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Prevalence of common mental health disorders in adults who are high or costly users of healthcare services: protocol for a systematic review and meta-analysis

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ABSTRACT

Introduction In all healthcare settings, a small proportion of patients account for a large level of healthcare use and associated high healthcare costs. Depression and anxiety are common co-morbidities in patients who are high users of care. The aims of this systematic review are to: (1) estimate the prevalence of anxiety/depression in adults who are high users of general physical healthcare services and/or who accrue high healthcare costs (2) estimate the magnitude of healthcare use associated with the presence of anxiety/depression.

Methods and analysis This review will include any studies where patients are high users of primary, secondary or emergency healthcare services and/or accrue high healthcare costs. This is the first systematic review to focus on patients who are over the age of 18, whose degree of anxiety/depression has been evaluated with a standardised questionnaire or by a clinical interview generating a diagnosis according to international diagnostic criteria. The review will include eligible studies indexed in Medline, PsychINFO, Embase, Cumulative Index to Nursing and Allied Health Literature, Prospective Register of Systematic Reviews, Cochrane Library from inception to 1 April 2019. We will estimate the prevalence of anxiety/depression in these populations and the magnitude of use associated with anxiety/depression across various general physical healthcare settings. We will provide a narrative description of findings and factors that may influence them. A meta-analysis may be pursued if the degree of heterogeneity across studies is acceptable.

Ethics and dissemination This systematic review will use data from existing studies, hence no ethical approvals are required. Findings will be disseminated in a peer-reviewed publication and at relevant academic meetings.

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INTRODUCTION

The cost of healthcare in developed countries has continued to grow over the recent years, and the current projected trajectories of growth are unsustainable.[1] This situation is particularly severe in the USA, where the cost of healthcare is nearly twice that of most other developed countries.[1 2] Across healthcare systems, a small proportion of patients account for a large proportion of healthcare use and cost.[3] These findings have consistently emerged from studies of general practice (GP) attendances,[4] inpatient length of stay,[5 6] outpatient appointments[7] and emergency department (ED) services.[8–10] In primary care, approximately 10% of 'frequent attenders' account for up to 39% of all consultations.[11] In the USA, approximately 5% of patients account for about 50% of all US healthcare spending.[12]

It has been suggested that approximately 50% of high users of healthcare in primary and secondary care have significant mental health problems, either alone or, in addition to physical health needs, and have been

Strengths and limitations of this study

► This systematic review will include both studies of high healthcare use and/or high healthcare costs.
► It will include studies undertaken in general physical healthcare settings—primary, secondary care and emergency departments.
► It will focus on studies that have specifically recorded the presence of depression and/or anxiety in the high cost/high use population studied, using standardised questionnaires or clinical interviews leading to a clinical diagnosis.
► We will provide a narrative summary of findings with sources of variation and bias based on a comprehensive data extraction framework, with relevant subgroup analyses and interpretations based on: country, type of healthcare system, location of study (primary, secondary care, emergency department or total healthcare) and way of recording depression/anxiety.
► A meta-analysis may not be feasible given a likely high level of heterogeneity in outcome definitions and measurements.

termed 'distressed high users'.[13] High use of healthcare services has been associated with a variety of mental health problems including multiple psychiatric diagnoses,[14 15] long histories of psychological ill health,[16 17] history of childhood abuse or neglect[18] or addictions.[19]

A recent systematic review of the general characteristics of high-cost patients found a high prevalence of multiple chronic conditions among this patient population.[20] Mental health problems were also common but varied according to the healthcare system. In US Medicaid, the prevalence of mental illness ranged from 30% to 75%, whereas in US Medicare, the prevalence was between 10% and 25%. One of the main findings of the review was that high-cost patients were more likely to have a mental health disorder. There were, however, no details as to the nature of mental health problems experienced by these high-cost patients, as data were grouped under a broad category of mental and behavioural disorders. This review will focus on patients with depression and anxiety disorders, as they are the most common form of mental disorder. We will focus on studies where depression and anxiety are identified through standardised questionnaires or by clinical interviews leading to a clinical diagnosis. Our review will provide information about the prevalence of depression/anxiety in both high-income and low-income countries and in different general physical healthcare settings, namely primary, secondary care and ED.

Several methods have been studied to try to improve the care of high-cost or high-use patients in the hope of reducing excessive or unnecessary healthcare use, but efforts to date have had mixed results.[21 22] Evidence suggests that effectiveness and efficiency of care improves when interventions are targeted to those who are most likely to benefit.[23 24] Specific interventions for treating depression and anxiety in people with comorbid physical health problems have shown promising results[25 26] but have not been targeted at high-cost patients with comorbid depression/anxiety.

Improved recognition of the association of depression and anxiety with high healthcare use and costs will enable treatments that have already been developed for depression/anxiety in physical disease to be evaluated in this high need/high cost group. Although there has been a general call for better integration of physical and mental health services, the treatment and management of comorbid depression/anxiety in chronic physical disease remains poorly managed.[27]

Our aim is to estimate the prevalence of anxiety/depression in adults who are high users of healthcare or accrue high healthcare costs and where possible to estimate the magnitude of use associated with anxiety/depression. Segmentation analysis has been suggested as a method to identify homogeneous groups of patients with similar characteristics, needs and behaviours to personalise treatment and policy.[28] We are specifically interested in depression and anxiety, as opposed to all mental health problems, as interventions have already been developed

to treat depression/anxiety when associated with physical disease. Such interventions could be used to target a subgroup of high-use/high-cost patients with the potential to improve their health and reduce healthcare use. Other forms of mental illness require other treatment approaches.

Aims

This systematic review will aim to: (1) estimate the prevalence of anxiety and/or depression in patients who are high users of healthcare or accrue high healthcare costs and (2) determine the magnitude of healthcare use/cost associated with the presence of anxiety and/or depression.

METHODS AND DESIGN
Population

This review will include studies focusing on adults aged ≥18 years, who are high users of healthcare services or accrue high healthcare costs and whose level of depression/anxiety have been evaluated through standardised questionnaires or clinical interviews. We include studies conducted in general rather than specialist physical health services, namely primary, secondary care and ED across all healthcare systems. We will not include studies with populations seen in the context of psychiatric or mental health services for a primary diagnosis of a psychiatric condition (ie, psychosis, schizophrenia) as the aim is to estimate the prevalence of anxiety/depression among high users of general physical healthcare services. We will not include specific medical specialties/illnesses associated with more frequent or costly healthcare use due to the nature of the condition or specialty (eg, surgery, paediatrics, palliative care, obstetrics, transplant, neurodegenerative diseases, oral and maxillofacial, dentistry, nephrology, infectious diseases, virology and HIV/AIDS studies, physiotherapy and cosmetic surgery).

We have focused on general hospital, ED and primary care services to ensure the review is relevant to as wide a population as possible. There is great variability in the way costs, healthcare use and depression/anxiety have been recorded in the literature. To add studies on individual disease conditions or specialities would considerably inflate the variability within the population of this review.

For studies of high-cost patients, we will include studies that have defined high-cost patients as being in the top 1st, 5th, 10th and 20th percentiles of the patient population.[20] For studies involving high use of healthcare, we will include studies that have either used similar percentiles to describe high use (ie, 1st, 5th, 10th or 20th) or have used a recognised definition of high or frequent use for the particular healthcare services. For ED, we will use the definition of four or more attendances per annum.[29] For primary care, we will use the definition of 10 or more attendances per year[30] or the top 10% of consulters.[31]

The review will include studies reporting costs and healthcare use. However, resource use and costs are sensitive to variability both within and between countries due to aspects such as local prices or aspects of service organisation and delivery. This may limit the generalisability and transferability of estimates of cost and healthcare across settings. We will not attempt to combine costs or health use in the analyses across studies. The prevalence of depression or anxiety will be compared across studies. To determine the magnitude of healthcare use associated with depression/anxiety in high-use/high-cost patients, we will estimate the healthcare used by depressed and non-depressed individuals. If sufficient studies report similar effect measures (eg, odds ratio ORs, relative risk, incidence rate ratios) of the frequency of healthcare use in these patients,[32] they will be combined in a meta-analysis, consistent with current recommendations.[33–35] Studies reporting different effect measures will not be combined, unless they can be transformed.[34 35]

Interventions

We will not include randomised controlled trials due to their selective nature. We will include cohort studies of naturalistic changes in health service delivery for example, implementation of a new integrated care pathway across a geographical region, where external validity is likely to be high.

Comparators

We will include studies where anxiety/depression is described in groups of patients considered 'high/frequent users' and/or 'high cost users' versus non-high cost and non-high users of healthcare services. We will include studies where high healthcare use/costs are compared between patients with anxiety/depression versus study patients without anxiety/depression.

Outcomes

The primary outcome is the prevalence of anxiety/depression in high/frequent and/or costly users of general healthcare services. The secondary outcome is the magnitude of healthcare use and costs associated with anxiety/depression. Studies including a diverse range of standardised assessments and metrics for anxiety/depression will be eligible. We will extract and report the prevalence of anxiety/depression based on the type of assessments used. For standardised, validated, self-report measures, this will be in the form of caseness. For clinical interviews, this will be in the form of a clinical diagnosis. Studies will be excluded if they do not meet our criteria for the assessment of anxiety or depression. A review concerning general mental health disorders has already been undertaken by Wammes et al.[20]

Study designs

We will include retrospective and prospective cohort studies, case–control, nested case–control and cross-sectional studies. We will exclude case studies, randomised controlled trials and qualitative studies.

Search strategy

We will screen the five databases that are most likely to include studies focusing on our outcomes of interest: Medline, PsychINFO, Embase, Cumulative Index to Nursing and Allied Health Literature, Prospective Register of Systematic Reviews, Cochrane Library, from inception to 1 April 2019. We will hand-search reference lists of relevant reviews/meta-analyses. For each database our search strategy has three parts (see search terms for Medline in online supplementary appendix 1). Search terms within the first part will identify studies pertaining to general healthcare settings of interest. The second part will focus on terms related to high cost or high/frequent use of healthcare services. The final part will focus the search on studies evaluating anxiety/depression. This strategy ensures we identify all studies (1) conducted across general healthcare settings such as primary, secondary care and ED; (2) which include measurements of healthcare use and/or costs (3) and assess anxiety/depression. We will not be able to include studies that do not quantify either healthcare use or costs and studies that do not quantify anxiety/depression. This strategy ensures we include cohort studies describing the characteristics of high-use and/or high-cost patients and case–control studies where (1) anxiety/depression is compared between high and low use and/or costs, as defined by the respective study or where (2) healthcare use/costs is compared between patients with high and low levels of anxiety/depression, as defined by the study.

The strategy was developed in collaboration with experts in these fields and experienced librarians at the universities of Birmingham and Manchester to ensure it yields appropriate studies. We will include studies in all languages; translations will be pursued either by coauthors or by international colleagues/students in the universities of Birmingham, Leeds and Manchester. The search will be restricted to studies with adults over the age of 18.

Eligibility screening

Eligible studies identified in all the databases will be organised using the EndNote reference management software. Duplicates will be identified and removed before screening titles and abstracts.

Study selection

Titles and abstracts will be screened independently by two reviewers. Remaining full-text articles will be further screened and evaluated for their eligibility using the adapted Hayden et al's framework[36] (see online supplementary appendix 2). Any disagreement over eligibility will be resolved through discussions with a third reviewer. The inclusion criteria checklist (table 1 and online supplementary appendix 2) ensures consistency in the review process and adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines[37]; we will provide a PRISMA

Table 1 Inclusion criteria checklist based on the PRISMA guidelines

Study designs	Cohort studies (retrospective and prospective). Case–control and nested case–control studies. Cross-sectional studies.
Participants	Adult aged ≥18 years. High user of healthcare. Accrue high healthcare costs. Assessment of anxiety/depression.
Comparators	Non-high cost and non-high users of healthcare. Frequent/high-cost users without depression/anxiety.
Outcomes	Prevalence of anxiety/depression in high users of healthcare and/or high-cost patients. Magnitude of cost or use of healthcare associated with the presence of anxiety/depression.

PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

flow-chart depicting the study selection and inclusion/exclusion process.

Quality assessment

The quality of the included studies will first be ensured through the robustness of our database search and the careful title, abstract and full-text screening of relevant studies, carried out independently by two reviewers using the forms in online supplementary appendix 2. We will only include studies reporting on high or costly users of healthcare where anxiety/depression is also assessed. All full-text studies meeting the eligibility criteria will undergo a quality assessment carried out independently by two reviewers through an adapted Newcastle-Ottawa Scale[38] (NOS; see online supplementary appendix 3). Assessment of study quality will include sampling method, sample size, adequacy of description of study population, attrition, method of outcome evaluation (eg, methods for recording costs/use; type of anxiety/depression measurements, whether they are validated for the setting and so on), analytical method and consideration of confounders/covariates. The adapted NOS quality assessment form will first be piloted on known papers to ascertain its feasibility. Opinion differences will be resolved by consensus or by involving a third reviewer. Risk of bias (including reporting bias) will be evaluated commensurate with recent recommendations for the narrative interpretation of variation in observational studies[34 35] and the recommendations of the Cochrane Collaboration.[39 40] Risk of bias will be reported in a categorical format, with 'yes' indicating high risk, 'no' low risk or 'unclear' for each predefined domain. We will describe the study quality and risk of bias for each study included in our review. For both low-quality and high-quality studies, we will provide a narrative description of definitions and measurements of costs and healthcare use and prevalence of anxiety/depression used across healthcare settings, regions and patient populations. If a meta-analysis can be pursued, we will run a sensitivity analysis to explore if outcomes change when removing low-quality studies. Through sensitivity analyses, we will also specifically explore the effects of excluding studies which have used non-validated measures of depression/anxiety in medically ill populations.

Data extraction

Following the selection of relevant full-text articles and quality assessment, two reviewers will independently extract relevant information in a data extraction form designed based on Hayden *et al*'s framework[36] (see online supplementary appendix 2); it will be developed iteratively and first piloted on five known papers, by two reviewers, before performing the data extraction for all studies.

The data extraction form focuses on the study design, population, comparator and outcome. It will include: year and country of study, type of healthcare system, criteria used to define high use or high costs, method used to record depression/anxiety (self-report measure validated or non-validated, clinical interview), prevalence of depression and anxiety, healthcare use, costs and associated ranges, the methods used to evaluate these, healthcare settings (eg, primary, secondary or ED or total healthcare use/cost, if reported as general metrics), healthcare use and cost estimates for depressed/anxious patients compared with non-depressed/anxious patients and patient characteristics (eg, comorbidities, whether anxiety/depression is managed). We will also record the presence and source of bias, including funding, given its potential association with reporting bias.[39 40]

DATA ANALYSIS AND SYNTHESIS

The primary outcome is the prevalence of anxiety and/or depression in patients who are high and/or costly users of healthcare services. Prevalence rates with any dispersion metrics will be extracted or calculated from the data available. Where enough studies are available for quantitative summaries (minimum two studies[41]), we will offer weighted estimates of prevalence within relevant subgroups related to populations, comparators, study designs, measurement types and geographical regions. Pooled prevalence estimates with 95% CIs will be calculated using SPSS V.25 (IBM Corp); where possible and warranted, estimate transformations and quantitative summaries will be pursued using R.[33]

The secondary outcome is the magnitude of healthcare use orcost associated with the presence of anxiety/depression. We are not attempting to pool or calculate costs or health use across studies. We will only be able to determine the magnitude of healthcare use associated with depression/anxiety in relation to studies that have

specifically calculated or estimated these. This will be studies where high healthcare use/costs are compared between patients with anxiety/depression versus patients without anxiety/depression. Outcome metrics (including ORs, relative risk, etc) and 95% CIs will be extracted from studies presenting the number of healthcare contacts (eg, ED attendances or GP contacts or number of hospital admissions) by subjects with and without depression.

We expect both the prevalence of depression/anxiety to be available from studies evaluating high-use/high-cost populations alone or in studies comparing high-use/high-cost patients to general patient populations or populations with low use/cost. Data analysis will result in quantitative and narrative summaries, as appropriate, based on current recommendations for the pooling of observational studies.[34 35] Whereas there is some published guidance on the number of studies necessary to ensure the power of the effect size estimates when pooling interventional studies,[32 42] there are no similar clear, agreed guidelines on the number of studies necessary for an appropriately powered meta-analysis of observational studies. We will offer a quantitative summary for any number of studies (2>) if combining their outcomes is clinically meaningful, if they report the same effect metrics or if transformations are possible.[34 35 41] We will comment on these pooled results in light of clinical practice and research significance and potential statistical issues that may decrease the generalisability of the effect estimates (eg, high level of heterogeneity, potential sources of bias). For both outcomes, subgroups will be explored quantitatively and narratively, as appropriate and depending on the type of effect estimates available, based on potential differences related to: (1) country, (2) type of healthcare system, (3) medical settings (eg, primary, secondary care, ED, inpatients, outpatients, etc) and (4) metrics used to evaluate health use/costs (eg, attendances, hospital admissions, etc). For instance, we expect to find studies that may only focus on frequent attendance at ED, primary care outpatient visits, number of bed days in secondary care or more generic attendance metrics across either of these healthcare settings. We will account for such differences in reporting, but we are not planning to compare outcomes across settings, just to record and estimate the magnitude of use/cost in each of these contexts.

We will use random-effects models to describe the prevalence of depression/anxiety high-use or high-cost populations. This is because it is implausible that the underlying study-specific prevalence of depression (ie, the prevalence that would be observed were a study of infinite size) is the same for each study. Prevalence is likely to vary from study to study according to factors, both measured and unmeasured, that differ between them.[43]

We will use the inverse variance method of DerSimonian and Laird to estimate between-study heterogeneity in underlying depression prevalence and the I^2 measure with associated 95% CIs, which represents the proportion of total variance attributable to this heterogeneity.[39 44] The I^2 measure gives the percentage of variability in the effect estimate that is due to heterogeneity rather than to chance. A rough guide to the interpretation of the I^2 measure suggests that I^2 <40% indicates low to no problems with heterogeneity, 30% to 60% indicates moderate problems, 60% to 90% indicates significant problems, whereas an I^2 of 75% or more suggests considerable problems.[42] If I^2 is less than 40%, we will consider the estimated effect to have a low degree of heterogeneity, but this will also be interpreted in light of the magnitude, direction of the effect and its 95% CI, sources of bias and clinical significance.[35 39 41 42]

Egger's statistics with 95% CIs and associated funnel plot will depict potential publication or small sample bias related to our main outcome summaries and/or within subgroups.[45] Egger's test is based on the Galbraith plot which is a plot of study difference over standarderror against 1/standarderror. Egger suggests calculating the regression of study difference over standarderror on 1/standarderror be undertaken to test the null hypothesis that the intercept is equal to zero. If Egger's test is significant (p<0.05), it means that the funnel plot is asymmetric and that smaller studies with smaller precision show larger effects sizes, suggesting bias. Sensitivity analyses will be pursued at minimum on high-quality/low-quality studies on the use of unvalidated standardised questionnaires and use of structured clinical interviews. If enough studies are available, other factors that could influence our observed findings will be explored (eg, sample size). Tabular and narrative descriptions will be offered for the studies which cannot be pooled into quantitative summaries due to differing metrics.

Patient and public involvement statement
Patients and the public were not invited to contribute to the writing or editing of this systematic review protocol. The research question was informed by the lack of prior systematic reviews or meta-analyses exploring the outcomes of interest: prevalence of anxiety/depression in highly/costly healthcare users and the magnitude of healthcare use associated with anxiety/depression across adult populations in any general medical settings.

DISCUSSION
The purpose of this systematic review is to estimate the prevalence of anxiety/depression in people who are frequent, high-cost users of general healthcare services, and then, if possible, to estimate the level of healthcare use associated with the presence of anxiety/depression. While evidence is available suggesting that a small percentage of the population accrues a high percentage of healthcare/costs, it is unclear to date to what extent the costs and use may be due to the presence of common mental health problems (depression/anxiety). By examining the information available to date, we aim to describe the prevalence of anxiety/depression in people who are highly/costly healthcare users and where possible the magnitude

of use or costs associated with these two common mental health problems.

Our review will build on the recent systematic review by Wammes and colleagues[20] that described the characteristics of high-cost patients and found that a high prevalence of high-cost patients had associated mental health disorders. This review will specifically focus on depression/anxiety and include both studies of cost and healthcare use. It will also provide information about the prevalence of depression/anxiety in different healthcare settings, including primary care and ED. There is a trade-off between diagnostic accuracy versus size of study. Our results will complement those of Wammes and colleagues[20] and increase our understanding of the role of depression/anxiety in driving healthcare use and costs.

Strengths of this review are that it focuses on common mental health problems, includes both studies of healthcare cost and healthcare use and includes general healthcare settings, including primary, secondary care and ED. Additional strengths are the inclusion of studies published in any language and the independent study identification, selection and data extraction pursued by two independent reviewers.

Implications of results

The results of this systematic review will provide an estimate of the prevalence of common mental health disorders in high users of healthcare services, while also providing an estimate of the magnitude of use associated with depression/anxiety. It will enable treatments, such as the collaborative care model, that have already been developed for the treatment of depression/anxiety in the physically ill, to be evaluated in high-cost patients with comorbid depression/anxiety resulting in a more personalised approach to both treatment and policy.

Ethics and dissemination

As this systematic review will use data from existing studies no ethical approvals are warranted; the results will bepublished in a peer-reviewed publication and presented at relevant academic meetings.

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