Ireland Where Digital Health Thrives

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Health in the future

Pól Mac Aonghusa, Senior Research Manager at IBM Ireland, speaks about the importance digital health can have on making the right health decisions in the future, both for the patient and the healthcare professional.

"80% of the time, we don't really think about our health," says Pól Mac Aonghusa, who works at the Irish facility of US company International Business Machines (IBM) Corporation. "It's only when a negative incident happens, that healthcare suddenly becomes vital. For example, we might think about short-term fixes, like fad diets, losing weight after Christmas or needing to eat healthy. But we need to think about healthcare seriously in the long-term.

"A chronic condition like obesity doesn't happen because of a weekend binge on junk food. It develops over several years, as can other chronic conditions such as congestive heart disease and chronic obstructive pulmonary disease. So where we need to help is not just when we feel unwell – it's also helping us to adopt behaviours to delay the onset of chronic conditions and to self-manage to help lessen impact on our daily lives, for as long as possible."

This is where Pól sees the opportunity for digital health, "It's about managing our resources in the healthcare system and making people more aware of the impact their current decisions can have on their future health."

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Delivery of care

IBM is one of the largest technology and consulting companies in the world, with its research lab setting-up in Ireland in 2010. Pol's research involves looking at how technology can make the delivery of care to people better, and help to augment the highly skilled people that work in the medical fields.

He's currently involved in two major joint research projects – Ireland's first Digital Surgery Unit at the Mater Hospital, which is funded by the Government, and ProACT, which is funded by Horizon 2020.

"The Digital Surgery Unit is led by Professor Ronan Cahill, Director at the Precision Surgery Centre, UCD and Digital Surgery Unit Mater Misericordiae University Hospital, and is a partnership with IBM Research and Royal College of Surgeons in Ireland (RCSI)," explains Pol. "The Unit is focused on how new techniques and technologies, such as Artificial Intelligence (AI) might be applied in a surgical context.

"We are trying to use digital technologies to improve the performance of surgery and assist in better performance for better delivery of medicine – digital medicine."

According to Professor Ronan Cahill, "This research programme brings together world-class expertise from the Mater Hospital, UCD, RCSI and IBM Research here in Ireland. Beginning with cancer, our work has the potential to transform surgical practice and improve patient outcomes across a range of conditions and on a global scale."

Pól says part of this research is focused on image-assisted surgery, using a combination of smart cameras and fluorescence imaging. The aim is to precisely characterise types of tissue encountered during surgery, and so assist medics to make decisions that are personalised to the needs of the patient.

"Indocyanine green (ICG) is a medical dye used when the patient has been given anaesthetic, to help determine the cardiac output, liver function, and blood flow in the liver. After it's been injected, if you shine a fluorescent light source on the patient, their external and internal appearance is green."

Pól continues, "If you watch the dye very carefully, you'll see the changes in colour happening, but it may not be behaving in the same way, for example changing colour as quickly, in some parts of the tissue as in others. This difference in dye

behaviour is traditionally used as a targeting aid, to help identify where the tumorous tissue might be."

The downside of this fluorescent technique is that it's possible to miss subtle changes, particularly during a busy surgery.

"However, a computer can spot subtle changes far faster than the human eye can," says Pol. "So, the project looks at how the relevant information, such as where the cancer is for example, can be extracted from the changes observed by the computer and relayed back to the surgeon using AI and maths."

Pól says this would this help to tackle challenges in the planning phase of the surgery – for example helping the surgeon identify what they are seeing – and in the post-operative phase. "By using these techniques, we hope to allow the surgeons to have a minimally invasive surgery, to reduce complications post-surgery and improve the prospects for longer-term recovery."

Improving home-based integrated care

In the personalised care field, to assist with providing support for older adults (65 and over) living at home, IBM Research is collaborating with the Trinity Centre for Practice and Healthcare Innovation (TCPHI) at Trinity College Dublin on ProACT.

Co-ordinated by Dr John Dinsmore of Trinity College, the programme looks at how new technologies can help to support people living with more than one chronic health condition, and to improve the care they receive. With trial sites in Ireland, Belgium and Italy, the project seeks to improve and advance home-based integrated care for older adults with multimorbidity, which is the presence of multiple diseases or conditions.

"As we age, more conditions develop, from high blood pressure to heart problems," says Pol. "Currently, these are treated as individual conditions, and so ProACT is trying to understand them as a group of comorbidities that can be managed together. We're investigating ways wearables, home sensors and tablet applications can be used to help persons with chronic multimorbidity self-manage, as well as assist their support actors, including their family, caregivers and health professionals."

ProACT aims to provide older people with the independence to manage their conditions at home. "This, too, would help take some stress off the primary care system, so that the hospitals are not overburdened with patients."

In addition to Trinity and IBM, the project includes a number of researchers and academic institutions such as Dundalk Institute of Technology – which has the NetwellCASALA Research Centre for Aging – and multinational tech company Philips.

Pól says that partnership between tech, medtech companies and clinicians plays an important part in developing digital health technologies.

> "How can people see digital health as something important that is giving them important information that can help them better manage their lives? How do we empower people?"

"Care providers need to get a lot more done for less cost, in less time and with less resources. By having access to some of these innovative tools, healthcare providers are able to get better guidance, instruction and information, so they can perform more effectively and make better decisions when it comes to patient care."

Empowerment

Pól adds that it's wonderful to see Sláintecare, the ten-year programme aiming to transform Irish health service, and the HSE show an interest in the projects. "We've also had numerous discussions with the EU for further research funding, to expand the projects internationally.

"With Covid taking over, it will be interesting to see whether there's a renewed or a deeper understanding of how close to capacity we run the healthcare system. I do think that there is increased reflection in Ireland's healthcare system now on how we can ensure that the system is more robust and resilient to potential future health shocks."

However, Pól says there is work needed to understand how to change people's behaviours. "How can people see digital health as something important that is giving them important information that can help them better manage their lives? How do we empower people?

"Essentially, I see digital health providing us with a lot more detailed input from top to bottom – from the delivery of care, all the way up to how systems are budgeted.

He adds, "With digital health, we should be able to build much more adaptive, real-time and relevant perspectives of what's going on in people's lives, and plan and deliver healthcare accordingly."

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