Prevalence of clinically significant radiological abnormalities in people with first episode psychosis

Magnetic resonance imaging (MRI) can be used to identify secondary psychoses caused by structural brain abnormalities, which may require different treatment from primary psychoses[1]. However, there is no international consensus as to whether MRI should be routinely offered in first episode psychosis[2-5]. We examined MRI radiology reports in a large sample of people with first episode psychosis, drawn from the South London and Maudsley NHS Foundation Trust Biomedical Research Centre Case Register. We determined the clinical significance of MRI scans by assessing the proportion of patients with a scan that was abnormal, and the proportion of scans that led to a change in the clinical management.

The study population comprised all patients who received a first diagnosis of a psychotic disorder within a 14-year period (from January 1, 2007 to June 30, 2021). In those who underwent MRI in an 18-month window around the index diagnosis, we determined the indication for the scan, the results of the scan, and any subsequent change to clinical management. The project was approved by the Oxfordshire Research Ethics Committee (23/SC/0257).

We categorized indication for MRI as: cognitive impairment (including suspected dementia), head injury, neurological features (for example, focal neurological signs or seizures), headaches, suspected encephalitis, suspected space-occupying lesion (including suspected brain metastases), hyperprolactinaemia, other atypical presentation (such as unusual age of onset or rapid onset), routine screening, and not specified. An MRI was coded as "normal" if this was specified in the radiology report, or if the findings were described as "within normal limits", a "normal variant", "no abnormality detected", "normal for age" or words to this effect. When abnormalities were reported, we specified the finding and grouped them following the classification used in the meta-analysis by Blackman et al[6]. The broad categories comprised atrophy, cyst, pituitary abnormality, tumour, vascular abnormality (excluding white matter), ventricular abnormality, white matter abnormality, or other.

We used logistic regression to examine the association of indication for the scan with having an abnormal result. The same approach was used to examine the relationship between indication and a subsequent change in clinical management. Covariates included in these models were age, ethnicity, gender, and primary diagnosis. All statistical analyses were carried out using R statistical software version 4.3.0, and the glm function was used for the logistic regression models.

We identified 23,953 patients with a first diagnosis of psychosis, 1,693 of whom (7.1%) were referred for an MRI within the 18-month window around the index diagnosis. The most common indication for the scan was routine screening (n=615, 41.4%), followed by other atypical presentation (n=184, 12.4%) and cognitive impairment (n=162, 10.9%). The indication was "not specified" in 279 cases (18.8%) (see also supplementary information).

Radiological reports were available for 1,486 patients. Those with an abnormality were 380 (25.6%). Any white matter abnormality was found in 206 patients (13.9% of all scans), any atrophy in 101 (6.8%), any vascular abnormality in 71 (4.8%), any cyst in 31 (2.1%), any ventricular abnormality in 18 (1.2%), any pituitary abnormality in 17 (1.1%), any tumour in 10 (0.7%), and any other abnormality in 28 (1.9%). Among patients whose indication for MRI was routine screening, 91 (14.8%) had an abnormal scan (see also supplementary information).

Compared to routine screening, clinical indications of suspected space-occupying lesion (odds ratio, OR=5.3, 95% CI: 2.2-12.9), suspected encephalitis (OR=3.2, 95% CI:1.3-7.2), neurological features (OR=2.6, 95% CI: 1.5-4.4), cognitive impairment (OR=2.1, 95% CI: 1.3-3.3) and other atypical presentation (OR=1.9, 95% CI: 1.2-2.9) were associated with an

abnormal scan in the adjusted model (see also supplementary information). Of the covariates modelled, only age was associated with an abnormal MRI (OR=1.06, 95% CI: 1.05-1.07).

In total, 137 (9.2%) of scans were followed by a change in clinical management, including referral to another specialty (n=60), change in diagnosis (n=36), and further investigations (n=34). In the subgroup of patients who had a change in management following a routine screening MRI (n=28), 13 were referred for further investigation and 13 were referred to another specialty. However, none of these routine screening cases were associated with a change of diagnosis or identification of a secondary cause for psychosis.

In the adjusted model, indications of suspected encephalitis (OR=4.1, 95% CI: 1.3-11.3), neurological features (OR=3.5, 95% CI: 1.7-6.9), suspected space-occupying lesion (OR=3.2, 95% CI: 1.0-8.8), head injury (OR=2.8, 95% CI: 1.0-6.8) and cognitive impairment (OR=2.6, 95% CI: 1.4-5.0) were associated with a change in clinical management (see also supplementary information). Of the covariates modelled, only age had a statistically significant effect, with each increasing year of age being associated with a change in management (OR=1.04, 95% CI: 1.03-1.06).

The proportion of patients with radiological abnormalities was remarkably similar to that found in a meta-analysis of MRI data based on patients with first episode psychosis (26.4%)[6]. However, in the present study, the proportion of scans that led to a change in clinical management was higher (9.2%) than in that meta-analysis (5.9%). This may reflect differences in the patient populations; notably, around half of the studies included in the meta-analysis were based on research cohorts, and all excluded patients with clinical features suggestive of a secondary cause of psychosis[7]. Although previous studies of radiological findings in psychosis have examined whether these led to a change in management, they did not report the changes in detail. By accessing clinical records in a large sample, the present study was able to determine why each scan had been ordered and what actions, if any, were taken in response to the radiology report.

Scanning in the absence of a specific indication ("routine screening") was not associated with any diagnostic changes and did not identify any secondary psychoses. The latter finding is consistent with data from a study of routine MRI screening in first episode psychosis (n=349), which also failed to identify any cases of secondary psychosis[8]. These data suggest that the likelihood of detecting secondary causes of psychosis in the absence of a clinical indication for MRI is small[9]. However, this may depend on the quality of the clinical evaluation: a detailed history and examination may not be feasible in busy services with limited resources, or if the patient is difficult to assess.

Uncertainty about the prevalence of clinically relevant radiological abnormalities in people with first episode psychosis underlies a lack of consensus on the clinical utility of MRI in the clinical assessment of this population. The present study, the largest to investigate this issue to date, indicates that around 9% of scans in these people are followed by a change in clinical management, supporting the use of MRI as part of the initial assessment of people with first episode psychosis.

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