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Neuroimaging referral for reassurance in evaluation of headache with low-risk features

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ABSTRACT A clinical decision report using:

Howard L, Wessely S, Leese M, et al. Are investigations anxiolytic or anxiogenic? A randomised controlled trial of neuroimaging to provide reassurance in chronic daily headache. *J Neurol Neurosurg Psychiatry*. 2005;76(11):1558-1564.

<https://doi.org/10.1136/jnnp.2004.057851>

for a patient with daily headache.

Keywords: *neuroimaging, reassurance, headache, referral, nonacute, low-risk*

Clinical-Social Context

Noah Alexandre (pseudonym) is a 49-year-old man who presents to clinic with the chief complaint of headache that has bothered him for 4 months. He has history of depression, anxiety, hypertension, coronary artery disease, and myocardial infarction 1 year prior to his visit. Mr. Alexandre works as a repairman for the facility at which the clinic is located, which makes it easy for him to book appointments and follow up with his physicians.

Mr. Alexandre has had similar headaches in the past. However, they were usually not this frequent nor quite as bothersome, which has been causing him anxiety. Given his risk factors and previous myocardial infarction at a young age, he was worried that this time it could be a stroke or another serious cause. Mr. Alexandre's headache began gradually about one month ago. It is throbbing in quality and constant with infrequent periods of relief. Mr. Alexandre's headache is bilateral and frontal in origin, radiating to the occipital region and neck. He has tried acetaminophen without relief. He denies nausea, vomiting, and dizziness. Mr. Alexandre describes the severity as 7/10 but emphasizes that it has not been bad enough to limit his everyday activities or his productivity at work. It has also not affected his sleep, but it bothers intermittently throughout the day. Although he bears it, it makes everything more uncomfortable and distressing than it needs to be.

Mr. Alexandre informed us that he does not believe that his headache is a migraine because his daughter has migraines and he "knows what they look like". His neurological exam was unremarkable and there was no tenderness to palpitation in the head or neck area. His blood pressure has been under control (133/84 this visit) and he has been feeling well despite his headache, which he describes as the only current source of significant stress in life. His depression is also under control with medication and psychiatric follow-up. Given the description of his headache and lack of typical alarm symptoms, Mr. Alexandre's clinical picture suggests a tension-type headache.

Although not clinically indicated for headaches without danger signs, neuroimaging was considered. We wanted to reassure our patient, who is in mild distress and has history of anxiety and mood disorder. We were also mindful

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that Mr. Alexandre works in the building. He was wearing his uniform during the encounter and told us how easy it was for him to use recommended hospital services, as he could simply “pop in” during a long lunch break.

Clinical Question

Should neuroimaging be offered to reassure a patient with history of anxiety who presents with headache that lacks clinically concerning features?

Research Article

Howard L, Wessely S, Leese M, et al. Are investigations anxiolytic or anxiogenic? A randomised controlled trial of neuroimaging to provide reassurance in chronic daily headache. *J Neurol Neurosurg Psychiatry*. 2005;76(11):1558-1564.
<https://doi.org/10.1136/jnnp.2004.057851>¹

Description of Related Literature

A PubMed advanced literature search began by searching the words (neuroimaging) AND (headache). This yielded 5,455 results. Adding the filter “clinical trial” yielded 159 results. Adding the search term (reassurance) with the same filter yielded a single result, which was considered for appraisal.¹

A broader search was initiated on Google Scholar by typing “neuroimaging headache reassurance” into the search bar. This yielded 6,190 results, which were sorted by relevance. The first 100 results were reviewed. The first result was Howard et al.¹ It appeared twice more, on page 3 and page 6 of the search results. Of the remaining results, 33 pediatric articles were excluded. Other results that were excluded were literature reviews, guidelines, unrelated clinical trials, chart reviews, letters, surveys, cross-sectional studies, expert opinions, and case series. Only two results remained, both of which were prospective studies.^{2,3}

Rua et al. compared the costs of referral to Neurology and direct referral to MRI for headache patients. These groups were not randomized and were instead based on the recommendation of a general practitioner on a case-by-case basis. Difference in patient satisfaction between the two groups, which was based on a non-validated questionnaire, was also assessed.² Sempere et al. investigated the frequency of intracranial lesions in nonacute headache patients. Although this may provide insight into the utility of neuroimaging for low-risk headaches, there was no group that did not undergo neuroimaging.³ Both articles were reviewed for appraisal, but ultimately excluded due to the nature of their methods, which lack randomization. Moreover, they each lacked a proper negative control group that did not receive any type of referral or intervention aside from typical, nonacute headache treatment.

Howard et al. is a randomized control trial that investigates whether the offer of neuroimaging is effective in reassuring patients with chronic daily headaches.¹ The use of randomization and a negative control group of patients that were not offered neuroimaging or another type of referral set it apart as the superior study. In addition, Mr. Alexandre meets most of the inclusion criteria, which required patients with headache that did not have clinical justification for neuroimaging. Furthermore, the evaluation of multiple outcomes, which include health anxiety and healthcare costs, is highly relevant to the clinical question as it pertains to a holistic approach for Mr. Alexandre.

The Grade of Recommendation for neuroimaging for patients with chronic daily headaches is B, based on few quality patient-oriented studies.⁴

Critical Appraisal

Howard et al. designed a randomized control trial to evaluate if brain MRI effectively reassures patients with chronic daily headache (CHD).¹ New patients presenting to a London headache clinic who met criteria were recruited by the clinic director. CHD, as defined by the researchers, is a headache that occurs at least 15 days per month for more than 6 months. Excluded were patients with headache that had clinical justification for neuroimaging aside from only providing reassurance, as well as patients with medical

contraindication to MRI scan. Mr. Alexandre meets most of the criteria for this study apart from headache duration; his headache had been present for only 4 months. Patients who met criteria were asked to consent to participate in interviews and follow up questionnaires, which were administered by a research assistant. Patients were then randomized to be offered MRI scan. Post-randomization consent was obtained only in the MRI group because patients who were asked to consent but not offered an MRI might become more anxious and less reassured, which potentially affects patient wellbeing as well as outcomes. The study was stratified so that patients with possible anxiety or depression, determined by a cutoff point of 11 on the Hospital Anxiety and Depression Scale (HADS), were randomized separately.

The study had an adequate sample size of 150 patients, but 77% were female and the mean age was 36 (SD 12.4). Although this is not an ideal representation of Mr. Alexandre's demographic, the stratification of HADS positive patients (44%) allows for a more specific interpretation of results. Based on Mr. Alexandre's known history of depression and anxiety, it is reasonable to assume that he would have screened HADS positive.

Primary outcomes following MRI referral were health anxiety, use of health services, and healthcare costs. Health anxiety was measured by 3 standardized questionnaires, including the visual analogue scales, Likert scales, and the Health Anxiety Questionnaire. Use of services and costs were measured with a modified version of the Client Service Receipt Inventory. Secondary outcomes were aimed to be supplemental to the understanding of patients' physical, mental, and emotional status with the use of two more standardized questionnaires (Revised Illness Perception Questionnaire and Medical Outcome Study Short Form 36), as well as a standardized headache index. These instruments were utilized again at 3 months and 1 year follow up by a second research assistant, who was blinded to MRI referral status.

The study used independent statisticians to evaluate the results, which demonstrated that patient anxiety levels were unaffected by offer for MRI regardless of HADS status. However, HADS positive patients offered MRI used fewer health services the following year compared to HADS positive patients who were not offered a scan, which also correlated with a reduction in healthcare costs for the former. This was not true of the HADS negative groups, suggesting that patients such as Mr. Alexandre with significant psychiatric comorbidity are more likely to benefit in this respect, despite not feeling subjectively reassured. The results also showed that one third of HADS positive patients without MRI referral had scans done elsewhere in the following year.

The use of several standardized measures was a significant strength of this study, which at least partially addresses the difficulty of accurately determining level of reassurance. In addition, it effectively blinded researchers following intervention. However, the intervention in this study limits it from the possibility of being truly double-blinded. Although patients not offered an MRI were not aware that it was a possibility, outcomes are based on the MRI group being aware of the offer. Finally, 36% of patients were lost to follow-up by the 1-year mark. This likely introduces attrition bias, as patients with worse psychological outcomes may have been more likely to drop out. This study provides level 2 evidence based on SORT criteria, with follow up of <80% preventing it from reaching level 1.⁴

Clinical Application

Noah Alexandre is a 49-year-old man with history of anxiety and depression whose presenting symptoms are mostly consistent with inclusion criteria in Howard et al. That is, his headache occurred at least 15 days per month and would not normally warrant referral for neuroimaging based on its clinical features. The one exception is total duration. Inclusion in the study required headache of at least 6 months, while Mr. Alexandre had symptoms for 4 months.

The results of the study did not produce a clear answer to the clinical question, but they provide key information to consider. Essentially, there is no evidence that referral for neuroimaging would reduce Mr. Alexandre's level of anxiety. However, there is evidence to suggest that it may reduce his use of healthcare services, as well as his total healthcare costs. Although this provides insight for clinical decision-making, it is important to note that we cannot be certain that Mr. Alexandre would have screened HADS positive, despite his psychiatric history and illness anxiety. This is a particularly important assumption, as there was no significant reduction in use of services and cost between intervention groups in HADS negative patients.

As mentioned, Mr. Alexandre works as a repairman in the hospital. It is difficult to say how much his work environment within the healthcare system affects his perspective and anxiety levels. What is clear is that it facilitates his ease of receiving recommended healthcare services. We fortunately did not have to worry as much about Mr. Alexandre losing significant time from work. We ultimately offered Mr. Alexandre a CT with the possibility of MRI if the initial scan was negative, which it likely would be. Considering both, the mixed results of the study and factors specific to Mr. Alexandre, this was ultimately a reasonable decision.

New Knowledge Related to Clinical Decision Science

Medical practitioners generally agree on avoiding unnecessary tests. Not only do they increase costs for health systems, but they potentially promote certain expectations in patients. However, we must holistically balance the pros and cons of doing so on an individual basis. Mr. Alexandre did not have a history of illness-specific anxiety or requesting unnecessary tests prior to his myocardial infarction. We empathized with his perspective and considered his particular situation. Given his cardiovascular risk factors, the occurrence of a subacute vascular event was not impossible. The more likely benefit is that referral for neuroimaging may have prevented him from repeatedly seeking out unnecessary services in the future. A variety of clinical situations are associated with anxiety, not just headaches. Clinical Decision Science allows us to ask about the potential positive effects on reassurance versus further diagnostic testing for similar decisions.

Anxiety is a shared social phenomenon. Clinical Decision Science forces us to ask how much diagnostic testing is done because the doctor has anxiety—specifically about missing a potentially important diagnosis. We should also understand that there is probably a variation in both patients' and doctors' perspectives about risk behaviors.

Conflict Of Interest Statement

The author declares no conflicts of interest.

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