

FOREWORD

BY SIR LIAM DONALDSON

“It has completely transformed the way I look after my patients.” This was just one of the responses from a group of frontline nurses that I chatted to over a cup of tea during a visit to Croydon University Hospital. Another told me: “If my patient gets sicker, I spot it straightaway. I can react before the problem gets worse. I can almost feel when I’m saving a life.”

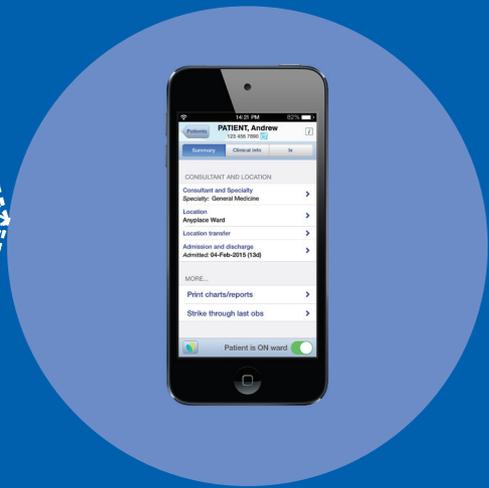
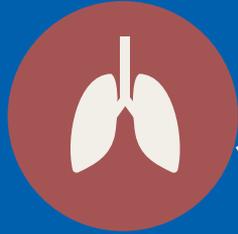
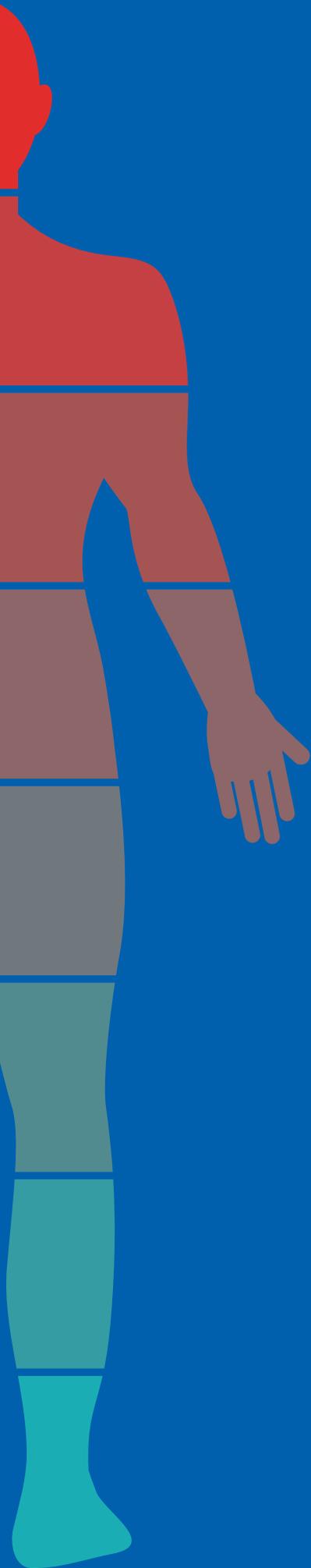
I had watched as this team of nurses had reviewed, on a computer screen, the vital signs of all the patients under their care. They focused on the changes over time, identifying people who were not getting better as they should or were getting worse. They made comparisons and quickly identified the patients who were most at risk. I saw how animated they became. They admitted that they weren’t the sorts of people who had used data before in their clinical work. They didn’t need any statistical training or even have to be interested in numbers. The beauty of the data they were looking at was that it gave them clinical insight. It prompted them to take action to protect their patients. It told a story that made sense to them as nurses. The power of those data was almost palpable. That day I realized that whilst the quality of NHS tea hadn’t improved since I last drank some, there was no doubt that I was witnessing a transformation in the quality of care for acutely ill patients.

Each patient’s vital signs were being collected, automatically analysed and displayed by a system called VitalPAC. Nurses input the data into their mobile devices. From all the hospitals that are using VitalPAC, a database of more than 100 million sets of data has been assembled. When I think of Big Data, the theme of this White Paper, I see VitalPAC as an excellent example of the benefits that this revolution makes possible.

If I were to pile, on a table, 30 sets of hospital case notes, each containing (along with much other paper filed away), a set of charts with manual recordings of the patients’ vital signs on different days and at different times, I am confident of three things. Firstly, that no one involved in day-to-day clinical care would have the time or inclination to look through the records to try to see a pattern in the quality of care being delivered. Secondly, such a pattern would be very difficult to discern, even if it was present. Thirdly, some essential data would be missing. On the last of these, there is a telling point about human fallibility. Amongst the regular observations recorded on patients – the vital signs – is the frequency at which they breathe in and out (the respiratory rate). Changes in this measure can be a strong indication that a patient’s condition is worsening. Yet, in traditional nursing observations, this vital sign is often missed out. Crucially, it takes time to do and nurses are almost always operating under extreme time pressures. Automated monitoring of vital signs involves the device obliging the nurse, for example, to take and record a respiratory rate. It will not allow her or him to move on to the next item until a plausible reading has been entered, so it cannot be missed out due to pressure of time. Also a wildly high or low reading will prompt an “are you sure?” check, reducing another source of error that could harm the patient.

About the same time that I visited Croydon University Hospital, I was undertaking research to examine the causes of patient safety-related deaths in NHS hospitals in England. I analysed 2000 individual reports made by NHS staff because they perceived that the patient’s death was associated with unsafe care. I found that an entire third of these deaths involved mismanagement of those acutely-ill patients whose condition was deteriorating. The precise underlying circumstances varied but many involved failure to take necessary observations, missing out observations and not noticing or acting on worsening of vital signs.

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The research was subsequently published in a major medical journal. The results shocked me, especially as I had read each individual incident report, each one describing a human tragedy. This state of affairs emphasised once again what other high-risk industries have known and acted upon for decades: when systems or procedures are at risk from human errors or failings, then safeguards need to be designed in to provide protection. Health care worldwide has not learned this lesson and, as a result, it is not as safe as its patients and their families should expect. Too many people are dying unnecessarily, not because of their illnesses but because of the way their care is organized and delivered.

New opportunities to improve the quality and safety of care are just one of the health aspects of Big Data highlighted in this White Paper. Every health system in the world is struggling to cope with the increased burden of chronic diseases like diabetes, cancer, heart disease and stroke. Too many years are spent incapacitated and suffering with the consequences of poor health. Every health minister in the world would like to prevent, or at least postpone the onset, of these diseases. One of the keys to doing this is to gain a greater understanding of people's behaviour and the factors that influence it. Research has already told us a great deal about this but the opportunity to bring together health data with sources of information from many unrelated areas opens new doors. It may take us closer to the means to shape the behaviour patterns of whole populations towards the ultimate goal of enabling tens of millions of people to achieve a better state of health and sustain it for most of their life.

"DJ" Patil, the first Chief Data Scientist appointed by the United States Government, described President Obama as "the most data-driven President we've had." It is significant that world leaders see the Big Data revolution as so important that they are not leaving it to computer scientists to take forward. Since Patil started his job, at the request of the President, he has made 130,000 government datasets available to the public. It is also significant that the first area being addressed is health and healthcare. The initiative will seek to harness genomic and personal health information: "An innovative approach to disease prevention and treatment that takes into account individual differences in people's genes, environments, and lifestyles." In the United Kingdom, the first strides into this exciting area have been faltering as the public and some groups of healthcare professionals have become alarmed about data privacy. This is a very legitimate area of concern and it is vital that the most robust safeguards possible are built in. The Government has not done a good job of communicating and explaining to the public the ways in which data can be a force for good in their lives. There is a risk that the traditional British strengths of invention and innovation will be held back whilst other countries march forward.

Through this White Paper, The Learning Clinic is signaling its intention to move the debate on Big Data (particularly in the field of health and healthcare), on from a diffuse exploration of the subject to practical ideas and action that will benefit the patient and the citizen. It is nothing less than a new frontier in the human endeavour.

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References

Liam J Donaldson, Sukhmeet S Panesar, Ara Darzi. Patient-Safety-Related Hospital Deaths in England: Thematic Analysis of Incidents Reported to a National Database, 2010–2012. PLoS Medicine 06/2014; 11(6):e1001667.

Tessa Berenson. Obama's chief data scientist reveals how the government uses Big Data. Time. 26th September 2015.