Equity of utilisation of cardiovascular care and mental health services in England: a cohort-based cross-sectional study using small-area estimation

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Scientific summary

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Scientific summary

Background

There is a general understanding that socioeconomically disadvantaged people are also disadvantaged with respect to their access to NHS care. Insofar as considerable policy effort and NHS resources have been targeted at deprived areas, it is important to better understand whether or not and why socioeconomic variations in utilisation exist, not least so that policy-makers are informed about what they can further do to address inequity.

This is the background to the project, which, reviewing the shifting policy context, proposes that any inequalities in the utilisation of NHS care are today likely to be complex. First, we hypothesise that the nature of inequality will vary according to clinical condition. For instance, given that the distribution of mental health problems is profoundly different from that of degenerative disease [and general practitioners (GPs) managing a high caseload of the former are likely to have a lower caseload of the latter], it is unlikely that any variation in access to GP services will have a similar effect across all clinical conditions. Second, we propose that inequalities in utilisation are likely to occur at different levels of the health-care system, depending on how people identify and assert their claims for health care, and how those claims are then acted on by health professionals. The relative mix of care can also influence patterns of use. For example, the effective management of health problems by GPs may result in lower demand for hospital care. Thus, it should not be presumed that inequalities characterise access and use uniformly. Third, there are other dimensions of inequality than socioeconomic status, such as age, sex and ethnicity, which may have been relatively neglected as a result of a prevailing concern with socioeconomic status. All of these factors suggest the need for a more nuanced understanding of variations in access and in use.

Aims and objectives

Against this background, the overall aim of this project is to examine variations in the use of NHS care with respect to two very different sets of conditions: cardiovascular disease (CVD) and common mental health disorders (CMHDs). We seek to explore the extent to which variations in use (a) reflect underlying health-care needs; (b) are characterised by systematic inequalities according to socioeconomic status, age, sex, ethnicity and rurality; and (c) occur randomly. We also seek to investigate variations in use relative to need at different points of the care pathway (i.e. presentation, primary management and secondary management of disease).

To this end, our objectives are:

- to review existing evidence of variations in access to and use of cardiovascular care and mental health services
- to build on existing techniques of small-area estimation in order to develop robust estimates of the prevalence of CVD and CMHDs in populations served by general practices, primary care trusts (PCTs) and Clinical Commissioning Groups (CCGs) in England
- to obtain, and apply to appropriate populations and population cohorts, health service utilisation data relevant to the health-care needs for which estimates have been produced, and thereby generate condition-specific use-to-need ratios
- to test the extent to which variations in the use of cardiovascular and mental health services (a) reflect underlying differences in the health-care needs of general practices, PCTs and CCGs; (b) relate to the sociodemographic, socioeconomic, ethnic and geographical characteristics of populations; and (c) occur randomly.

- to support service planning and delivery by disseminating, via Public Health England (PHE), estimates of health-care need for a variety of geographic and organisational units, namely lower-layer super output areas (LSOAs) and middle-layer super output areas (MSOAs), PCTs, CCGs, upper- and lower-tier local authorities (LAs), Strategic Health Authorities (SHAs) and regions.

Methods

Literature review

Objective
To search relevant literature for quantitative and/or qualitative evidence of inequality, specifically relating to variations in access to and utilisation of cardiovascular care or mental health services.

Inclusion criteria
Studies pertaining to the presentation, primary and specialist management of CVD and mental health; studies of any design (even when methodologically flawed, although this has been flagged); studies pertaining to the English NHS and published after 2004.

Exclusion criteria
Reviews of international studies where less than half of the reviewed evidence pertained to the English NHS; expert opinion articles, letters and editorials.

Search strategy
The following databases were used in the search: Applied Social Sciences Index and Abstracts, MEDLINE, PubMed, EMBASE, Social Sciences Citation Index (Web of Science). Cumulative Index to Nursing and Allied Health Literature, PsycINFO, SOCindex, EThOS (national thesis service), and a range of websites consulted for grey literature. Key phrase searching (with and without Boolean search functions), backwards and forwards citation tracking and hand-searching of key journals were used with multiple combinations of key phrases, terms relating to setting, access, type of service, type of disease and nature of inequality. The searches were carried out from September 2014 to February 2015. Data published between 2004 and 2014 were accepted for inclusion.

Retrieved literature
Thousands of potentially relevant hits were retrieved, most eliminated through consulting the title and abstract alone. A total of 123 studies were included that had investigated inequalities in access to CVD services and 101 studies were included on mental health services. These were summarised according to stage on care pathway (presentation, primary management, specialist management) and dimension of inequality.

Development of prevalence estimates
The approach adopted involves a 'bottom-up' estimation of population-level disease prevalence through the aggregation of modelled individual-level disease risk estimates. Thus, large-scale survey data sets are interrogated to model the likelihood that different 'person types' will exhibit or develop particular diseases. Person types are defined in terms of the level of deprivation of the area in which they live as well as with respect to their sociodemographic characteristics, and the resulting disease likelihood risks are attached to all such individuals in all populations for which prevalence estimates are required. Forging an appropriate link between survey data and census data is crucial, with survey-based models being constructed using only variables that are also available in the 2011 census. 2011 census multivariate tables provide evidence on the sociodemographic composition of small areas (LSOAs and above), but not in sufficient detail.
A form of iterative microsimulation has thus been developed in order to derive a full description of the composition of local populations. Individual disease risk estimates are then used to predict, mediated by a Bernoulli trial, whether or not each individual in each area has or does not have a particular disease, and

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the number of people predicted to have the disease, divided by the denominator population, provides the prevalence rate estimate. Estimate uncertainty is captured by taking bootstrap ('with replacement') samples from the original survey data set and then replicating the entire process all the way to local area estimation. Having generated multiple bootstrap-based estimates, summary data are extracted to describe the nature (mean and 95% confidence interval) of the resulting estimate distributions. Summary data have been produced for 12 age–sex defined cohorts, as well as for overall populations, across all English LSOAs, MSOAs, upper- and lower-tier LAs, regions, general practices, PCTs, CCGs and SHAs. Many of these data are to be disseminated via PHE's 'Local Health' website.

Analysis of variations in use relative to need

Variations in use have been explored relative to modelled prevalence with respect to presentation [Quality and Outcomes Framework (QOF)-recorded prevalence]; primary management [rates of prescribing by *British National Formulary* code/category, Programme Budget Category (PBC) expenditure on prescribing and, in the case of CMHDs, community management]; and specialist management (elective and emergency admissions, specific procedures and PBC secondary expenditure). Using linear regression modelling (in which stepwise parameter selection was used to identify significant predictors of per-capita utilisation), the percentage variation in the utilisation of health-care services explained by (a) estimated underlying need, (b) socioeconomic deprivation, (c) percentage of population Asian, (d) percentage of population black, (e) percentage of adult population < 50 years old and (f) percentage of rural population has been explored at CCG, PCT and practice levels.

Results

Literature review

A larger proportion (35%) of studies of variations in access to and use of CVD had explored inequalities by socioeconomic status than by other social characteristics. In mental health studies, the largest proportion (35%) of studies had explored inequalities by ethnicity. According to reviewed studies, older age and female sex are the key dimensions of inequality with respect to CVD care; and older age and non-white ethnicity are the key dimensions of inequality with respect to access to and use of mental health services. For both CVD and mental health, very significant unexplained geographical variation exists in access and use, which is strongly suggestive of a 'postcode lottery'.

The reliability of the Plymouth needs estimates

Cardiovascular disease

A total of 24 prevalence estimates have been produced for CVD. Those for diabetes (a risk factor for CVD), coronary heart disease (CHD), hypertension and stroke were compared against health service utilisation data. These are better predictors of variations in QOF registration rates than existing equivalent PHE estimates. Moreover, whereas the Plymouth prevalence estimates are invariably incorporated as explanatory factors in linear models of variations of service use (and usually as the single most important factor), the PHE estimates behave erratically.

Mental health

A total of 41 potential 'markers of mental health needs' were identified, resulting in a wide diversity of prevalence rates. All perform poorly as predictors of the number of patients GPs identify as having depression (and, therefore, the number they place on the QOF Depression Register). This may suggest that the way in which people respond to questions about their mental health undermines the use of the resulting data for predictive purposes. However, modelled prevalence rates were more effective at predicting CCG-level variations in community mental health, Improving Access to Psychological Therapies and secondary mental health services. This suggests that QOF registration may not provide useful information, presumably because of variations in GP case finding. The Plymouth estimates explain a greater proportion of variation in health service use than do existing North East Public Health Observatory estimates.

All of the Plymouth needs estimates will be publicly available (via PHE) at a range of spatial scales (LSOAs, MSOAs, LAs, general practices, PCTs and CCGs).

Analysis of variations in use relative to need

Cardiovascular disease

Underlying prevalence rates explain (% R^2) between 62.1% (diabetes) and 87.4% (stroke) of the variation in QOF registration rates at PCT level, and between 44.5% (diabetes) and 65.4% (CHD) of variation in QOF registration rates at practice level. Incorporating additional factors (demography, ethnicity, deprivation and rurality) into a linear regression model increases prediction to between 75.6% (diabetes) and 90.4% (stroke) at PCT level, and between 57.6% (diabetes) and 70.5% (CHD) at practice level.

As one moves up the care pathway, the percentage of variance that can be explained by either estimated prevalence or additional factors declines, although, at the PCT level, prediction (using the full model) exceeds 50% for a number of use indicators, including drugs for diabetic use and PBC diabetic prescribing (diabetes); angiotensin-converting-enzyme (ACE) inhibitor, beta-blocker, aspirin and bendroflumethiazide prescribing (CHD) and admissions for main diagnosis angina/acute myocardial infarction (CHD); ACE inhibitor, calcium channel, thiazide diuretic and PBC all circulatory/cerebrovascular prescribing (hypertension); and oral anticoagulant, antiplatelet, warfarin and PBC cerebrovascular prescribing as well as hospital admissions (stroke).

It is encouraging that variations in several indicators of use are largely explained by underlying need. Nevertheless, the regression models yielded a number of significant ($p < 0.05$) standardised coefficients, which suggest systematic sociodemographic inequalities in utilisation. In some cases, populations make greater use of services than expected, while in other cases they make less use of services than expected.

Key findings

- Primary care trusts and practices with higher Asian populations have higher than expected rates of diabetes presentation and prescribing and lower than expected rates of secondary care.
- Primary care trusts and practices with higher black populations have lower than expected rates of CHD presentation and prescribing (for four of the six items considered) and higher than expected rates of emergency admissions for coronary artery bypass graft (CABG) and any admission for percutaneous coronary intervention (PCI). This may suggest that poor management of disease at lower levels of the health-care system is resulting in higher demand for emergency and hospital care.
- There are pronounced geographical variations in use relative to need for CHD care. The North East has relatively high levels of use of cardiac care, which contrasts with evidence of poor access to care in the 1990s. Relatively high rates of use, at least with respect to PBC secondary and total expenditure, are also found in parts of the South East and South Central regions. Rural (shire) areas have low levels of use relative to need.
- With the exception of lower than expected rates of prescribing among younger and rural practice populations, evidence of inequality in the management of hypertension is mixed.
- Both black and Asian populations have lower QOF registrations of stroke and lower prescribing of oral anticoagulants and warfarin than expected. Younger populations also have lower presentation and prescribing rates. Secondary care use is also lower than expected among ethnic populations.
- Across the four categories, deprivation does not emerge as a consistent predictor of lower use relative to need. Deprived practices make higher use than expected of many health-care services for diabetes, hypertension and stroke. However, they have lower than expected rates of CABG and PCI interventions.
- There is little evidence of age-related inequality, which conflicts with the key findings of the literature review.

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Mental health

Variation in mental health service use is poorly explained by underlying need and the addition of potential explanatory factors does not substantially improve matters. Thus, the overall picture is one of unexplained variation. There are, however, some notable trends.

Key findings

- Rates of QOF registration and prescribing tend to be lower than expected in areas with large black populations.
- Rates of QOF registration and prescribing tend to be higher than expected in areas serving more deprived populations.
- Our findings of lower rates of mental health use among black populations and higher rates among deprived populations correspond with existing literature. However, there is little evidence of age-related inequality, which conflicts with a key finding of the literature review.
- There appears to be a pronounced 'London effect', with rates of QOF registration and prescribing being much lower than expected.
- There is considerable practice-level variation in use relative to need, even in London and other major cities.

Conclusions

This is an ambitious study, the largest of its kind with respect to national-level analysis of variations in utilisation of CVD and CMHD health-care services. Great care has been taken to develop objective and rigorous prevalence estimates, and the findings, which are nuanced and contrasting, support the contention that, owing to different epidemiologies, patterns of utilisation relative to need are likely to vary by clinical condition. Nevertheless, the fact that the models were far better at explaining variation in use of CVD services than mental health services deserves further investigation. It is not known, for example, whether this can be attributed to problems in the prevalence estimates or problems in mental health service data sets or whether utilisation of mental health services in England is truly subject to the random variation that is suggested by the modelling. More work thus needs to be done on modelling unexplained variation. The project offers interesting insights (particularly with respect to CVD) regarding the importance of relative mix of care (higher levels of presentation and primary management being associated with lower levels of hospital admission); the persistence of ethnic variations after controlling for age and deprivation; and the role of systematic factors (such as rurality) in shaping patterns of utilisation. These, it is proposed, are fruitful areas for further investigation.

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