

# Yorkshire and the Humber Clinical Network Neuro-imaging in Dementia Guidance

To Scan or not to Scan?



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This guidance has been written by the Yorkshire and Humber Clinical Network for Dementia and Older People’s Mental health with a working group which included old age psychiatrists, physicians, radiologists, senior nurses and a GP.

**Disclaimer:**

Healthcare professionals must make their own decisions about assessment and care on a case-by case basis, after consultation with their patients, using their clinical judgement, knowledge and expertise. This guidance is not intended to take the place of physician judgment in assessing individual patients prior to treatment nor is it intended to be a prescriptive direction defining a single course of management. Variations, taking individual circumstances into account, will be appropriate.

Ratification of this guidance for local use should follow the usual process within all affected organisation (s). Departure from local prescriptive protocols or guidelines should be fully documented in the patient’s case notes at the time the relevant decision is taken.

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## Background

The [Prime Minister’s Challenge on dementia 2020](#) set a number of key aspirations, including decreasing the length of time a person waits for a diagnosis of dementia, with the expectation that “the national average for an initial assessment should be 6 weeks following referral from a GP (where clinically appropriate), and that no one should be waiting several months for an initial assessment of dementia”.

In July 2017, the “[Implementation Guide and resource pack for dementia care](#)” was published which cites within it the NHS Operational Planning and Contracting Guidance for 2017/19. This sets an expectation in the provision of dementia care to ‘Increase the number of people being diagnosed with dementia, and starting treatment, within six weeks from referral; with a suggested improvement of at least 5% compared to 2015/16’.

Neuroimaging is one of the most important ancillary investigations in the diagnostic work-up of dementia, with most clinical guidelines recommending at least one structural imaging procedure in every patient with suspected dementia. Whereas the traditional purpose of imaging was to exclude potentially treatable causes for cognitive impairment, with advances in technology, neuroimaging is also used to include diagnosis of the dementia subtype.

The [NICE Pathway for Dementia diagnosis and assessment](#) (2017) advises that “diagnosis of subtype of dementia should be made by healthcare professionals with expertise in differential diagnosis using international standardised criteria”. A Multi-Disciplinary Approach (MDT) is important when diagnosis is complex, and in these cases lead clinicians should have access to advice from Neurologists, Radiologists and Psychiatrists with the relevant expertise in order to determine appropriate scanning, as well as interpreting reports to ensure accurate diagnosis.

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## Aims and Purpose

The guidance is aimed at Commissioners and Providers to aid the streamlining of memory services pathways by implementing this guidance in order to work towards achieving expectation set out in national guidance.

Access to appropriate and timely neuroimaging has been cited as a particular challenge in some areas, and the Yorkshire and Humber region is no exception. This guidance has therefore, been written with the aim of presenting a summary of current national and international recommendations, and adapting them to local resource availability, to identify possible ways to optimise service pathways and in so doing support services to achieve the national expectations.

The guidance addresses the questions of when neuro-imaging should be undertaken, which scan should be requested, addresses the benefits of scanning and discusses which patients a scan may not be appropriate for. It also emphasises the importance of providing appropriate information on request forms to obtain the best reports and provides a worked example.

It is important to note that no single test will confirm diagnosis, and a diagnosis of dementia is only made after a comprehensive assessment, including: history taking, cognitive and mental state examination, physical examination, review of medication. It is therefore, vital that a holistic approach is taken when undertaking memory assessments.

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## What are the main indications for a scan in the diagnosis of dementia?

NICE guidance CG42 (2006, updated 2016) says: “Structural imaging should be used in the assessment of people with suspected dementia to exclude other cerebral pathologies and help establish the subtype diagnosis. Imaging may not always be needed in those presenting with moderate to severe dementia, if the diagnosis is already clear”.

### Mild Cognitive Impairment (MCI)

People presenting with MCI are at an increased risk of developing dementia. Baseline imaging should be undertaken as follows:

Structural image (e.g. CT/MRI) undertaken alongside neuropsychological testing

OR

Functional image (e.g. SPECT/DAT/FDG PET-CT) undertaken

The tests chosen will depend on local access and expertise, and consideration should be given to clinical reassessment and repeating scans to establish whether or not change has occurred over time.

In cases of MCI leading to potential young onset dementia, where diagnosis is more difficult to arrive at and Alzheimer’s disease is suspected, ideally a FDG PET-CT scan would be appropriate.

Length of time waiting for a scan for patients presenting with MCI should not be a key determinant in deciding on choice of scan.

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## Which Scan?

A scan does not in itself diagnose dementia; it provides support for the clinical diagnosis and can help establish the sub-type (cause) or rule out other pathologies.

A structural neuroimaging procedure, usually multi-slice CT with coronal reformats or MRI should be considered where there is a clinical indication to rule out other pathologies, with functional imaging such as SPECT/FDG PET-CT/DAT reserved where establishing the sub-type is important in determining the appropriate treatment pathway.

CT scans can be requested in primary or secondary care by clinicians trained in obtaining consent for the procedure. Where other more specialist scans are indicated, a specialist assessment should first be completed.

Functional imaging should be reserved for situations where the precise diagnosis is crucial and the information obtained would alter management e.g. to differentiate between sub-types for treatment purposes, early onset or atypical presentations of dementia usually in younger patients.

Note: Specialist advice should be taken when interpreting scans in people with Learning Disabilities or Down's syndrome, as the pre-existing brain structure may be different. People with Down's syndrome may show SPECT abnormalities throughout life that resemble those in Alzheimer's Disease, and therefore this test is not helpful for this group.

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## Structural Scanning Versus Functional Scanning

It is important to note that no single test will confirm diagnosis, and a diagnosis of dementia is only made after a comprehensive assessment, including: history taking, cognitive and mental state examination, physical examination, review of medication. It is therefore vital that a holistic approach is taken when undertaking memory assessments. The NICE Pathway for Dementia diagnosis and assessment (2017) advises that “diagnosis of subtype of dementia should be made by healthcare professionals with expertise in differential diagnosis using international standardised criteria”. A Multi-Disciplinary Approach (MDT) is important when diagnosis is complex, and in these cases lead clinicians should have access to advice from Neurologists, Radiologists and Psychiatrists with the relevant expertise in order to determine appropriate scanning, as well as interpreting reports to ensure accurate diagnosis.

### Structural Scanning

CT or MRI

### Functional Scanning

*Best practice suggests an MDT approach when selecting a specialist scan. Where there is uncertainty around the diagnosis when interpreting the results an MDT approach should also be taken.*

DAT, FDG PET-CT, SPECT, Amyloid PET

**For full information on the different scans and guidance for choosing the right scan, click [here](#).**

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## What are the benefits of completing a scan?

Exclude other pathologies which may be treatable and which may present with symptoms similar to dementia e.g. cerebral tumours, sub-dural haematomas and hydrocephalus.

Exclude other pathologies that may mimic Alzheimer’s Disease in younger adults.

Establish the sub-type (cause) of dementia e.g. Vascular Dementia, Alzheimer’s Disease etc. to ensure the appropriate treatment and support plan (including lifestyle advice).

To meet patient/carer expectations.

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## Which patients may not require a scan?

Scanning is unnecessary for people with severe dementia or who are very frail and dependent and when it is unlikely that the results of a scan would influence management.

Other patients who may not require a scan:

- Patients with significant co morbid physical illness where life expectancy is less than a year
- Patients who have had structural cerebral neuro-imaging in the previous year that could be re-reported
- Multiple co-morbidities
- Patient choice not to undergo a scan

There may be other situations where a clinician has to evaluate the benefit of scanning, for example local geography and the distance a patient has to travel to obtain a scan and the associated distress and inconvenience this may cause, and risks associated with completing repeated scan. It must be remembered that a scan does not in itself diagnose dementia it provides support for the clinical diagnosis and can help establish the sub-type (cause).

The final decision must be down to the judgement of the clinician taking into consideration the individual circumstances of the patient. Please see disclaimer on page 1.

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## Costs

The following information has been obtained from the [National Tariff for 2018/19](#) published by NHS Improvement and NHS England.

|  | Scan Cost (£)<br>2018/19 | Report Cost (£)<br>2018/19 | Total (£) |
|--|--------------------------|----------------------------|-----------|
| MRI Scan of one area without contrast          | 114                      | 22                         | 136       |
| MRI Scan of one area with post contrast only   | 163                      | 22                         | 185       |
| CT Scan of one area without contrast           | 71                       | 20                         | 91        |
| CT Scan of one area with post contrast only    | 85                       | 20                         | 105       |
| CT Scan of one area with pre and post contrast | 100                      | 20                         | 120       |
| SPECT-CT Scan of one area                      | 148                      | 26                         | 174       |
| SPECT Scan (without CT)                        | 133                      | 26                         | 159       |
| FDG PET-CT                                     | 797*                     |                            |           |

\* Please note the FDG PET-CT cost quoted above has not been taken from the national tariff but from data provided by NHS improvement for 2016/17.

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## Summary Table

|   | CT   | MRI  | SPECT-CT   | FDG PET-CT  | DAT Scan   |
|---|--|--|--|---|--|
| <b>Scan Detail</b>                      | X-Ray producing cross sectional images   | Magnetic field alters the axes of spinning protons, which is detected by scanner   | Uses a gamma camera to detect gamma- emitting radioisotopes. Can involve a CT scan at the same time  | Uses a gamma camera to detect a positron-emitting radioisotope. CT scan can be performed during the same session  | Test to look at the level of dopamine receptor cells in the brain using a small amount of an iodine based radioactive material |
| <b>Benefits</b>                         | Quick, painless, quiet, readily available, well established  | Non- invasive, painless, no exposure to ionising radiation, post-scan modification of images   | Allows assessment of blood flow to brain. Relatively quick.  | Allows assessment of biological activity, such as glucose activity. Non- invasive   | Differentiate between Lewy body Dementia & other forms of dementia and/or Parkinson's Disease                                  |
| <b>Key Indications</b>                  | Clinical history highly suggestive of a neuro-degenerative condition. Clinical history suggestive of other organic cause<br>History of cancer that could metastasise to the brain. | Consider if vascular dementia suspected. Acute or rapidly progressive. A-typical presentation. Suspected younger onset Alzheimer's Disease | Where diagnosis is unclear or difficult to establish via CT or MRI scans e.g. MCI or co-morbid mental illness in potential young onset dementia. Where there is complex presentation which may be related to underlying mental health problems but where the clinician suspects that the underlying cause maybe dementia | Differentiating between Alzheimer's disease, vascular dementia and Frontotemporal dementia if the diagnosis is in doubt. Detecting Alzheimer's disease where diagnosis is complex (e.g. young onset) <i>NOTE: If patient is diabetic, this test becomes more difficult to interpret</i> | Suspected Lewy body dementia   |
| <b>Tolerability in elderly patients</b> | Generally well tolerated   | Can be less well tolerated as longer to perform, claustrophobic and noisy  | Can be less well tolerated because of invasiveness and claustrophobia  | Generally well tolerated  | Can be less well tolerated because of invasiveness and claustrophobia  |
| <b>Estimated time to undertake</b>      | 1-2 minutes  | 25 minutes   | 15 minutes   | 2 hours   | 30 minutes   |

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## Resources

- [Screening Questions for the Assessment Proforma](#)
- [Making a Scan Request](#)

More in development....

- Template for a scan request

### Specialist Services:

NHS England commission three Specialist Neuro-Science Centre’s located in the Yorkshire and the Humber Region:

- Sheffield
- Leeds
- Hull

Referrals are usually received from Consultant to Consultant, where it is felt the presentation moves beyond their speciality or where there is someone specifically trained in that area. This also allows access to more tests in one place.

The full specification can be found [here](#). Or please follow [this link](#) to the Specialised Services web page.

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