# Open access neuroimaging for general practitioners — diagnostic yield and influence on patient management

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*SUMMARY*

*This study assessed the first year of a regional general practitioner (GP) open-access neuroimaging service, to determine diagnostic yield and influence on patient management. Overall, 48.1% of examinations demonstrated a radiologically significant abnormality with 64.1% of spinal imaging examinations demonstrating significant findings. Utilised appropriately, a regional open-access neuroimaging service has good diagnostic yield and may influence the management of most referred patients.*

***Keywords:*** *magnetic resonance imaging; open-access services; computed tomography; general practice.*

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## Introduction

IMAGING investigations requested by general practitioners (GPs) and hospital specialists have similar diagnostic yield.[1-3] For many common clinical problems, magnetic resonance imaging (MRI) or computed tomography (CT) are now the most appropriate firstline investigations[2] and successive governments have emphasised the desirability of improved GP access to diagnostic services.[4] Following the success of a pilot open-access neuroimaging service in Lothian for fundholding practices,[2] Lothian Primary Care funded an extension of this service to all Lothian GPs (129 practices covering a population of 760 000). The aim of this study was to assess the diagnostic yield of the service and ascertain the influence of imaging on patient management.

## Method

Consultant neuroradiologists' reports on open-access neuroimaging examinations performed between 1 April 1999 and 31 March 2000 were reviewed, to determine the number of radiologically significant abnormalities. A significant abnormality was regarded as one that was likely to directly influence patient management or explain presenting symptoms and signs.

A questionnaire was sent to the GP requesting information on how each examination had altered planned management, what the management would have been had the service not been available, whether the report contained appropriate detail, and the timeliness of its receipt. To find out attitudes to waiting times, GPs were asked at what point they felt the wait for an examination would become too long for the service to be worthwhile. Waiting times were defined as the period from receipt of request to the date of the first appointment offered.

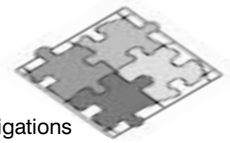
## Results

One hundred and seventy-nine GPs from 75 practices referred 366 patients for 389 open-access examinations (mean = 2.1 per GP per year, range = 1 to 15). Of these, 292 (75.1%) were MRI and 97 (24.9%) were CT scans. Three patients did not attend, three cancelled the appointment, and one died before MRI was performed. Eight patients did not tolerate MRI; of these, four proceeded to CT. Examinations performed are listed by modality in Table 1.

One hundred and eighty-two out of 378 (48.1%) examinations revealed a radiologically significant abnormality (Table 1); on brain imaging, 13 out of 96 (13.5%) patients had a significant abnormality; and on spinal imaging 164 out of 256 (64.1%) had a significant abnormality.

Of 366 questionnaires, 278 (76.0%) were returned. Twelve

**HOW THIS FITS IN**



*What do we know?*

General practitioners and hospital specialists requesting imaging investigations have similar diagnostic yields.

*What does this paper add?*

Direct access neuroimaging for GPs, if appropriate guidelines are in place, has a good diagnostic yield and influences the management of most referred patients.

were incomplete, therefore the number of questionnaires analysed was 266. Waiting times for CT remained constant, with a 13-day median wait and interquartile range (IQR) of 11 to 14 days. For MRI, the median wait rose markedly from 13 days (IQR = 10–16) in the first six months to 32 days (IQR = 20–45) in the second six months. The monthly referral rate for MRI rose from an average of 15 per month in the first six months of the service, to 30 per month in the second six months, to 57 per month in the third six months; waiting time rose accordingly. GPs' attitudes to waiting times are summarised in Table 2.

Of 266 patients, 138 (51.9%) were referred to a hospital specialist. In 27 (10.2%) patients, neuroimaging did not alter planned management. In 11 (4.1%) patients, the referral speciality was changed by the neuroimaging result. There were 38 (14.3%) patients who had negative examinations but who were referred anyway. GPs indicated that the result provided reassurance during the wait for a routine outpatient attendance. Hypothetically, had the open-access service not been available, GPs stated they would have referred 239 out of 266 (89.8%) patients to hospital.

With regard to receipt of the radiologist's report, GPs considered a median average of five working days as preferable, but that seven working days was acceptable. The report was received within an acceptable time in 247 out of 266 cases (92.9%).

## Discussion

Open-access neuroimaging has a high diagnostic yield but radiological abnormality is not the only criterion on which an open-access service should be judged. The open-access service was considered by GPs to influence management in 90% of patients and, in up to 30%, hospital referral may have been avoided (according to the response to the hypothetical scenario where service was not available). A diagnostic yield of 64% for spinal imaging indicates a high prevalence of degenerative spinal disease in the population and appropriateness of referrals. This proportion of positive examinations was higher than in the pilot study.[2] However, the current study includes two categories not regarded as significant in the initial report; severe degenerative changes for age (15) and marked foramenal narrowing in the cervical spine (11). If these 26 patients are removed then the proportion of abnormal spinal examinations is 50% — similar to the 44% reported previously and similar to the yield from hospital referrals.[2] The proportion of significant abnormalities on cranial imaging (14%), although lower, was similar to previous

*Table 1: Diagnostic yield of the GP open-access neuroimaging service*

| | CT | | | MRI | | |
|---|---|---|---|---|---|---|
| Area examined | No significant abnormality *n* (%) | Significant abnormality[a] *n* (%) | Abnormality | No significant abnormality *n* (%) | Significant abnormality[a] *n* (%) | Abnormality |
| Brain (25.4% of studies) | 66 (86.8) | 10 (13.2) | 2 strokes, 4 cerebral metastases, 1 glioma, 1 gross atrophy, 1 osteoma, 1 BIH[b] | 17 (85) | 3 (15) | 2 demyelination, 1 stroke |
| Cervical spine (12.7%) | – | – | | 24 (50) | 24 (50) | 12 significant root compression, 9 significant disc prolapse, 3 severe central canal stenosis |
| Thoracic spine (2.4%) | – | – | | 7 (77.8) | 2 (22.2) | 1 osteoporotic collapse, 1 metastasis |
| Lumbar spine (52.6%)[c] | 3 (42.9) | 4 (57.1) | 2 severe canal stenosis, 2 significant disc prolapse | 58 (30.2) | 134 (69.8) | 76 significant disc prolapse, 21 canal stenosis, 15 root compression, 15 advanced degeneration for age, 3 spondylolisthesis and root compression, 2 osteoporotic collapse, 2 metastases |
| Other (6.9%) | 11 (84.6) | 2 (15.4) | 1 liver metastasis, 1 severe sinusitis | 10 (76.9) | 3 (23.1) | 1 nodal mass in neck, 1 severe sinusitis, 1 anal tear and fistula |

[a]A significant abnormality was defined as a radiological abnormality likely to lead to a direct change in patient management or that adequately explained the presenting symptoms and signs. [b]Imaging features consistent with benign intracranial hypertension. [c]Lumbar MRI made up 68% of all MRIs.

*Table 2. Waiting time for open access neuroimaging beyond which GPs considered the delay made the service not worthwhile.*

| | Maximum acceptable waiting time | | | |
|---|---|---|---|---|
| | 4–6 weeks | 6–8 weeks | 8–12 weeks | >12 weeks |
| CT | 30% (33/112[a]) | 25% (28/112) | 36% (40/112) | 10% (11/112) |
| MRI | 15% (17/113) | 18% (20/113) | 40% (45/113) | 27% (31/113) |

[a]112 GPs responded to this question for CT and 113 for MRI.

reports for both GPs and hospital practitioners.[2,5] It was reassuring that extending the service did not dilute diagnostic yield.

Some patients presenting with low back pain will be referred initially for lumbar radiographs — a high-dose examination typically equivalent to 1.3 mSv (equivalent to 65 chest radiographs or seven months' background natural radiation). These radiographs confer little benefit[6] and can largely be replaced by MRI, which uses no ionising radiation, has no known biological hazards in clinical imaging but provides an enormous improvement in diagnostic information.

In summary, an appropriately supervised regional open-access neuroimaging service has a high diagnostic yield and appears to influence the management of many patients.

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