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## Final report summary:

# Detecting cognitive problems in patients with small vessel disease

BMET: A MULTI-CENTRE EVALUATION OF A SCREENING TOOL FOR VASCULAR COGNITIVE IMPAIRMENT

**PROJECT CODE:** TSA 2010/08
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## Why did we fund this research?

Disease of the small blood vessels in the brain is known as cerebral small vessel disease, or SVD. It is a major cause of stroke, accounting for about 20% of all strokes. In addition, it is the major cause of vascular cognitive impairment (VCI) and vascular dementia, which is the second most common form of dementia in the UK[1].

Despite its impact, there is still a lack of research into the effect of SVD on the development of VCI and its progression into vascular dementia. One important reason for this that there are not effective tests to detect VCI in patients with SVD.

The tests currently used have been developed for patients with Alzheimer's disease which has a very different pattern of cognitive impairment to VCI caused by SVD[2,3,4]. These tests are not useful for VCI detection. Therefore, a test that is fit for purpose is desperately needed[3].

Previous research has already developed and assessed a brief, screening tool which holds promise for being able to accurately diagnose patients with VCI due to SVD, and differentiate them from patients who have Alzheimer's disease.

The screening tool is called the Brief Memory and Executive Test (BMET). In a small pilot study at one site in the UK, it was found to be more effective than the commonly used Mini-Mental State Examination (MMSE), a conventionally used test[2].

In this study, the researchers set out to address the following questions:

- What is the normal range of performance on the BMET screening tool across different ages and gender for healthy people without SVD? This information is essential for the use of the BMET in clinical practice.
- How common is cognitive impairment, measured by the BMET, in patients presenting with stroke caused by SVD?
- Can the BMET screening tool be successfully used in stroke services throughout the UK by non-psychologist clinical and research staff?

If successful, this study could mean that more patients with VCI due to SVD will get correctly diagnosed. It could also lead to improved monitoring for decline in their symptoms and it could inform research programmes which could investigate and develop appropriate treatments. The BMET tool could significantly reduce the burden of both stroke and dementia on society.

## What did the researchers do?

The BMET tool is a battery of six different tests: i) executive function, which includes problem solving, reasoning and planning; ii) memory; iii) visuospatial function, including perception of what is seen and the spatial relationship of seen objects to one another; and iv) motor function, which is the ability to move, such as walking, talking and gesturing. The BMET also tests 'orientation', meaning awareness of where a person thinks they are in time and place. The test of orientation is essential to differentiate cognitive impairment caused by SVD, from that caused by Alzheimer's disease.

To show what the normal range of scores should be on the BMET for people without VCI from SVD, participants were recruited from across five sites in the UK to act as a 'control' group. The researchers aimed to recruit 400 patients without a history of stroke or TIA, which adds to 100 control group patients already tested in previous study[3]. To account for changes with age, of the 400 patients, 80 were to be recruited from each decade between the ages of 40 and 90.

The study recruited 385 patients without a history of stroke or TIA to its control group. This almost met the target of 400 patients, but recruitment fell short in the age range 90-100. In addition, 50 patients with Alzheimer's disease were also recruited as an additional control group.

In a different subgroup of 100 of these 500 patients, the test was repeated again three months later to test how reproducible the results are.

To establish how common cognitive impairment is in SVD, the study recruited 200 patients with signs of stroke caused by SVD (called lacunar stroke). The patients received MRI brain scans and took the BMET test. The findings on the brains scans were then compared with the results of the BMET test.

A neuropsychologist co-ordinated the training of staff who delivered the BMET at all five sites of the study, and monitored how well they were able to administer the test to patients.

## What did the research find?

The results showed that the BMET can be administered easily by non-psychologists to patients with SVD in approximately 12 minutes. This makes the BMET an appropriate, brief screening tool in a variety of clinical settings. Conventional screening tools take at least 20 minutes to administer, and are therefore not appropriate for use in most clinical settings.

Analyses were conducted to determine how sensitive and specific the BMET was to detect cognitive problems in SVD and compared this with other commonly used screening measures. Sensitivity means how accurately the tool diagnosed those with VCI, and specificity means how accurate the tool could identify those without VCI.

The BMET could identify cognitive impairment from SVD with a sensitivity of 93% and specificity of 76%. This was significantly better than the Mini Mental State Evaluation (MMSE), and the Montreal Cognitive Assessment (MoCA), both commonly used tests.

The BMET has important implications for future clinical practice and could improve our ability to quickly and accurately detect the presence of cognitive impairment in SVD.

A future direction for this research is to see how well the BMET scores can be used in the longer term to monitor changes in VCI in patients with SVD.

The BMET test has been made free to download from www.bmet.info.

## What does this mean for people with SVD?

The BMET is an effective tool to screen for vascular cognitive impairment (VCI) in patients with cerebral small vessel disease (SVD), who are poorly served by current screening tests.

The BMET outperformed two commonly used brief cognitive screening tools, and its short administration time and reliability suggests that it could be effective across a number of clinical and

## References


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