

# THE DIGITAL BANDAGE THAT'S CHECKING VITAL SIGNS

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Dr Gareth Conway  
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A Fox News report online tells the story of an innovative medical device being used with patients in a California hospital. A BBC report shows the same device being tested in trials at a hospital in Brighton.

The device is a wearable wireless monitor – sometimes called the digital bandage – that checks vital signs every two minutes and may revolutionise routine patient care. It is being marketed by Sensium Healthcare, part of the UK Toumaz Group, but the antenna technology which has been the key to its success is the product of research by Dr Gareth Conway at Queen's.

Wearable sensors and their potential were the focus of Gareth's PhD at Queen's in 2005. 'They were being developed a lot for military use but I realised the medical application was there and I knew that would give me most satisfaction.

'I could also see a massive gap to be addressed in terms of performance. An antenna is designed to work on the side of a building,

for example, not on the human body, so that's where my research was focused.'

In 2008 he joined a Scottish company working on underseas communication but then he was contacted by Professor William Scanlon at Queen's. 'William had a project, with an EPSRC grant, that only I was eligible to do.' So Gareth came back as a Research Fellow to work on a Knowledge Transfer Secondment with a new commercial company – Toumaz.

'It doesn't matter what wearable application a wireless sensor supports, the antenna is usually the most inefficient part of the system. Toumaz were trialling in California but the antenna failed on some of the patients and that wasn't acceptable. It would never be passed clinically.'

Gareth worked on the project for 18 months. Part of his strategy was to develop a test that was likely to work on everyone. So he created a phantom.

'Rather than testing one person with one set of tissue thicknesses and one set of body properties, the phantom, a

prototype human, more or less, was more representative of the population.'

And it was a success. Toumaz went on to fully fund commercial research for Gareth to develop their antenna. 'It was a good collaboration but I don't think it would have worked if I hadn't spent time in industry, learning what's expected from an academic.'

Another challenge was disposability so that it could be replaced every five days to reduce the risk of patient infection. Gareth solved that problem too, developing a prototype made from conductive nano silver ink, printed out of an inkjet printer.

'We're at the stage where UK hospitals have accepted the system and it's being trialled at a private hospital in Brighton. The NHS are interested and a lot of European hospitals are going to adopt the technology.

'There are definite economic benefits for the health service and patients are happier too. They're not confined to bed when they don't need to be. They're not connected to machines

and case studies show that this is having a beneficial impact on their mental wellbeing.'

Gareth has also been recognised by Queen's, winning the 2014 Vice-Chancellor's Impact Prize for an Early Career Researcher.

He says, 'It all opens new possibilities. Quality of care is moving out of the hospital and into the home. There's an expensive infrastructure in a hospital but you might in future have a modem that you could use in your house.'

And he has another project in mind – implants for cancer patients. 'Just think – if you could implant sensors around your body and link that to a database to monitor your own health. With someone having chemotherapy, what an advantage it would be to have a sensor beside the tumour to detect changes and report on the effectiveness of the drug treatment in real time.'