Technology and Innovation in the NHS

Strathclyde Institute of Medical Devices at the University of Strathclyde

Strathclyde Institute of Medical Devices (SIMD) is a core part of the University’s activities in the healthcare field and it exists to stimulate Medtech activity across the University-Industry-Clinical interface. SIMD can offer a range of services to incoming companies and clinicians including introductions to academic teams, collaborative project scoping and roadmapping for Medtech product development, IP brokering and specialist events for companies or other groups. The Institute has also formed a Medtech Academic Advisory Group across Scotland and strong NHS partnerships to widen the impact of Scottish Medtech research. The Institute’s programme of activities in the Medtech sector, not least its close support of the EPSRC Centre for Doctoral Training in Medical Devices and Health Technologies (CDT), bridges the range of research project pathways from blue skies to certified medical device thereby feeding the innovation pipeline for new projects, products and services. SIMD is in the process of further extending its Medtech connectivity internationally. For example, it is poised to strengthen its connections in the USA through a partnership with the recently established Par USA business and investment fund.

1. What do you consider have been the main successes of the existing Scottish Government’s eHealth and telecare/telehealth strategies and why?

The piloting of NHS Florence (https://www.getflorence.co.uk/), a simple texting system with viewable responses and alerts, across a variety of healthcare settings (general practice, acute hospital, community and mental health) and health needs has been very successful. The system allows healthcare professionals to engage patients with their own healthcare. Crucially it is elegantly simple to use, aiding patient acceptance, and suits the current technology level and capability of the NHS without needing to address interoperability. NHS Flo is operated by the social enterprise company NHS Simple.

2. What do you consider have been the main failures of the existing Scottish Government’s eHealth and telecare/telehealth strategies and why?

I. Interoperability: Interoperability within the NHS systems is critical as it is imperative that healthcare professionals have the ability to share information across multiple technologies. Currently the underpinning IT system hampers professionals from exchanging information with ease, creating a healthcare system that is fragmented and inefficient. This goes from consultancy appointments to joining up data from patients/devices and the people with least feedback are patients, relying on whatever GPs can see on the current electronic system. The end-result is that it’s harder for healthcare professionals to care for patients and for patients to self-manage. Patients, in surveys, would welcome access to their own data instead of the current patriarchal approach. Medical device manufacturers have easy access to plug in and play via Bluetooth and
other such systems and the NHS data collection needs to provide a simple interface for collection of data generated by devices, meaning the technologies clinicians use to take care of people can seamlessly exchange information and be easily swapped out as needed. A single dashboard with data for clinicians and patients would be ideal.

II. **Investment:** The aspiration of the strategy to contribute to innovation occurring through the Health Innovation Partnerships (HIP), established in 2013, the research community and suppliers, including the small and medium enterprise (SME) sector was laudable, however it would appear that the actual impact is currently difficult to ascertain. Whilst preparing some documents around Medtech & innovation we would have liked to include some information on the Health Innovation Assessment Portal (HIAP) and HIP to help illustrate how ideas or innovations have been managed through to products for patient benefit. When enquiries were made we were advised there have been no formal reports on the progress and impact of either to date. Those outcomes that are in the public domain are generally anecdotal and far from systematic.

It is generally accepted that Scotland, in activities across a wide range of sectors, should be able to achieve about 10% of UK levels in industrial activities given per capita ratios and average performance. Whilst Scotland has always considered itself a good performer in the UK landscape this is not always born out in the evidence. UK Medical Technology Sector: Strength & Opportunity (2015 reports that 7% of the sectors jobs within the UK were in Scotland, in the 2016 that has fallen to 6%. In comparison other regions of a similar population, such as Yorkshire for example, had 10% of Medtech employment in 2015 and that grew to 11% in 2016. Yorkshire through HEFCE funding have recently established (2017), Translate: Medical Technologies in the Leeds City Region, which is a new partnership of universities in the region with world-class expertise in the development of new medical technologies. Such developments may help further consolidate Yorkshire as a leading regional Medtech player within the UK.

The University of Strathclyde has worked extensively to deliver a solution for Medtech in Scotland. This included preparing a full business plan for a National Centre for Medical Technology (NCMT) at the behest of Scottish Enterprise and the Scottish Funding Council. However, both have since declared a lack of funds available for this sector. Response from Scottish Enterprise to Medtech Sector needs has been directed mainly at increasing exports not investment in the innovation pipeline.

The situation as far as digital health employment is even more stark with Scotland trailing Yorkshire for example by nearly a factor of 3. In general when we look at trends across the UK wide Digital Sector growth has fallen from 28% in 2015 to 20% in 2016.
III. **Lack of deployment at scale**: Another area of perceived weakness is in the lack of true deployment at scale, DALLAS and Living it Up, notwithstanding. Living It Up in a “Scirocco” report of January 2017, nearly 2 years post-programme and 5 years after it began, described the state of “Transferability of the Good Practice” as, “Ready for transfer, but the innovative practice has not been transferred yet. The innovative practice has been developed on local/regional/national level and transferability has been considered and structural, political and systematic recommendations have been presented. However, the innovative practice has not been transferred yet.” Overall “pilotitus” remains an issue. In the NHS we are hampered by a clear difficulty in enacting business change in hospital to home care scenarios, in community medicine and in patient self-management. Busy staff are not incentivised to enact changes and deploy technology even if it can result in time and costs savings. Technology is often piloted as a duty and use withers away as soon as scrutiny of deployment is removed. In Scotland this will weaken the NHS and leave it open to competition from the private providers (some are very large organisations) who are preparing to respond to consumer driven interest in better monitoring and self-management.

At the Scottish Centre for Telehealth & Telecare’s Digital Health & Care Scotland: Our Ambitions Conference at Edinburgh International Conference on 30th November 2016 the ‘Attend Anywhere’ programme was highlighted as an ambition to be launched the following day. **Attend Anywhere** pilots the use of web-based video consultation for healthcare appointments. The programme was to be initially trialled across a small range of services in remote areas of Scotland including Speech and Language Therapy and Pharmacy prescription reviews. The project is collaboration between NHS Scotland’s Technology Enabled Care Programme and Healthdirect Australia. There seems to be an assumption that there is sufficient bandwidth in remote areas of Scotland to stream a live video call (using open source software) and that people have sufficient data bundles to facilitate live video streaming. Remote areas still suffer from a lack of high speed broadband, certainly not sufficient in many areas to stream live video. There are also, regardless of how this is spun, cost implications re the data usage for patients. For those with sufficient bandwidth or large enough data bundles this would prevent the need to go to appointments from distant locations.

However, an enquiry in February this year revealed only one patient had been enrolled between end of November and mid-February. Clearly strong support and public reporting of figures should be encouraged if this initiative is to gain widespread acceptance.

3. **How well does the Scottish Government’s draft Digital Health and Social Care Vision 2017-2022 address the future requirements of the NHS and social care sector?**

As far as we can see there is no draft strategy via the suggested link, or elsewhere, laying out how the Scottish Government plans to address the future requirements of the NHS and social care sector for Digital Health and Social Care. The website alludes to a draft plan that will be forthcoming later in 2017 and instead provides a statement of what a citizen of Scotland will have as a result of the Digital Strategy. It
then presents a number of case studies around small pilot projects which are hoped will help realise the vision when rolled out nationally.

Over the last few years Strathclyde has undertaken a large piece of work around delivering medical technologies to deliver the NCMT. Part of this work established that global health and social care delivery systems are failing to keep pace with the needs of an ageing population, the increased prevalence of chronic conditions (non-communicable diseases), and rising patient and public expectations. The World Economic Forum and Harvard University produced a report in 2011 that highlighted this economic and social burden, specifically they said:

“Non-Communicable Diseases already pose a substantial economic (global) burden and this burden will evolve into a staggering one over the next two decades. For example, with respect to cardiovascular disease, chronic respiratory disease, cancer, diabetes and mental health, the macroeconomic simulations suggest a cumulative output loss of US$ 47 trillion over the next two decades. This loss represents 75% of global GDP in 2010 (US$ 63 trillion). It also represents enough money to eradicate two dollar-a-day poverty among the 2.5 billion people in that state for more than half a century”

Healthcare systems will crumble under this increasing burden and fundamental changes to healthcare delivery systems are needed, with greater emphasis on:

- Preventing illness and tackling risk factors, such as obesity, to help people remain in good health
- Encouraging individuals to take more responsibility for their own health and to become more participative in managing their care
- Being proactive in predicting the likelihood of disease and in detecting disease at an earlier stage
- Supporting people to live in their own homes and offering a wider range of housing options in the community with localized and distance support
- A reduction in the more expensive methods of delivering healthcare e.g. visits to Accident and Emergency, hospital stays etc

Medical technologies, of which digital health is an important subset, have an important role to play in achieving this vision. Rather than being seen as an additional cost for the health service, new technologies and devices should play a pivotal role in helping individuals lead a healthy life and in dramatically changing the way healthcare is managed, leading to improved outcomes and reduced costs. Unfortunately not enough NHS staff have received this message and sometimes view technological change and digital health as something that may erode the skill base and be difficult to enact. There needs to be specialised teams deployed for business change tackling one area (chronic disease for example) at a time.

4. Do you think there are any significant omissions in the Scottish Government’s draft Digital Health and Social Care vision 2017-2022.
There appears to have been a lot of work around information sharing through the Information Sharing Board. When the key groups are viewed on the strategy website there is little, or no, reference/representation from patient/citizen groups. Patient groups can drive uptake of devices and self-management if they are properly enabled.

Health technology assessments have been introduced; including a lighter touch Innovative Medical Technology Overview (IMTO). These are often seen by SMEs and micro businesses as a ‘must have’ in order to sell technology into NHSScotland. However, they have no official capacity except as a summary review of the evidence and have no traction in NHS procurement. If a technology is reviewed and thought to be of benefit to citizens in Scotland there should be a means of ensuring that it is procured. Perhaps even given a ‘mandate’ to use, if it is thought that it would have a significant impact on the health of the citizens and on the Scottish economy.

SIMD participates in the work of Scottish Health Technologies Group (SHTG) and the IMTO process is a step in the right direction, however it is not a mandate to procure by NHSScotland thereby benefitting patients. To date there have been 8 IMTOs of non-medicine technologies. How many are now being bought by the NHS? In the interests of transparency, an open report into the ongoing HIP and HIAP activities would be of interest in order see to how effective and beneficial these initiatives have been for Scottish citizens.

5. What key opportunities exist for the use of technology in health and social care over the next 10 years?

As part of the work around the NMCT we recognised that there are many barriers to uptake of new technology in the NHS and Social Care sectors. The consumer revolution in social media, IT and technology is now turning towards medicine and healthcare with many large and influential companies such as Apple, Nike and Samsung developing Medtech devices and digital applications. Within a very short time, citizens will have much more choice over methods of health monitoring and access to medical advice. If we can harness citizen power to help drive better wellbeing and clinical innovation in Scotland then we will have developed a new and exciting model that could set the trend internationally. Citizens and clinicians would be supported to work together to embed new devices and practices in the care pathways. Failure to do so will encourage the provision of private services.

The adoption and diffusion of new medical technologies in the NHS, and other hard-pressed health services globally, offers the prospect of reducing costs and driving efficiencies. The efficiencies agenda in the NHS, coupled with private sector Medtech activity to deliver innovative clinical solutions, presents a significant win-win scenario for Scotland. The Medtech sector has a strong academic base in the underpinning technologies, covering the physical sciences, engineering and life sciences, through to design, software, IT, and digital technologies, backed up by strong clinical centres of excellence and a significant NHS capability and spend.
However, SIMD’s own survey of the academic Medtech network in Scotland revealed that this group feels a need for much more co-ordination and connectivity of the community, particularly to compete on the global stage. Again, SIMD planned for this in the NCMT plan prepared for and presented to SE and SFC.

In order to address areas of “unmet clinical need” that will benefit patients and have a positive impact on the health and social care services, it is necessary to engage with Health Care Practitioners (HCPs). A programme of organised and regular engagement events help HCPs to articulate “unmet clinical need” in their areas of specialty and with the assistance of the team from SIMD)/CDT and working with the Medtech community develop potential solutions (TRL 4-5). TRLs (Technology Readiness Levels) are a measurement system to assess the maturity of a technology under development. TRL 1 - the lowest - is really about basic core research, whereas TRL 9 - the highest - for Medtech is about surveillance and post marketing studies.

In November 2016 SIMD and the CDT held an engagement event ‘Optimising the Academic - Clinical Medical Technology Collaboration’. This was attended by a mix of clinicians, academics and students. The aim of the event was to generate new project ideas for the CDT 2017 project call, due to open in early 2017, as well as to help clinicians and researchers grow their networks and bridge the gap between academia and the clinic. The event was well attended with 65 people in total, 22 of whom were clinicians. As part of the event three key questions were posed:

1. Emerging clinical themes & opportunities?
2. State of the art and clinical needs?
3. What are the barriers to creating new collaborative projects?

The questions were discussed round table and fed-back to the larger group. Each group comprised of a mixture of clinicians and academics. Below are the emerging clinical themes & opportunities identified:

- Real time monitoring (Lab/Tissue on a chip) Digital Health (App based)
- Patient inclusion in device development
- Patient Driven Digital technology
- Primary treatments or at home treatments
- Patient self- management - Wearable technology, Easy data gathering & friendly display
- Remote Monitoring
- Apps - Useful for diagnosing diseases rapidly
- Apps - Primarily for clinicians at the moment
- Apps - Data Analysis and analytics
- Apps - Dementia related research
- Standardisation for collaboration and communication of data between areas
- Apps that can be used to aid clinical data organisation - Example an app in which results can be analysed by clinicians
- Real time monitoring using wearable tech to inform Clinicians
Again, with a funded NCMT we could address and deliver in many of these areas of need across Scotland. It will be apparent that some of the needs, above, may be within the remit of the Digital Health Institute, but most of the practical problems relate to monitoring and therapies that involve medical technologies.

6. **What actions are needed to improve the accessibility and sharing of the electronic patient record?**

We do not feel this is our remit and it is more appropriate that this should be addressed by NHS & Government. However, there would appear to be a pressing need to give patients access to their own data.

7. **What are the barriers to innovation in health and social care?**

There are many recognised barriers to innovation in health & social care which include the need for business change, staff resistance to change and procurement. One of the areas highlighted in our discussions with clinical, academic and industrial collaborators is the inability to get a new technology adopted within the health & social care sector in Scotland. As part of the event mentioned previously (see question 5 above) we posed the question ‘What are the barriers to creating new collaborative projects?’ The mixed groups identified the following:

- Managers say no money, in particular silo budgets are being protected across the NHS & Social Care sectors
- Management - issues with obstruction to new innovations from managers and staff
- Need for a process to make a Health Economic case to clinical service manager to obtain funding
- Lack of NHs funding for state of the art Equipment, usually comes from charitable donations
- Fear of new technology e.g. replacing staff - More labour intensive & more training required
- Innovations fund - Scottish Government
- Economic Impact