

# Development and validation of the 4AT: a new rapid screening tool for delirium

<b>Submission date</b> 30/05/2014	<b>Recruitment status</b> No longer recruiting	<input checked="" type="checkbox"/> Prospectively registered
		<input checked="" type="checkbox"/> Protocol
<b>Registration date</b> 02/06/2014	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan
		<input checked="" type="checkbox"/> Results
<b>Last Edited</b> 12/08/2019	<b>Condition category</b> Mental and Behavioural Disorders	<input type="checkbox"/> Individual participant data

## Plain English summary of protocol

### Background and study aims

Delirium (acute confusion) affects more than 15% of acute hospital patients. It is commonly due to acute illness, trauma or the side effects of drugs and can be very distressing for the patient and their families. Rapid detection of delirium is vital so that the patient can receive the appropriate treatment and support. Currently doctors use screening tools to help them assess whether a patient has delirium. However these are not suitable for all patients and can be time consuming to use. As a result it is estimated that two-thirds of acute hospital patients with delirium are not being diagnosed. A new quick, easy to use screening tool for delirium and cognitive impairment called the 4AT has been developed to help doctors diagnose delirium. It has 4 parts and is very quick to complete. In this study we compare the new 4AT screening tool against a reference standard assessment to show that it can be used to accurately diagnose delirium. The 4AT is compared with one of the most commonly used screening tools, the CAM (Confusion Assessment Method) to find out if it performs similarly whilst being potentially quicker to use. The study also includes a cost evaluation. The study's findings will improve the diagnosis of delirium allowing better management by the clinical team thereby improving both patient care and outcomes.

### Who can participate?

Patients who are admitted to hospital via the emergency department or through acute general medical or geriatric units will be eligible. The 4AT study aims to recruit 900 patients over 70 years old from the 3 hospitals involved in the study.

### What does the study involve?

Patients on the study are split into one of two groups at random. One group is screened for delirium using the 4AT screening tool while the other group is screened using the CAM screening tool. All patients on the study are screened using the reference standard assessment. Patients are screened within the first two days following admission. Information about their subsequent hospital stay will be collected from their medical records.

### What are the possible benefits and risks of participating?

Patients on this study will be screened twice for delirium. There are no known risks to these assessments. A possible benefit of participation is that patients on this study in either group

may be diagnosed with delirium more frequently which will mean that more can receive more appropriate care.

Where is the study run from?

The University of Edinburgh and NHS Lothian (UK)

When is study starting and how long is it expected to run for?

March 2015 to end of May 2017

Who is funding the study?

National Institute for Health Research; Health Technology Assessment Programme (UK)

Who is the main contact?

Professor Alasdair MacLulich

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## Contact information

### Type(s)

Scientific

### Contact name

Prof Alasdair MacLulich

### Contact details

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## Additional identifiers

### Protocol serial number

HTA 11/143/01

## Study information

### Scientific Title

Development and validation of the 4AT- a new rapid screening tool for delirium: a multicentre randomised controlled trial

### Acronym

4AT

### **Study objectives**

The diagnostic screening performance of 4AT will be assessed by comparing the diagnostic accuracy of the 4AT with the reference standard (Delirium Rating Scale-Revised-98) using the positive and negative predictive values, sensitivity and specificity.

In addition

1. The 4AT will be compared with one of the most commonly used screening tools, the short CAM (Confusion Assessment Method)
2. Performance of the 4AT cognitive screening assessment will be evaluated
3. Performance of the 4AT in predicting clinical outcomes will be evaluated

More details can be found at <http://www.nets.nihr.ac.uk/projects/hta/1114301>

Protocol can be found at [http://www.nets.nihr.ac.uk/\\_\\_data/assets/pdf\\_file/0009/113949/PRO-11-143-01.pdf](http://www.nets.nihr.ac.uk/__data/assets/pdf_file/0009/113949/PRO-11-143-01.pdf)

### **Ethics approval required**

Old ethics approval format

### **Ethics approval(s)**

1. Scotland A REC, 03/07/2015, ref: 15/SS/0071
2. Yorkshire & The Humber – Bradford Leeds REC, 16/09/2015, ref: 15/YH/0317

### **Study design**

Multicentre randomised controlled trial

### **Primary study design**

Interventional

### **Study type(s)**

Screening

### **Health condition(s) or problem(s) studied**

Delirium/geriatric/acute admissions

### **Interventions**

Patients on the study will be randomised into one of 2 groups. One group will be screened for delirium using the 4AT screening tool while the other group will be screened using the CAM (Confusion Assessment Method) screening tool. All patients on the study will also be screened using the reference standard assessment (Delirium Rating Scale-Revised-98). Patients will be screened within the first two days following admission. Information about their subsequent hospital stay will be collected from their medical records.

### **Intervention Type**

Other

### **Phase**

Not Applicable

### **Primary outcome(s)**

Primary objective: 4AT vs reference standard (binary): the diagnostic screening performance of 4AT versus the reference standard will be assessed using the positive and negative predictive values, sensitivity and specificity. The exact binomial 95% confidence interval will be reported for each measure. An ROC curve will be constructed to verify that the proposed cut point on the 4AT score is appropriate. The area under the ROC curve and its 95% confidence interval will be reported.

### **Key secondary outcome(s)**

1. 4AT vs short CAM: differences in each of sensitivity, specificity, positive and negative predictive values between 4AT and short CAM will be tested by Fisher's exact test and quantified by the difference in the two proportions (4AT-CAM) and its 95% confidence interval. To aid comparison of 4AT and CAM, the overall performance of each will also be summarised using Youden's Index (sensitivity minus false positive rate) and the odds ratio of sensitivity to specificity.
2. Performance of the 4AT cognitive screening items: is the 4AT an adequately sensitive tool for detecting general cognitive impairment as judged against a documented history of dementia and /or the Informant Questionnaire for Cognitive Decline in the Elderly? Methods as per primary objective.
3. 4AT vs clinical outcomes: as assessment of criterion validity, the performance of the 4AT in predicting length of stay, institutionalisation, and mortality, up to 12 weeks. Descriptive statistics of clinical outcomes (continuous variables: mean, median, standard deviation, minimum, maximum; categorical variables, number and percentage of participants) will be presented for the groups with and without 4AT scores above the cut point of 3.

### **Completion date**

30/05/2017

## **Eligibility**

### **Key inclusion criteria**

1. Subject > 70 years old
2. Subject admitted to hospital via:
  - 2.1. Emergency Department (ED)
  - 2.2. Acute general medical and geriatric unit

### **Participant type(s)**

Patient

### **Healthy volunteers allowed**

No

### **Age group**

Senior

### **Sex**

All

### **Total final enrolment**

843

**Key exclusion criteria**

1. Acute life-threatening illness
2. Communication difficulties

**Date of first enrolment**

01/04/2015

**Date of final enrolment**

31/12/2016

**Locations****Countries of recruitment**

United Kingdom

England

Scotland

**Study participating centre****NHS Lothian**

Royal Infirmary of Edinburgh

Little France

Edinburgh

Edinburgh

United Kingdom

EH16 4SA

**Study participating centre****Sheffield Teaching Hospitals NHS Foundation Trust**

Weston Park Hospital

Whitham Road

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United Kingdom

S10 2SJ

**Study participating centre****Bradford Teaching Hospitals NHS Foundation Trust**

Bradford Royal Infirmary

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BD9 6RJ

# Sponsor information

## Organisation

University of Edinburgh and NHS Lothian - co-sponsors (UK)

## ROR

<https://ror.org/03q82t418>

# Funder(s)

## Funder type

Government

## Funder Name

Health Technology Assessment Programme Ref. 11/143/01

## Alternative Name(s)

NIHR Health Technology Assessment Programme, Health Technology Assessment (HTA), HTA

## Funding Body Type

Government organisation

## Funding Body Subtype

National government

## Location

United Kingdom

# Results and Publications

## Individual participant data (IPD) sharing plan

### IPD sharing plan summary

#### Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
<a href="#">Results article</a>	results	24/07/2019	25/07/2019	Yes	No
<a href="#">Results article</a>	results	01/08/2019	12/08/2019	Yes	No
<a href="#">Protocol article</a>	protocol	10/02/2018		Yes	No
<a href="#">HRA research summary</a>			28/06/2023	No	No

[HRA research summary](#)

28/06/2023 No

No

[Study website](#)

Study website 11/11/2025

11/11/2025 No

Yes