NHS in England by 2023/24. The funding was to be spread over the years up to 2023/24 which is an increase of around 3.4% a year. However, FullFact pointed out how with increased inflation, the increase may end up being less than that.



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The predominant issues With current

hospitals

Increased demand for services, an ageing population and not enough money has led to the current state of hospitals in the UK. Throughout the last decade, 'saving the NHS' has become a priority for many British citizens and NHS workers complaining of a lack of funds for the country's most vital service and calling for an end to budget cuts as well as a junior doctor strike where staff protested being overworked and receiving low pay.

Lack of funding and equipment even led to the UK having one of the worst healthcare systems in the developed world in 2015. A year later, the NHS failed a flu pandemic test.

Soon after Boris Johnson was elected Prime Minister, he announced what the BBC called the implementation of 'State-of-the-art hospitals'. The project included 40 hospital schemes including new buildings and renovating existing hospitals with six said to be going ahead across five years with a £2.7B investment (from taxpayers). Further investments were planned for replacing breast cancer screening equipment and MRI, CT scanners as well as to British science companies for developments in healthcare.

Tech innovations in hospital healthcare

Though, if this current pandemic is teaching us anything so far, it's that we need to look into how British hospitals and healthcare can be fundamentally improved. Tech innovations are promising for a new medical revolution that provides a glimpse into the future of hospitals and healthcare in the UK.

In August 2019, the government announced £250M for a national laboratory in England that will use artificial intelligence in healthcare in the form of using algorithms to forecast demand for hospital beds and using tools to identify signs of disease from diagnostic images. Hosted by NHSX, the technology branch of the NHS, the focus of the laboratory is on reducing workloads for clinicians and improving productivity as well as allowing patients to access services directly and allowing clinical information to be accessed securely. It's also important that any new tech is developed alongside underserved and marginalised communities and the laboratory has a diverse workforce.

Although robotic surgery is not new, the latest systems will transform hospital procedures in the future as robotic surgery is less invasive and boasts an improved recovery time for patients. Systems such as The Da Vinci System and Versius surgical robotic system are always improving and will help meet growing demands in healthcare. The robotic system is still operated by a trained surgeon but requires a lot less physical and mental demand as the surgeon sits in front of the control system directing the robotic instruments during the surgery. The system also allows surgeons to operate on patients through a 3D and high definition vision lens. A step above this comes in the form of surgeons using robotic systems to perform operations from another continent through 5G.

The NHS could also benefit from wireless brain sensors used to monitor pressure and temperature within the skulls of patients. They can benefit patients who suffer from dementia, traumatic brain injury, Parkinson's disease and other brain conditions as they monitor neurological fluctuations and help cognitive functionalities.

3D printing offered by companies such as Axial3D can provide support to hospitals in the way of pre-surgical planning, particularly in orthopaedics and spinal surgery which saves surgeons vital time. 3D printing has also been used to perform a kidney transplant by producing a model of liquid

plastic created from CT and MRI scans which is then moulded into a model to replicate the organ being replaced. This allows surgeons to plan the procedure more accurately before operating.

Virtual reality has been used for intensive care rehabilitation in Birmingham. The system works by connecting to an exercise bike where patients can cycle and feel as if they are no longer in the hospital building. VR headsets have been used at St George's Hospital in London to relax and calm anxiety in patients who undertake surgery whilst awake. The headset transports patients to picturesque outdoor locations including beaches and forests. Patients who used the headsets reported feeling less anxious and felt less pain. It also means patients don't require sedatives or general anaesthesia and so have a shorter recovery time.

Apricity is changing how people can access fertility services. The London-based company launched an app that acts as a virtual fertility clinic which offers women and couples trying to conceive the opportunity to connect with clinicians as well as providing personal support. The company also uses a state-of-the-art Fertility Predictor® that utilises artificial intelligence to estimate the chances of conception.

Finally, In the US, doctors used Crispr-Cas9, a gene-editing tool inside a patient's body for the first time this year to treat an inherited form of blindness. The tool works on a person's DNA to treat diseases, but it will take at least a month to see if the procedure has worked.

Will tech lead the vision for hospitals of the future?

Before the COVID-19 pandemic, UK hospitals were overburdened and in much need of a revamp. Understaffed hospitals, lack of life-saving

equipment for both doctors and patients and a shortage of tests have made the battle against the pandemic that much harder as well as a crucial sign that changes need to be implemented. Saving time, improving treatments and ultimately saving lives can all be executed through new tech innovations and will hopefully pave the way for the hospitals to come.



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