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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FIRST LOOK DRAFT

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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 resource have been targeted at deprived areas, it is important to better understand whether and why socio-economic 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 to that of degenerative disease (and general practitioners 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 then acted upon by health professionals. The relative mix of care can also influence patterns of use. For example, 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 socio-economic status, such as age, gender and ethnicity which may have been relatively neglected due to a prevailing concern with socio-economic status. All of these factors suggest the need for a more nuanced understanding of variations in access and 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 reflect (a) underlying health care needs, (b) are characterised by systematic inequalities according to socio-economic status, age, gender, ethnicity and rurality, or (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
- build upon existing techniques of small area estimation in order to develop robust estimates of the prevalence of cardiovascular disease and common mental health disorders in populations served by general practices, Primary Care Trusts (PCTs) and Clinical Commissioning Groups (CCGs) in England.
- 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:need ratios.
- test the extent to which variations in the use of cardiovascular and mental health services reflect (a) underlying differences in the health care needs of general practices, PCTs and CCGs, (b) relate to the socio-demographic, socio-economic, ethnic and geographical characteristics of populations, or (c) occur randomly.
- support service planning and delivery by disseminating via Public Health England (PHE), estimates of health care need for a variety of geographic and organizational units; namely Lower and Middle Layer Super Output Areas (LSOAs/MSOAs), PCTs, CCGs, upper and lower tier Local Authorities, Strategic Health Authorities (SHAs) and regions.

Methods

(i) 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 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 & Abstracts (ASSIA), Medline, PubMed, Embase, Social Sciences Citation Index (Web of Science). Cumulative Index to Nursing and Allied Health Literature (CINAHL), 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 forward 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.

Retrieved literature: Thousands of potentially relevant hits were retrieved, most eliminated through consulting the title and abstract alone. 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.

(ii) 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 datasets 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 socio-demographic 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 socio-demographic 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 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 dataset and then replicating the entire process all the way to local area estimation. Having generated multiple bootstrap-based estimates, summary data is extracted to describe the nature (mean and 95%CI) of the resulting estimate distributions. Summary data has been produced for 12 age-sex defined cohorts, as well as for overall populations, across all English LSOAs, MSOAs, upper and lower tier Local Authorities, regions, general practices, PCTs, CCGs and SHAs. Much of this data is to be disseminated via Public Health England's 'Local Health' website.

(iii) 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 (BNF) code/category, Programme Budget Category (PBC) expenditure on prescribing and, in the case of CMHD, 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) socio-economic deprivation, (c) % population Asian, (d) % population Black, (e) % adult population <50 and (f) % rural population has been explored at CCG, PCT and practice levels.

Results

(i) Literature review

A larger proportion (35%) of studies of variations in access to and use of CVD had explored inequalities by socio-economic status than 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.

(ii) The reliability of the Plymouth needs estimates

Cardiovascular disease: 24 prevalence estimates have been produced for CVD. Those for diabetes (a risk factor for CVD), CHD, Hypertension and Stroke were compared against health service utilisation data. These are better predictors of variations in QOF registration rates than existing equivalent Public Health England (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: 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 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 (IAPT) 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 (NEPHO) 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).

(iii) 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); ACE Inhibitor, Beta Blocker, Aspirin and Bendroflumethiazide prescribing (CHD) and admissions for main diagnosis angina/acute MI (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 variation 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 socio-demographic inequalities in utilisation. In some cases, populations make greater use of services than expected, in other cases less.

Key findings

- PCTs and practices with higher Asian populations have higher than expected rates of diabetes presentation and prescribing and lower than expected rates of secondary care
- PCTs and practices with higher Black populations have lower than expected rates of CHD presentation and prescribing (for 4 of the 6 items considered) and higher than expected rates of emergency admissions for CABG and any admission for PCI. This may suggest that poor management of disease at lower levels of the health care system are 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 CAGB and PCI interventions.
- There is little evidence of age-related inequality, which conflicts with the key findings of the literature review.

Mental health

Variation in mental health service use is poorly explained by underlying need and the addition of potential explanatory factors does not improve substantially 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 corresponds 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 within 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, due 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 than mental health services deserves further investigation. It is not known, for example, whether this can be attributed to problems in the prevalence estimates, problems in mental health service datasets 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.