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Editorial Open Access

Innovating Technology for Use in Rehabilitation

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In rehabilitation, as with most other health care fields, there is strong demand for a robust evidence base of effectiveness and cost efficiency. However, researching the evidence base in our field is complex. To evaluate outcome we must adopt a multi-variate and multi-domain approach. Further rehabilitation services are often concerned with patients with multiple long term conditions rather than a single acute illness and hence the results of intervention are less certain and may only be apparent over the longer term. Unlike conventional clinical trials of medicines or medical devices rehabilitation research must therefore develop alternate methods for evaluating and exploring innovation and practice. Complex interventions such as rehabilitation need a more flexible development and evaluation roadmap which is more akin to those used in engineering than those used in medicine. These complex methodologies and development processes which mix quantitative and qualitative data in the research, development and evaluation process are familiar to designers, technologists and engineers who often have to take on mixed model data when designing products or services. The opinion of users must be mixed with hard scientific data on cause and effect when developing and engineering products. The UK Medical Research Council recognised this in 2008 when they proposed the MRC schema for the development of complex interventions (Figure 1).

Innovation partnerships will create the framework of collaboration that will lead to future services and technologies that have been effectively evaluated and can be deployed to promote a healthier, more active and fulfilled life for all individuals in our community. The shift of rehabilitation from primarily a time limited, acute hospital based service to a community based service supporting the individual to achieve maximum functional outcome in their own home and community and the shift of enablement services from council care services to an integration with rehabilitation are seismic changes in the way we currently operate. These changes must be accomplished with limited financial resources, using, where possible, existing health and social care infrastructure and with a rapidly increasing older adult population who need to access them. This is both a challenge but also opportunities to innovate in the way these services are provided.

It is clear that Allied Health Professionals and Bioengineers will require to draw on the skills of other scientists, engineers and technologists to help produce these new platforms for the delivery of rehabilitation and re-ablement. We will also require to work closely with clinical trials units to ensure that these developments are supported by suitable quality research data to meet the regulatory requirements of the MHRA, FDA, standards for devices and manufacture etc. We will need to work with business, commerce and industry to help finance these developments and to make them commercially exploitable by Businesses.

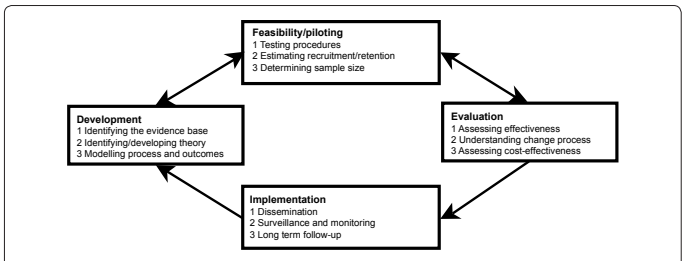

Figure 1: MRC schema for the research and development of complex interventions (MRC 2008)

We have been working on these sorts of novel developments as part of our Collaborative, RCUK funded, Envisage project which is part of the Lifelong Health and Wellbeing programme led by the UKs Medical Research Council (http://www.envisagerehab.co.uk). Envisage is a research project concerned with promoting independence by involving users in their rehabilitation through the use of visual methods of displaying movement data. During this project it became clear to us that the various communities involved in developing rehabilitation technology shared the same circular design process with roughly the same stages of development but did not describe this innovation circle in the same terms. We have therefore developed a common schema that links the partners in the innovation network together and allows all involved to see where a project sits in terms of the development cycle.

In writing this editorial for this special issue of the journal I hope to encourage those who innovate rehabilitation technology for the future to adopt the schema so as to assist smooth project development and inter-disciplinary communication. I have no doubt that the teams

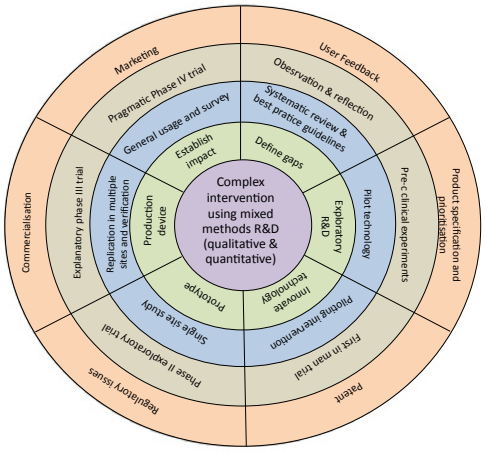

Figure 2: A Design and Innovation schema to link the Business, Clinical Trials, Clinical Practitioner and Engineering sectors

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who have presented their innovative developments in this special issue of the journal have succeeded in achieving this required professional skills integration and sustained it through at least some of the circle of development. Others may have gone forward in the circle and then based on the experience gained may have gone back one or more stages before restarting the wheel. These retrograde loops are part and parcel of the innovation and development process. We have found the scheme outlined below in the circle diagram (Figure 2) a useful tool for all stakeholders in the innovation and development process to comprehend the innovation and development journey for a rehabilitation technology. We hope you find it equally useful in your own developments and when evaluating the market ready ness for the innovations reported in this special issue of the Journal.

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