Neuroimaging in dementia: a national survey of non-radiology specialists, radiologists and radiographers in Ireland

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Aims and objectives

More than 41,700 people in Ireland and 12,000 people in North Wales are currently living with dementia, and the number of Irish people with the disease is likely to rise to 147,000 by 2041 (1) due to increased life expectancy. Dementia frequently remains undiagnosed, however, even though early diagnosis is essential for the provision of adequate treatment and care. At the same time the capability of neuroimaging in the diagnosis and understanding of dementia is underutilised.

The aim of the current study was to establish the views of consultant neurologists, consultant geriatricians, consultant old-age psychiatrists, consultant radiologists and radiographers on the subject of neuroimaging in dementia. Issues such as accessibility of neuroimaging modalities, use of referral guidelines, level of knowledge of neuroimaging in dementia, as well as interest in training were explored.
Methods and materials

The research design was a postal questionnaire survey. Separate questionnaires containing open and closed questions relating to accessibility, perceived importance of referral patterns, including adherence to guidelines, and knowledge relating to neuroimaging in dementia were developed for the individual groups (clinicians, radiologists, radiographers). The questionnaires were posted nationally to all neurologists (n = 46), geriatricians (n = 78), old-age psychiatrists (n = 53) and all radiologists (n = 236).

Since there is currently no national listing of radiographers, a pre-questionnaire letter was sent to all radiography service managers (RSMs) located in non-specialised hospitals or private services (n = 51) inviting them to partake in the survey. Interested RSMs were sent a questionnaire for distribution among the radiographers in their service. The survey was completely anonymous. Respondents were given four weeks to return the questionnaire. There was no follow-up.

This study was granted an ethical exemption by the UCD Human Subjects Research Ethics Committee (Research Ethics Exemption Reference Number (REERN) is: LS-E-12-191-McNulty).
Results

The survey response rate was 43.2% for geriatricians, neurologists and old-age psychiatrists (Figure 1), and 16% for radiologists. Thirty-five percent of RSMs participated and a total of 40 Radiographer questionnaires were returned.

58.3% of the clinicians were male compared to 75.7% of radiologists and 27.5% of radiographers. The majority of participants worked in county Dublin (Figure 2). Most of the clinicians (77.6%) worked under the general medical scheme, while 40.5% of radiologists worked in a teaching or university hospital, 18.9% worked in a general hospital, 16.2% in a regional hospital and only 5.4% in a private hospital or imaging centre. The average number of brain scans read per week was 18.94 (SD = 36.71) for MRI and 19.4 (SD = 16.84) for CT. The average number of brain scans for dementia read per month was 6.06 (SD = 8.9) for MRI and 9.58 (SD = 10.64) for CT. 52.5% of radiographers worked in a private hospital or imaging centre, 30% in a general hospital, 10% in a university teaching hospital and 7.5% in a regional hospital or imaging centre. 54.1% of radiologists had further training in neuroimaging, 36.8% of which stated that there was a focus on dementia. 43.6% of radiographers had specific training in neuroimaging, 56.3% of which stated that there was a focus on dementia.

A quarter of the clinicians considered neuroimaging as 'very important' for the diagnosis of dementia, and a further 46.1% deemed it 'important'. Similarly, 24.3% of radiologists considered neuroimaging as 'very important' for the diagnosis of dementia, and 40.5% considered it 'important'. Nearly all radiographers (97.4%) believed that neuroimaging has a role in the diagnosis and patient management in dementia.

The vast majority of clinicians (92%) referred clients with suspected MCI or dementia for neuroimaging to rule out other causes, 68% referred for a differential diagnosis, 61.3% to establish a subtype of dementia, and 45.3% because a client was aged less than 65 years (Figure 3). Only 13.3% of clinicians referred people with suspected dementia to neuroimaging based on clinical guidelines (Figure 3). Radiologists and radiographers listed cerebrovascular accident (CVA) or stroke as the top clinical indication for MRI and CT brain examinations. CT was available to all clinicians and MRI to most (96.1%). For the majority of clinicians (80.3%), HMPAO SPECT and FP-CIT SPECT were not available and FDG-PET or FDG-PET/CT was not available to 64.5% of clinicians (Figure 4). Clinicians who had access to SPECT and PET were located in areas of major population such as Cork, Dublin and Galway.

More than half of clinicians (55.4%) were not aware of dementia-specific protocols for referrals for neuroimaging. 64.7% of radiologists reported that they had no specific
scanning protocol for dementia for MRI and 67.6% had no specific scanning protocol for CT. Similarly 44.4% of radiographers responded that they had no specific scanning protocol for dementia for MRI and 57.1% had no specific scanning protocol for CT. The majority of radiologists (73.5% for MRI; 75.8% for CT) did not use specific structured / template reporting for dementia.

77% of non-imaging respondents were 'somewhat confident' or 'not very confident' about modality selection (Figure 5). Only 13% of respondents were 'very confident' in their understanding of the role of neuroimaging in dementia. The majority (71.6%) rated the usefulness and their comprehension of radiology reports as 'good', another 12.2% rated it as 'excellent' (Figure 6).

A third of radiographers (33.3%) stated that they had no knowledge of the disease process of dementia in relation to MRI findings and 45.9% had no knowledge of the disease process in relation to CT findings. In relation to their knowledge of neuroimaging in dementia, specifically in MRI, 61.1% of radiographers had little knowledge of the image appearances and 48.6% had little knowledge of appropriate scanning protocols.

The majority of consultant radiologists (71.4%) and radiographers (76.9%) expressed an interest in further training focused on dementia and on the application of the latest neuroimaging techniques in the diagnosis of dementia. More than half of clinicians (58.7%) (Figure 7), 38.9% of radiologist and 28.2% of radiographers found it 'very important' to further their knowledge about neuroimaging in dementia, and a further 34.7% of clinicians, 38.9% of radiologist and 48.2% of radiographers found it 'important'.


Fig. 1: Fig 1. Specialisms of non-imaging clinician respondents

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Fig. 2: Fig 2. Geographical distribution of non-imaging clinician respondents

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Fig. 3: Fig 3. Reason for neuroimaging referral by clinicians

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Fig. 4: Fig 4. Availability of neuroimaging to referring clinicians
**Fig. 5:** Fig 5. Confidence in selection of the most appropriate neuroimaging examination by referring clinicians.
Fig. 6: Fig 6. Comprehension of neuroimaging reports by non-imaging clinicians

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Importance to Further Knowledge

- NI
- NI in Dementia

- Very important: 55%, 59%
- Important: 40%, 35%
- Somewhat important: 5%, 4%
- Unimportant: 0%, 3%
Fig. 7: Fig 7. Importance of furthering knowledge of neuroimaging and neuroimaging in dementia

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Conclusion

The survey results suggest that there is a need for further training in neuroimaging in dementia among clinicians in order to improve knowledge and confidence in respect of this imaging technology. Results suggest that there is a strong interest in training in this area and underline the need for increased use and awareness of guidelines.
References