

Delbox and Delapp: diagnostic tools for delirium



About LLHW

Lifelong Health and Wellbeing provides a platform for coordinating ageing research, supported by the Research Councils, and a dedicated route for funding multidisciplinary ageing research that delivers the shared aims of the LLHW programme. Lifelong Health and Wellbeing is led by the Medical Research Council on behalf of AHRC, BBSRC, ESRC and EPSRC.

New technology has the potential to transform the way we diagnose delirium in older people, making it easier, quicker and more accurate.

An underdiagnosed syndrome

Delirium is an acute neuropsychiatric syndrome which causes short-term fluctuations in attention, arousal and cognition. The syndrome tends to develop after surgery or infection, or as a result of drug side-effects. Patients with delirium experience a severe and distressing state of confusion, which can last for between a few hours to several months.

Delirium is particularly common among older people in hospital settings, where it affects around 1 in 5 patients. Importantly, it is a major risk factor for future dementia and death in this group. It can affect how long patients stay in hospital and have a negative impact on patients' future mental and physical health.

Detecting and treating delirium early is important for improving health outcomes for these patients. Yet, up to three-quarters of all cases go undiagnosed. This is partly because delirium is very difficult to recognise, with symptoms very similar to those in other conditions such as depression and dementia. Many clinicians also lack the knowledge and experience needed to diagnose delirium using the scales and assessments that are currently available. It is clear that new ways of easily and accurately detecting delirium are needed.



About Delbox and Delapp

Researchers at the LLHW Centre for Cognitive Ageing and Epidemiology (CCACE) and the Edinburgh Delirium Research Group, at the University of Edinburgh, have developed a new, quick and simple method for diagnosing delirium. Together with the company, Eagle Designs, they have designed a computerised testing device, known as 'Delbox', which can be used to detect delirium using simple visual tests.

Delbox works by testing inattention, which is the core feature of delirium. The box has two buttons which flash on and off. Patients are asked to either count how many light flashes the device produces over a short period of time or to press a button each time they see one of the buttons light up.

Delbox is the first computerised test specifically designed for detecting delirium. Its simple and objective scoring system makes it easy for clinicians to use. It also has a robust and portable design, which makes it suitable for bedside testing in a hospital environment, and the retro appearance is intended to appeal to older patients. Crucially, Delbox has been designed to differentiate between delirium and dementia. It does this by working on the basis that patients with dementia are able to focus their attention for longer periods than patients with delirium, so are expected to do better on the test.

The team at CCACE is now taking this diagnostic test one step further by designing a prototype software application for smartphones. Known as Delapp, the software incorporates a visual acuity test, a brief arousal assessment and a graded counting task to measure attention. A smartphone app like Delapp has many advantages over a mechanical test for diagnosing delirium: it is easy for clinicians to use, cheaper to "build", and has the potential to become more widely available than a mechanical version



Outcomes and impact

Delbox has been found to successfully diagnose delirium in older hospital patients. In a trial of 20 patients each with delirium, dementia and no cognitive impairment, those patients with delirium scored the lowest in all eight of the tasks.

Studies using Delapp in more than 200 hospital patients have shown that it is similarly very successful in diagnosing delirium in general hospital wards and in ICU. Patients also found the app easy to use, providing positive feedback overall. The CCACE team is now developing Delapp further to confirm the clinical effectiveness of the technology and to pave the way for licensable software in the future.

To hear Professor Alasdair MacLulich talk more about Delapp, visit www.mrc.ac.uk/network