Wireless technology used to monitor health

Dr Heather Duncan, intensive care consultant and lead of the RAPID (Real-Time Adaptive and Predictive Indicator of Deterioration) project at Birmingham Children’s Hospital, discusses the benefits of wireless monitoring.

Technology is literally everywhere in our lives – from the devices in our pockets to the electromagnetic waves that flood our homes. This change has come about overnight, in the blink of an eye in terms of human history and culture. We are filling our lives with technology’s new promises to deliver more, deliver things more quickly, and to open up our lives to more opportunities.

It’s giving us completely new ways to get work done in the world. At the same time technology is less and less limited to a specific place.

Take phones for example. Do you remember corded phones – where you had to go to one place in the house to use the phone? I grew up with phones like that and even I can barely remember them.

Now technology is everywhere and one particular area where it is making the biggest difference is in healthcare. Like corded phones, patients are used to being wired up to machines in hospital to check their vital signs including heart rate, respiration rate, and oxygen saturation levels; unable to move from their bed without the assistance of a nurse. For example, while you, the patient, lay confined to your bed, the doctor or nurse visits you for your routine four hourly observation. They take your vital signs manually and write down the statistics by hand on a chart before moving quickly onto the patient in the next bed. And, every time you need to use the bathroom you have to ring the bell or call for a nurse to disconnect you before you are allowed off your bed.

This system is time consuming for a healthcare professional and uncomfortable for the patient. But, this doesn’t have to be the case. Less than a week after open heart surgery two-year-old Lucas West was bounding around the playroom of Birmingham Children’s Hospital with a huge smile on his face. The hospital visit was one of many for Lucas who has a serious congenital heart defect.

But this trip was slightly different for Lucas, thanks to the Patient Status Engine, a new wireless sensor and analytics platform designed by Isansys Lifecare which is being used to monitor patients continuously and wirelessly in the hospital’s cardiac unit.

Instead of being connected to bedside monitoring devices with dozens of wires and being confined to his bed, Lucas was free to move around on the ward, go to the playroom and canteen and be cuddled by his mum. Even though he was free to move around as he pleased, Lucas was still being monitored continuously by the PSE, a CE-marked, Class IIa, continuous patient monitoring platform, and the Lifetouch wearable patch sensor, which is currently being trialled as part of the RAPID (Real-Time Adaptive and Predictive Indicator of Deterioration) project at Birmingham Children’s Hospital.

The wireless body-worn sensors were stuck to Lucas’s chest under his clothing and as he played, they were automatically collecting and analysing his vital sign data continuously and in real-time and were relaying the information back to the nurses’ station. Ground-breaking in its aim, if Lucas’s condition would start to deteriorate, the technology which will soon incorporate smart alarm systems, designed by mathematicians at Aston University, would have activated and doctors and nurses would have been alerted immediately, allowing a swift response.

Technology like this means that vital signs normally recorded every one to four hours on paper charts could potentially become a thing of the past, with continuous individual monitoring that gives more accurate information helping lead to faster treatment – saving lives and reducing hospital stays.

Monitoring vital signs

The wireless nature of the technology meant life for Lucas and his family was much easier during his stay at the hospital. It allowed him and his family the opportunity to roam throughout the hospital while still being monitored as if he was in an intensive care unit.

Like corded phones, I imagine it will only be a matter of time before being tied up with wires in hospital will also become a thing of the past.

As well as offering mobility though, this technology offers so much more. It’s reshaping the future of healthcare for both patients and healthcare professionals alike. It is enabling healthcare providers to monitor patients in real-time and continuously, while being able to act more quickly on critical patient data.

Before starting the RAPID project, we identified that children in the hospital sometimes deteriorate quickly because observations were either only being carried out intermittently or infrequently, and were sometimes missed.

Now, with the use of this technology we can monitor children not only wirelessly and continuously, but, for the first time ever, clinicians can look at each patient’s vital signs and see how they change over a longer period of time.
We are now able to see those more subtle and slower changes in a patient’s condition that are really important for us to be able to identify who’s becoming sick and who is getting better.

With the use of automated early warning scores, we are also able to detect deterioration much earlier than we would be able to otherwise.

In itself, that is an enormous benefit. However, this next generation technology is achieving remarkable efficiencies in terms of patient safety and data accuracy, which are crucial to providing quality patient care, reducing costs and handling higher patient volumes.

**Analysing data**

Since starting the project we can now analyse and model large volumes of data in real-time and develop adaptive algorithms so we can learn from each specific child what is normal for that particular child. This has never been done before and has already helped us to focus on a more proactive care delivery model rather than a reactive one.

The gained efficiencies resulting from technology in healthcare are simply too beneficial to shy away from.

The integration of wireless medical devices can reduce administrative time significantly and by facilitating accurate record-keeping, wireless medical technology allows caregivers to spend more time with their patients. Doctors and nurses can easily access up-to-date patient information, enabling treatment decisions supported by real-time medical information and resulting in improved outcomes for the patient. No longer will simple tasks like monitoring vital signs every four hours, handovers, or getting the correct dosage of a drug be an issue. Both patients and family members can feel safe knowing that because of the abundance of accurate, real-time data being collected, the very best care will always be received.

With the use of wireless technology, processes can be streamlined, allowing each nurse to efficiently monitor and take care of a greater number of patients with better access to quality data. Assuming it takes a nurse approximately five to 15 minutes to visit each patient and check all vital signs, he or she can only visit approximately four to 12 patients per hour. Medical technology solves this problem by automatically sending data from devices to the Electronic Health Record, saving nursing time, increasing productivity and ultimately allowing for better patient care.

The RAPID project was started in the paediatric intensive care unit to closely monitor children and predict when a child’s health status may be deteriorating. It’s been a really positive time for Birmingham Children’s Hospital, especially with our recent ‘Outstanding’ rating from the CQC but we measure our success by the quality of care that we provide and the number of patient outcomes we improve.

**Technology in healthcare**

Our RAPID project is another example of how valuable the adoption of technology is for healthcare.

Looking to the future, I think for children, wireless monitoring in hospital is the way forward. It will have wide applications across the NHS and healthcare globally and could help save money currently spent on expensive monitors, whilst at the same time allowing greater freedom for the patients, enabling more patients to be treated at the same time, while also providing an opportunity for patients to be treated at home. The large amounts of patient data it provides could also help researchers to find new and better treatments for a wide variety of conditions.

This type of technology is changing the face of healthcare as we know it. The exciting thing is, the more work we do on this, the more we recognise how important and profound this new data-driven approach to healthcare is.

We are in the midst of the greatest revolution the world has ever known, and it’s just getting started.