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Editorial

Brain imaging in psychiatric disorders: target or screen?

Thomas Rego and Dennis Velakoulis

Summary

There is currently debate about when a clinician should consider neuroimaging for patients with a known psychiatric illness. We consider this topic and propose a set of 'red flags' to use to aid decision-making.

Declaration of interest

None.

Keywords

Imaging; psychotic disorders; organic syndromes; neuropsychiatry; neuroimaging.

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Findings in Beyer *et al*'s population study on brain imaging

The population study from Beyer and colleagues[1] examines a cohort of psychiatric patients referred for brain scanning for a range of clinical indications. The study demonstrates a much higher frequency of relevant pathology (31.8%) than previously shown in screening studies. The increased prevalence is related to increasing age and diagnosis, particularly dementia and head trauma. The study suggests that patients referred for imaging with clinical indications have higher rates of pathology than the rates seen in healthy populations.

The strengths of the study lie in the large number of clinically identified patients (2922) from a single site over a 10-year period. The study has several limitations including the reliance on clinical reports and the absence of a healthy control group with the authors relying on published control data from previous studies for comparison. Finally, patients underwent either magnetic resonance imaging (MRI) or computed tomography (CT), which limits the interpretation of the findings. This is of relevance for example when considering that the most commonly identified pathology was white matter lesions, which may not be seen on a CT scan. Like previous studies in this area, the authors recommend that imaging in psychiatric populations is indicated especially in the presence of specific neurological symptoms.

Use of brain imaging in first-episode psychosis

So when should a clinician consider brain imaging in patients with a psychiatric presentation? Despite decades of brain imaging studies (MRI, CT, positron emission tomography, single photon emission computed tomography) in primary psychiatric disorders (excluding the dementias) brain imaging disappointingly has failed to provide clinicians with diagnostic information. Brain imaging, particularly structural imaging, remains a means of excluding brain pathology.

This question has been particularly considered in first-episode psychosis populations. Past studies[2,3] have looked at the percentage of scans that yield a result of clinical significance and demonstrated little difference in rates of abnormal findings compared with normal controls.[4] In Beyer *et al*'s study,[1] they demonstrate that the higher rates of scan abnormalities are seen in older populations. Paradoxically, while these (and other) findings suggest that brain imaging is most likely to be of clinical benefit in older patients, clinical guidelines for imaging in psychiatry predominantly refer to the first-episode psychosis population. Structural neuroimaging remains part of the work up for first-episode psychosis in the Canadian Psychiatric Association Clinical Practice Guidelines (2005);[5] however, it is specifically not indicated in the UK National Institute for Health and Care Excellence guidelines produced in 2008.[6] Updated American Psychiatric Association guidelines[7] published in 2010 and Royal Australian and New Zealand College of Psychiatrists guidelines[8] published in 2016 recognise that opinion is divided on structural neuroimaging at baseline and recommend imaging if clinically indicated by an unusual pattern of illness or neurological signs. There are no similar guidelines for patients with established psychiatric illness who display a change in clinical presentation, or new signs and symptoms.

Red flags for considering neuroimaging

Based on Beyer *et al*'s population study including consecutive referrals from a psychiatric service, it appears a set of 'indicators for neuroimaging' are needed. Pre-test probability is important when neuroimaging is considered, particularly with increasing age or change in symptoms/presentation. We propose a set of 'red flags' to use when considering whether neuroimaging is indicated in patients with known psychiatric illness.

(a) Neurological signs or symptoms.
(b) Pre-existing neurological condition or brain pathology.
(c) Significant change in presentation.
(d) Family history of neurological disorders.
(e) History of head injury.
(f) Seizures.
(g) Acute onset or delirium-like picture.
(h) Prior to electroconvulsive therapy.

With decreased cost and time required for imaging, particularly in the case of MRI, the increased availability of scans makes it a much more pragmatic option. We advocate that imaging should be performed to identify pathology in psychiatric populations where one of the above indications exists. This should go hand-in-hand with other measures to improve physical health and aim to improve life expectancy for those with major mental illness. Further cost–benefit analysis is needed particularly with reduced time and cost of MRI, as well as discussion of liberal versus strict referral practices.

Additional challenges

There is also the question of diagnostic overshadowing, in the patient who has had a 'screening' scan for first-episode psychosis but presents with a change in presentation or new signs and symptoms. Treating psychiatrists will not want to miss the new pathology, however, discerning neurological symptoms in a patient with thought disorder or acute agitation is challenging.

What of the patient who simply cannot be examined for neurological signs, such as a patient in a manic phase refusing examination, or an older person with depression or dementia who will not cooperate with neurological examinations – many of which rely on active participation. These would need to be considered on a case-by-case basis and Beyer and colleagues have been able to shed some light on the pre-test probability.

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