Do higher primary care practice performance scores predict lower rates of emergency admissions for persons with serious mental illness? An analysis of secondary panel data

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Scientific summary

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Background

Serious mental illness (SMI) encompasses a set of chronic enduring conditions such as schizophrenia, bipolar disorder and psychoses. Despite a lifetime prevalence of > 1%, considerable disease burden, poor outcomes and costs, there has been little empirical research on the processes of care for people with SMIs in primary care. Primary care plays a central role in the provision of care for people with SMIs, with around 31% treated solely by their general practitioner (GP).

Good-quality primary care management of patients with a SMI should reduce complications of a SMI and comorbidities and should, therefore, be associated with lower unplanned admission rates. Conversely, better quality of care may result in more health problems being identified as part of regular screening activities and more frequent GP–patient contacts, thereby leading to more planned (elective) admissions for hospital care. If better-quality primary care leads to reduced emergency admissions, it may also be associated with lower NHS expenditure. Length of stay (LOS) for patients with a SMI is typically much longer than for other patients and better management in primary care could shorten their lengths of stay in hospital.

Quality indicators for the management of SMIs have been routinely measured in English primary care as part of the Quality and Outcomes Framework (QOF) since its introduction in 2004. The QOF is a voluntary incentive scheme for primary care practices, which offers financial rewards for good-quality care and one domain of the QOF focuses specifically on the management of people with SMIs.

Our study used four SMI QOF indicators. MH6 and MH9 relate to patients receiving a review and having a care plan in place, while two indicators, MH4 (record of thyroid and renal function) and MH5 (lithium levels in appropriate range), relate only to the subset of SMI patients who have bipolar disorder.

Objectives

Our research questions are:

1. Is better general practice performance on SMI QOF indicators associated with:
   i. lower rates of emergency hospital admissions for SMIs for practice patients with a diagnosis of a SMI?
   ii. lower rates of emergency admissions for a SMI for practice patients with a diagnosis of bipolar disorder?
   iii. lower rates of emergency admissions for physical conditions for practice patients with a current or previous diagnosis of a SMI?
   iv. higher rates of elective admissions for physical conditions in patients with a current or previous diagnosis of a SMI?
2. Is better general practice performance on SMI QOF indicators associated with shorter LOS for practice patients with SMI following admission for a SMI?
3. Is better performance on SMI QOF indicators associated with lower secondary care expenditure for mental health services for practice patients with a SMI?

Data

To answer the first set of research questions (1i to iv), we merged practice-level QOF data from around 8500 GP practices in England with admissions data for practice patients from Hospital Episode Statistics (HES) data for the study period 2006/7–10/11. We took account of baseline admissions for the financial years 2003/4–4/5. This pre-sample baseline picks up unobserved practice confounding characteristics which are time invariant. We identified SMI admissions by a main *International Classification of Diseases*, 10th revision, diagnosis of F20–F31 and bipolar admissions as F30–F31. We dropped practices with a list size < 1000 patients. We excluded practices if they did not report a SMI register in QOF or if the number of patients on the SMI QOF register was below 5. Only adult patients (aged 18 years and over) were included in the analyses.

Practices can 'exception report' patients from achievement on QOF indicators for various reasons including the patient is deemed to be unsuitable for treatment, is newly registered with the practice or newly diagnosed or that the patient makes an informed dissent. Data on excluded individuals are removed from the achievement calculation for the purposes of determining the QOF payments due to practices. However, we included all SMI patients (those recorded as eligible plus those who were exception reported) in the denominator for calculating achievement rates for QOF indicators, since we could not distinguish whether or not an admitted patient had been exception reported.

The HES and QOF data were linked to information on GP practice characteristics, characteristics of their patient populations and to population characteristics such as deprivation and other potential confounders that are recorded at small-area level [i.e. lower super output areas (LSOAs)]. We also controlled for measures of access to care such as distance to nearest hospital and availability of crisis resolution and home treatment teams. All analyses were carried out at GP practice level.

To answer the second research question, the same data sources were used as described above, but (1) admissions were not aggregated to practice level, (2) we excluded patients admitted primarily for physical conditions, and (3) we excluded outlier patients who remained in hospital for more than 180 days to reduce the effect of unusually long-stay patients.

To examine the third research question looking at the relationship between practice QOF performance and subsequent mental health expenditure, we used individual-level data from the Mental Health Minimum Data Set (MHMDS), which was costed using data from NHS Reference Costs for 2006/7 and 2007/8. Variables included demographic information and resource use data for hospital inpatient and outpatient care and community care provided by specialist mental health teams. MHMDS data were not structured in complete spells (episodes of care) and so we estimated a total cost per year for each individual rather than using spells as the unit of analysis. Owing to the absence of activity volume data for local authority services, we were unable to attach costs to all the resource use variables in MHMDS. This meant that the total annual cost was missing for around 20% of patients. As MHMDS contained no diagnostic or procedure codes we focused only on overall SMI measures in the QOF and excluded measures that applied specifically to people with bipolar disorder. Area characteristics were incorporated at practice level using weighted average values based on the LSOAs in which practice patients resided.

Methods

For the first research question (the relationship between practice QOF performance and admission rates), we estimated mixed-effects count models that take account of the nested structure of annual counts of admissions for each GP practice. We estimated separate models for each of the four admission types and allowed the two set of QOF indicators (MH6 and MH9) and (MH4 and MH5; for bipolar admissions) to enter separately or jointly. We ran sensitivity analyses to account for the fact that some patients with a SMI

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are admitted repeatedly within a short period of time. We therefore also counted the number of patients admitted at least once in a year, as an alternative to the number of admissions of practice patients in the year. We also tested the inclusion of patients with an unspecified main diagnosis to account for poor coding of diagnoses in some providers.

For the second research question, (relationship between practice QOF performance and LOS) we estimated mixed-effects linear regression models. We transformed LOS using a logarithmic transformation. We analysed the number of days spent in hospital and included day cases, rather than just analysing the number of nights, since admissions with no nights still consume resources. We estimated models for the two QOF indicators (MH6 and MH9) both separately and jointly. We ran sensitivity analyses, using a model without either patient-level covariates or hospital fixed effects, and a model with patient-level covariates and without hospital fixed effects.

The third research question (relationship between practice QOF performance and annual patient costs) was investigated using a multilevel mixed-effects linear regression model, with a logarithmic transformation of total annual cost per patient. We estimated models for each of the two QOF indicators (MH6 and MH9) separately and jointly. Given the lack of diagnostic information in MHMDS, we ran a sensitivity analysis excluding individuals aged 65 years and over who may have had dementia rather than a psychotic disorder.

We carried out further robustness checks for all three research questions estimating various levels of exception reporting to test sensitivity to assumptions around the specification of QOF achievement. The absence of individual-level data on QOF achievement and exceptions means we do not know what percentage of exceptions is valid. We therefore ran a series of regressions in which the percentage of exceptions deemed valid ranged from 0% to 100%, with increments of 10% in each regression. All models included year indicators to allow for temporal trends. We reported GP-level analysis coefficients as incidence rate ratios (IRRs).

Services users and carers were actively involved throughout the project, with representation on our steering group.

Results

The data set for the first research question resulted in a sample of 8223 GP practices for analyses with SMI admissions and 8042 practices for the bipolar sample. The association between QOF achievement and admissions was generally positive, implying better quality of primary care is associated with more admissions. The estimated IRRs suggested that, for the average practice, an additional 10 percentage points in QOF achievement was associated with an increase in the practice SMI admission rate of approximately 1.9% (95% confidence interval 1.0% to 2.9%). The strength of the effect varied across indicators and admission types. We found statistically significant associations between QOF achievement on MH9 (review of SMI patients) and both mental health and physical admissions. In contrast, while always positive, the effect of MH6 (care plan) on admissions was only statistically significant for physical emergency admissions. Results were not significant for elective admissions, although these were always positive. Of the two lithium indicators, results were statistically significant for MH4 (thyroid and renal function record). The significance of results depends on the way in which we specify the percentage of valid exception reporting. Results were robust to sensitivity analyses for the number of patients admitted at least once in a year and the inclusion of patients with an unspecified main diagnosis.

For the LOS analysis we had a data set of 98,993 individuals in 7912 practices. Longer LOS was associated with a primary diagnosis of schizophrenia, a higher number of comorbidities, older age, male gender, formal detention status, and Asian and black ethnicity. The quality of primary care, as measured by the QOF scores of the patient's practice, had no significant effect on LOS. Results were robust to sensitivity analyses for model specification and valid exception reporting.

For the analysis of costs using the MHMDS we had a sample of 981,373 observations for 711,820 adults. The mean annual per patient cost was £3159. The covariates had the anticipated signs in the regressions and suggested higher costs are associated with middle age, black or mixed ethnicity and formal detention. Across all analyses, a higher prevalence of informal carers in the residential area covered by the practice population was strongly associated with lower cost. Results from the regression analyses found the QOF indicators for annual review (MH9) and care planning (MH6) had no significant effect on total annual patient costs in any of the models, whether tested alone or jointly. Results were robust to sensitivity analyses that excluded individuals aged 65 years and over and varied the assumed validity of exception reporting.

Conclusions

The positive association we found between higher QOF achievement, particularly for annual health checks (MH9), and higher rates of emergency admissions for both mental and physical health admissions, was contrary to expectation. There are a range of possible explanations: (1) higher quality of primary care, as measured by QOF, may not effectively prevent the need for secondary care; (2) patients may receive their QOF checks post discharge, rather than prior to admission, as we do not know whether individuals who were admitted had received QOF checks or not; (3) SMI patients may select into practices that are more receptive to them or better organised to provide their care, and such practices would report carrying out more QOF checks but also have more emergency admissions; (4) better-quality primary care may be picking up unmet need for secondary care; and (5) the QOF measures may not reflect accurately the quality of primary care.

Further research would require patient-level data, in addition to practice-level data, to examine a number of research priorities: (1) the patient pathway and the timing of QOF checks in relation to admissions to determine causality; (2) which QOF measures might effectively prevent secondary care admissions among this patient group; (3) whether or not there are other (non-QOF) measures of primary care quality and management of people with a SMI that could reduce unplanned admissions and could potentially be incentivised; (4) the specific conditions and indications for admission among people with a SMI, to determine how they could be prevented; (5) which types of admissions are potentially avoidable for SMI care; (6) how comprehensive care plans are developed and documented for people with a SMI and their families and carers; (7) the level of unmet need for people with a SMI, particularly at GP practice level; and (8) how the supply-side capacity constraints impact on the ability of GPs to admit patients with a SMI.

There are a number of implications for practice: First, assess value for money of QOF health checks for people with a SMI. One possible conclusion from our results is that the QOF is not effective at reducing the use of secondary care services and should therefore be abandoned. However, the QOF was not specifically designed to reduce unplanned admissions. Many of the emergency admissions may be appropriate and represent good-quality care by GPs and may pick up and address unmet need. It would therefore be premature to draw conclusions about whether or not regular checks of people with a SMI should continue to be incentivised through the QOF. QOF checks, specifically those that focus on physical care may still be effective in promoting patient health and may be valued by service users. Second, factor in resource requirements for likely increase in referrals following QOF checks for SMIs. Practitioners and commissioners should be aware that carrying out regular checks on people with SMIs will have implications for the organisation and funding of mental health care. Third, improve diagnostic coding quality in secondary care, and finally, improve data coverage and quality of the MHMDS. A general observation from the study is the need for better-quality mental health data to enable important questions about quality of care to be addressed. Data quality could be incentivised particularly around the collection of accurate diagnostic information.

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