NIHR Service Delivery and Organisation programme

NHS National Institute for Health Research

SDO Protocol - project ref: 10/1011/22
Version: 1
Date: 05 November 2011

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

Chief investigator	Dr Rowena Jacobs
Sponsor	University of York
Funder	NIHR SDO programme
NIHR Portfolio number	
ISRCTN registration (if applicable)	N/A

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

1. Aims/Objectives:

Our project will address the following research questions:

1. Is better primary care practice performance on specific Quality and Outcomes Framework (QOF) indicators associated with lower rates of emergency hospital admissions for serious mental illness (SMI)?
2. Is better primary care performance on specific QOF indicators associated with lower rates of emergency hospital admissions for physical conditions in patients with SMI?
3. Is better primary care performance on specific QOF indicators associated with reduced subsequent secondary care expenditure on mental health patients?

Our null hypotheses are that QOF performance will have no effect on emergency hospital admissions for SMI or for physical conditions in people with SMI, or on secondary care expenditure. The evidence for an association between higher quality primary care (measured by QOF) and lower rates of emergency admission for various clinical domains is mixed, but more robust studies [1,2] show an effect. There is no research on the impact of QOF indicators on emergency admissions or expenditure for mental health. As mental health has the lowest average achievement rates and the highest variation of all the QOF clinical domains [3], our national longitudinal study will provide robust evidence to test the above hypotheses of an association between changes in practices' mental health quality indicators and changes in their emergency admissions, and the impact this has on subsequent secondary care expenditure.

In a challenging economic environment, it is important to identify the factors associated with high quality provision of mental health services to maximise the gains from limited resources. If better quality primary care helps reduce emergency admissions, our research will identify factors associated with better practice performance that can guide service development. If no relationship is detected, this has important implications for the provision and targeting of resources to improve health and enhance efficiency in primary care.

2. Background:

'Ambulatory care sensitive conditions' are those where better quality of care in ambulatory (primary) care settings can lead to reductions in 'unplanned' (emergency) hospital admissions [4,5]. By placing greater emphasis on prevention, earlier detection and treatment, or the provision of alternative types of care [6], improvements in primary care can potentially increase population health and wellbeing, reduce health inequalities [7,8] and reduce healthcare costs [9].

Despite significant efforts to 'manage demand' and reduce emergency admissions in the NHS, this has proven difficult [10].

Preventable hospital admissions have been researched as an indicator of quality [11-16]. Larger practice size may be associated with lower rates of emergency

admissions [17], although findings differ by disease area [18]. Greater continuity of GP care appears to lower the risk of admission [19]. Clinician factors are also important, evidenced by large variations in out-of-hours admission rates by GPs caring for the same patient population [20]. Admissions are also heavily influenced by factors outside the control of the primary care team such as social deprivation [21] and the supply of secondary care resources [22], and a robust analysis must adjust for these factors.

Evidence suggests that risk factors associated with increased emergency admissions include age (young children and older people are at higher risk) [51]; people who live in areas of social deprivation [53]; people who live in urban areas; [18] people with higher levels of morbidity and chronic illness [53]; and people from minority ethnic groups [54].

The evidence for an association between higher quality of primary care and lower admissions is mixed. Lower rates of admission for asthma have been found in practices with prescribing patterns that suggest better preventive care [23]. The provision of clinics in primary care significantly reduced admissions for diabetes, but not for asthma [17]. A systematic review of high standards of diabetes care in primary care showed it did not necessarily reduce hospital admissions [24].

Introduced in 2004, the Quality and Outcomes Framework (QOF) is one of several approaches to improving care with the potential to reduce preventable admissions [25-27]. Some studies have used QOF indicators to measure the impact of quality in primary care on emergency admissions [1,2,28,29]. Findings are mixed, with no association found between admission rates and quality indicators of coronary heart disease, asthma or COPD [18,28,29]. However, more recent evidence has found a significant association between poorer quality of care and higher emergency admissions for diabetes [1,2].

The evidence about whether mental health interventions reduce admissions is limited. A randomised control trial of regular structured assessments of long-term mentally ill patients by GPs improved the process of care but was underpowered to detect any significant effect on the rate of psychiatric admissions [30].

A systematic review examined the effects of intensive case management on hospital use for people with severe mental illness [31]. Intensive case management teams did not substantially reduce hospital use where this was already low, but were more successful where baseline use was higher.

Crisis Resolution and Home Treatment teams were introduced in England in 2000/01 to provide an alternative to hospital treatment, acting as gatekeepers within the mental healthcare pathway and facilitating a reduction in admissions. New national evidence suggests that this policy has had no impact on admissions [32].

None of the studies on QOF mental health indicators [33-41] has examined the potential for reducing admissions in people with mental health problems. These individuals are at higher risk of hospitalisation for physical ambulatory sensitive conditions than the general population, and they typically have longer stays and

higher hospital costs [42]. Thus even small reductions in avoidable admissions for people with mental health problems could help to reduce NHS hospital costs. Our research will address this gap in the evidence base by examining whether better primary care QOF performance is associated with lower rates of emergency hospital admissions for people with serious mental illness. We will examine admissions for both mental health and physical health conditions.

Martin et al [3] examined the association between QOF indicator performance, hospital costs and mortality. Between 2004/5 and 2007/8, improvements in the quality of primary care were associated with lower secondary care costs (a reduction of £165 million), and 2,385 fewer annual deaths. However their secondary care expenditure data excluded mental health. By exploiting new secondary and community care cost data in mental health services, we will build on this evidence to examine the financial impact of improvements in the mental health QOF.

The NIHR has funded several projects on the QOF (UKCRN ID: 6528, 8281, 8048, 4029), and a number of primary studies investigating the link between quality of primary mental health care and improved outcomes. None examines the impact of QOF indicators on emergency admissions for people with serious mental illness. The National Primary Care Research and Development Centre evaluated the effects on hospital admissions for a range of QOF indicators, but excluded mental health. The Nuffield Trust is examining hospital admissions for ambulatory care sensitive conditions over a 9 year period, tracking admissions by individual, GP practice, PCT and district council area. This analysis also excludes mental health indicators.

Our research will fill a long-standing and wide gap in the evidence base related to mental health care.

3. Need:

- *Health need:*

Up to half of those with a serious mental illness are seen only in a primary care setting. Our research will shed light on aspects of quality of primary care important for the prevention and treatment of serious mental illness and related physical conditions. Patients with serious mental health problems are at higher risk of physical ill-health than the general population [43]. Almost half of tobacco consumption is by those with mental illness [44], and smoking-related diseases, heart disease and premature death are more common in people with serious mental illness who smoke. People with schizophrenia are at increased risk of diabetes, and life expectancy for people with schizophrenia or bipolar disorder is typically 16 to 25 years lower than the general population. Poor compliance with medication is well recognised, and this may lead to relapse, poorer outcomes, and admissions. Although a typical GP practice will see just 50 patients with serious mental illness, admissions for these people are substantially longer and more costly than for other patients, even when the reason for admission is a physical problem [42]. Therefore, even small reductions in the rate of avoidable emergency admissions for serious mental illness could reduce NHS costs.

The mental health QOF indicators aim to improve the physical and mental health

of patients with serious mental illness by improving the quality of their care and medication. However, practices have the lowest average achievement rates on the mental health QOF indicators and the highest variation compared to all the other clinical areas [3]. This suggests the greatest scope for health improvements in this domain. Our research will provide an insight into the practice characteristics associated with better primary care performance on the QOF and reduced emergency admissions as well as the savings these may potentially generate for the NHS.

- *Expressed need:*

Both the Wanless Review [45] and the Darzi report [46] highlighted the need for NHS expenditure to be shifted towards prevention, and 'improving mental health' was one of Lord Darzi's six key goals for attaining high quality care. The government's strategy for mental health [47] emphasises the need to improve both the physical and mental health of people with mental health problems, using the new NHS outcomes framework to incentivise GP consortia. Demographic pressures are anticipated to increase substantially over the coming decades, making the current concentration of expenditure on acute services unsustainable [48]. The NHS must find £20 billion in efficiency savings by 2014, which will be reinvested to support improvements in quality and outcomes [49]. GPs will hold commissioning budgets from 2013 and evidence on how changes in the quality of care can improve health and deliver cost savings is urgently needed. Our work will show whether better quality of primary care services has the potential to deliver efficiency savings for the NHS.

- *Sustained interest and intent*:

Primary care has always been a cornerstone of the NHS. The current financial climate means that GPs will have incentives to reduce the rate of avoidable admissions; plans to give commissioning responsibilities to GP consortia enhance these incentives [49]. Variations in the quality of primary care are well documented [33,50] and incentive schemes such as the QOF seek to address quality deficits. Our analysis will help evaluate the appropriateness of the new QOF indicators planned for 2011/12, which will pay GPs for treating mental health patients for certain physical problems. By quantifying the size of the benefit that can be expected from a specific improvement in QOF scores, this research will determine whether these new indicators are likely to help patients and reduce costs.

- *Capacity to generate new knowledge:*

There is a dearth of high quality evidence on mental health services. This national longitudinal study will use a robust methodology to provide the NHS with important insights into quality of mental health care at primary care level. It will provide information on the characteristics of primary care practices that are associated with reduced emergency admissions for both mental health and physical health conditions. It will also add to knowledge on the impact of better primary care on subsequent secondary care expenditure for mental health.

- *Organisational focus consistent with SDO mission:*

This research is consistent with the SDO focus on organisation and delivery of healthcare. It examines the delivery of primary healthcare to mental health

service users. It will help NHS managers and practitioners improve primary care practice for both physical and mental illness and our dissemination strategy will be focused towards engaging those who manage, organise and deliver services to use the research evidence.

- *Generalisable findings and prospects for change:*

A key strength of this study is that it uses a national dataset covering the whole of England. Therefore the findings will be generalisable and of value to the whole NHS management community. In particular, GP practices and GP commissioning consortia can use the results to improve their provision of primary care for mental health service users and get better value for money from limited NHS resources. Emergency admissions have risen steadily over the past 10 years and represent around 65% of all hospital bed days in England [51]. The results will help commissioners make better decisions about how to reduce avoidable and expensive hospitalisations.

- *Building on existing work*:

Previous work on preventing avoidable admissions has not covered people with serious mental health problems; NIHR funded work has examined mental health QOF indicators, but not in relation to their impact on avoidable admissions. Our work builds on existing work looking at the impact of QOF on secondary care costs which previously excluded mental health expenditure. An advantage of the project is that it will utilise the Mental Health Minimum Data Set, an important source of secondary data that has been under-exploited. The quality of the data has improved recently and this project will be one of the first to use the data for large scale analysis.

4. Methods:

- *Design and theoretical/conceptual framework:*

Effective primary care can have an important preventive role, and should therefore be associated with lower emergency admission rates. Quality indicators for mental health have been routinely measured in English primary care over a number of years as part of the Quality and Outcomes Framework (QOF). Our null hypothesis is that there is no association between QOF performance and emergency hospital admissions for people with mental illness either for mental or physical conditions. We will test for an association between changes in practices' mental health QOF indicators and changes in their rates of emergency admission using data on all practices in England over the period 2004/05 to 2009/10. Our analysis will also estimate the impact of potential improvements in the QOF on subsequent mental health expenditure on secondary care.

- *Sampling:*

We will construct a national dataset covering around 8000 English GP practices by drawing together routinely available secondary data. To examine the impact of the QOF on hospital expenditure, we will merge this national dataset with the costs of all 1.2 million patients who use specialist psychiatric hospital or community care in a given year. Our analysis will therefore be representative and produce generalisable results.

- *Setting/context:*

We will use Hospital Episode Statistics (HES) data on emergency admissions for mental health patients from general practices for both physical and mental conditions over the period 2001/02 to 2009/10 in England. QOF data is available from 2004/05 to 2009/10. We will merge a number of data sources at practice level to create a panel which will provide statistical power and precision to the econometric analysis. To examine the relationship between the QOF and subsequent mental health expenditure we will use individual level cost data in the Mental Health Minimum Dataset (MHMDS) which has been derived from Reference Costs and is available for 2007/08 and 2008/09 covering care by specialist psychiatric teams in hospital or in the community.

- *Data collection:*

We will use the following data:
QOF Indicators: The Quality Management Analysis System (QMAS) provides QOF achievement and prevalence data at practice level. Some QOF indicators have remained constant, others have been modified, dropped or introduced. This represents a 'natural experiment' that allows variations in admissions between practices to be investigated.
Covariates:
Local population characteristics: Neighbourhood Statistics (ONS) socio-economic and demographic data will be attributed to GP practices using the Attribution Data Set which contains information on the number of patients in each practice resident in each Lower Super Output Area. The socio-economic data are very rich and include measures of deprivation, education, morbidity, ethnicity, rurality and small area characteristics.
GP Practice variables: General Medical Statistics (GMS) data on GP and practice characteristics, and MHMDS data which will be aggregated to practice level. Mental Health Services Mapping Data will be used to construct supply variables.
Hospital variables: hospital characteristics and quality indicators.

- *Data analysis:*

We will estimate both cross-sectional and panel data models for the period 2004/05 to 2009/10 to examine the association between QOF and admissions over time. Examining the within practice temporal variation will remove the risk of unobserved factors which might affect both practice emergency admissions and quality. We will estimate both random and fixed effects multiple regression and count data models. All models will include year indicators to allow for temporal trends, and a rich set of relevant local population and practice covariates [1]. Random effects panel data models will include the average admissions for a practice over the period 2001/02 to 2003/04. This pre-sample 'baseline' will pick up unobserved practice and patient confounding characteristics which are time-invariant [52]. We will also include lags of QOF to allow for delayed effects of quality. We will carry out a variety of robustness checks. For ease of presentation the scores for all variables will be reported as incidence rate ratios (IRR).

Our models for examining the association between QOF and subsequent hospital costs will include both OLS cross-sectional and random and fixed effects panel data models where we control for practice fixed effects and year dummies. We will regress costs in 2007/08 and 2008/09 on QOF scores from 2004/05 up to

2008/09. Given the positive skewness of costs we will also estimate transformed OLS and generalised linear models (GLM). We will use two-part models to test if better quality scores have an effect on average patients by reducing the probability of admission and/or by reducing costs once admitted. Possible lagged quality effects on costs will be captured by modelling 'baseline' quality from 2004/05 to 2006/07 on patient expenditure in 2007/08 and 2008/09.

5. Plan of Investigation:

The project will commence on 1 January 2012 and complete on 30 June 2013. Table 1 shows the timetable for the key activities in this project.

Table 1: Monthly project timetable for scheduling of key activities

Project month:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Identify relevant data sources	■																	
Decision on DAAG applications for sensitive data	■	■																
Establish project advisory group (with lay representation)	■	■																
DAAG applications made		■	■															
Routinely available data collated		■	■	■														
First meeting of project advisory group					■													
Document all potential confounders		■	■	■	■	■												
Progress report 1						■												
Data entry to panel dataset		■	■	■	■	■												
Cleaning and collating of panel data		■	■	■	■	■	■	■										
Incorporate sensitive data (if available)				■	■													
Robustness checks				■	■	■	■	■										
Refine econometric model					■	■	■	■										
Clinical input						■		■		■								
Preliminary analysis						■	■											
Main analysis								■	■	■	■	■						
Sensitivity analysis									■	■	■	■						
Second meeting of project advisory group											■							
Progress report 2													■					
Workshop												■						
Finalise analysis													■	■				
Final meeting of project advisory group																	■	
Report writing					■	■						■	■	■	■	■	■	■
Final draft report circulated for comments																	■	
Final report																		■

Immediately on completion of the project we will:

1.) host a 1-day conference in London
2.) produce academic publications for peer reviewed journals
3.) produce a lay summary of our results for distribution to the NHS, policy makers, service users and charities
4.) contribute to the CHE and HYMS research newsletters
5.) publicise our results to the Mental Health Research Network and Primary Care Research Network
6.) target publications such as Pulse and Health Services Journal

We will also present our research results at national and international conferences and the timing of these will depend on exactly when in the life of the project they fall, whether within the 18 month period or immediately thereafter.

6. Project Management:

RJ will be the principal investigator and project manager on the study and will ensure overall responsibility for the conduct of the study, the day-to-day running

of the project and for managing the budget. She has experience of being principal investigator on a number of large grants which have all run to time, to budget, and produced high quality outputs.

We will monitor progress on the project by working within the planned timeframe and communicating regularly via emails and meetings as needed.

All applicants in the Centre for Health Economics have worked closely together for a number of years on a range of different projects. We are a cohesive group, and there are clear lines of communication established between the investigators.

We will meet with our co-applicants from the Department of Health Sciences and the Hull York Medical School periodically in person, and since we are based in close proximity it will be easy to share information and updates on progress.

We will establish a steering group to guide the analysis: checking our understanding of key concepts, informing the interpretation of results and commenting on reports. The steering group will consist of:

1. Three service users / carers
2. A Department of Health Mental Health policy lead
3. An academic with expertise in primary care and mental health research
4. A GP with a special interest in mental health and expertise in clinical commissioning
5. A psychiatrist who works in the community and has experience of research
6. RJ as project leader and – where appropriate – one other member of the research team as applicable to the stage of the project.

The steering group will meet three times during the course of the project.

7. Service users/public involvement:

One of our co-applicants is a Service User Representative for the NIHR Mental Health Research Network (MHRN). She will have direct involvement in the project and will facilitate our PPI strategy.

Our strategy has 2 key components: (i) involving service user representatives in the research; and (ii) disseminating our research in a format appropriate for service users. With regard to (i), we will establish a steering group which will include service user and carer representation. Service users will: check our understanding of key concepts, advise on our approach; inform the interpretation of results and comment on reports. The steering group for the project will consist of three service users / carers. Our co-applicant is currently involved in establishing a training programme (based in the southern section of the regional MHRN) to support users and carers who wish to contribute to research. We are therefore confident that the other service users and carers will receive support from her to be active participants on the steering group. She will also be able to provide continued service user and carer input to the research team beyond the steering group and will be an active member of the project team.

With regard to (ii), we will hold a workshop to share our interim findings, including

service users and representatives of service users (e.g. MIND and RETHINK and members of local and regional NHS services). Our co-applicant will help co-ordinate and recruit participants for the event and we will also utilise the network of contacts that the York Mental Health Research Group (MHRG) (based at the Dept of Health Sciences, University of York) has built up through extensive research in mental health. They have a track record of involving service users in research and using stakeholder reference groups. The workshop will inform our strategy for wider dissemination of our findings. One of our co-applicants from the MHRG has extensive experience in planning and executing dissemination strategies.

We will present the final results of this project, with presentations on the general topic of mental health services at a 1-day conference, likely to be held in London, involving a range of stakeholders including service users, carers and organisations such as MHRN, RETHINK and MIND.

The budget includes service users' attendance costs and travel expenses for steering group meetings in accordance with the INVOLVE guidance, as well as travel expenses for those attending the workshop and conference.

8. References:

[1] Dusheiko M, Doran T, Gravelle H, Fullwood C, Roland M. Does higher quality of diabetes management in family practice reduce unplanned hospital admissions? Health Services Research 2011; 46:27-46.
[2] Bottle A, Millett C, Xie Y, Saxena S, Wachter RM, Majeed A. Quality of primary care and hospital admissions for diabetes mellitus in England. Journal of Ambulatory Care Management 2008; 31:226-38.
[3] Martin S, Smith PC, Dusheiko M, Gravelle H, Rice N. Do quality improvements in primary care reduce secondary care costs? Primary research into the impact of the Quality and Outcomes Framework on hospital costs and mortality 2010.
[4] Purdy S, Griffin T, Salisbury C, Sharp D. Ambulatory care sensitive conditions: terminology and disease coding need to be more specific to aid policy makers and clinicians. Public Health 2009; 123:169-73.
[5] Bindman A, Grumbach K, Osmond D, Komaromy A, Vranizan K, Lurie N, Billings J, Stewart A. Preventable hospitalizations and access to health care. Journal of the American Medical Association 1995; 274:305-11.
[6] Purdy S, Griffin T, Salisbury C, Sharp D. Prioritizing ambulatory care sensitive hospital admissions in England for research and intervention: A Delphi exercise. Primary Health Care Research and Development 2010; 11:41-50.
[7] Ashworth M, Seed P, Armstrong D, Durbaba S, Jones R. The relationship between social deprivation and the quality of primary care: a national survey using indicators from the UK Quality and Outcomes Framework. British Journal of General Practice 2007; 57:441-8.
[8] Doran T, Fullwood C, Kontopantelis E, Reeves D. Effect of financial incentives on inequalities in the delivery of primary clinical care in England: analysis of clinical activity indicators for the quality and outcomes framework. Lancet 2008; Aug 30: 372:728-36.
[9] Lester H. The UK quality and outcomes framework: Has improved quality of care and reduced health inequalities. British Medical Journal 2008; 337:1181-2.

[10] Blunt I, Bardsley, M., Dixon, J. Trends in emergency admissions in England 2004-2009: Is greater efficiency breeding inefficiency? Nuffield Trust. London, 2010.
[11] Engelhardt JB, Toseland RW, O'Donnell JC, Richie JT, Jue D, Banks S. The effectiveness and efficiency of outpatient geriatric evaluation and management. J Am Geriatr Soc 1996; 44:847-56.
[12] Helmer DA, Tseng C-L, Brimacombe M, Rajan M, Stiptzarov N, Pogach L. Applying diabetes-related Prevention Quality Indicators to a national cohort of veterans with diabetes. Diabetes Care 2003; 26:3017-23.
[13] van Hout HPJ, Nijpels G, van Marwijk HWJ, Jansen APD, Van't Veer PJ, Tybout W, Stalman WAB. Design and pilot results of a single blind randomized controlled trial of systematic demand-led home visits by nurses to frail elderly persons in primary care [ISRCTN05358495]. BMC geriatr 2005; 5:11.
[14] Counsell SR, Callahan CM, Clark DO, Tu W, Buttar AB, Stump TE, Ricketts GD. Geriatric care management for low-income seniors: a randomized controlled trial. Jama 2007; 298:2623-33.
[15] Mencke NM, Alley LG, Etchason J. Application of HEDIS measures within a Veterans Affairs medical center. Am J Manag Care 2000; 6:661-8.
[16] Banham D, Woollacott T, Gray J, Humphrys B, Mihnev A, McDermott R. Recognising potential for preventing hospitalisation. Aust Health Rev 2010; 34:116-22.
[17] Saxena S, George J, Barber J, Fitzpatrick J, Majeed A. Association of population and practice factors with potentially avoidable admission rates for chronic diseases in London: Cross-sectional analysis. Journal of the Royal Society of Medicine 2006; 99:81-8.
[18] Purdy S, Griffin T, Salisbury C, Sharp D. Emergency admissions for coronary heart disease: A cross-sectional study of general practice, population and hospital factors in England. Public Health 2011; 125:46-54.
[19] Menec V, Sirski M, Attawar D, Katz A. Does continuity of care with a family physician reduce hospitalizations among older adults? Journal of Health Services Research and Policy 2006; 11:196-201.
[20] Rossdale M, Kemple T, Payne S, Calnan M, Greenwood R. An observational study of variation in GPs' out-of-hours emergency referrals. British Journal of General Practice 2007; 57:152-4.
[21] Donnan PT, Dorward DW, Mutch B, Morris AD. Development and validation of a model for predicting emergency admissions over the next year (PEONY): a UK historical cohort study. Archives of Internal Medicine 2008; Jul 14: 168:1416-22.
[22] Giuffrida A, Gravelle H, Roland M. Measuring quality of care with routine data: Avoiding confusion between performance indicators and health outcomes British Medical Journal 1999; 319:94-7.
[23] Aveyard P. Monitoring the performance of general practices. Journal of Evaluation in Clinical Practice 1997; 3:275-81.
[24] Griffin S, Kinmonth A. Systems for routine surveillance for people with diabetes mellitus (Cochrane Review). Cochrane Database of Systematic Reviews 2006; 4.
[25] Toner R, Snape C, Acton S, Blenkiron P. Do general practitioners adhere to NICE guidelines for depression? Systematic questionnaire survey. Primary Health Care Research and Development 2010; 11:123-31.
[26] Appleby L. The National Service Framework for Mental Health – Five Years

On. London: Department of Health, 2004:84.
[27] Gravelle H, Dusheiko M, Sheaff R, Sargent P, Boaden R, Pickard S, Parker S, Roland M. Impact of case management (Evercare) on frail elderly patients: Controlled before and after analysis of quantitative outcome data. British Medical Journal 2007; 334 (7583):31-4.
[28] Downing A, Rudge G, Cheng Y, Tu YK, Keen J, Gilthorpe MS. Do the UK government's new Quality and Outcomes Framework (QOF) scores adequately measure primary care performance? A cross-sectional survey of routine healthcare data. BMC Health Serv Res 2007; 7:166.
[29] Bottle A, Gnani S, Saxena S, Aylin P, Mainous AG, Majeed A. Association between quality of primary care and hospitalization for coronary heart disease in England: a national cross-sectional study. Journal of General Internal Medicine 2008; 23:135-41.
[30] Kendrick T, Burns T, Freeling P. Randomised controlled trial of teaching general practitioners to carry out structured assessments of their long term mentally ill patients. BMJ 1995; 311:93-8.
[31] Burns T, Catty J, Dash M, Roberts C, Lockwood A, Marshall M. Use of intensive case management to reduce time in hospital in people with severe mental illness: systematic review and meta-regression. BMJ 2007; 335:336.
[32] Jacobs R, Barrenho E. The impact of crisis resolution and home treatment teams on psychiatric admission rates in England. The British Journal of Psychiatry 2011; doi:10.1192/bjp.bp.110.079830.
[33] Tsimtsiou Z, Ashworth M, Jones R. Variations in anxiolytic and hypnotic prescribing by GPs: a cross-sectional analysis using data from the UK Quality and Outcomes Framework. British Journal of General Practice 2009; 59:e191-8.
[34] Kendrick T, Dowrick C, McBride A, Howe A, Clarke P, Maisey S, Moore M, Smith PW. Management of depression in UK general practice in relation to scores on depression severity questionnaires: analysis of medical record data. BMJ 2009; 338:b750.
[35] Dowrick C, Leydon GM, McBride A, Howe A, Burgess H, Clarke P, Maisey S, Kendrick T. Patients' and doctors' views on depression severity questionnaires incentivised in UK quality and outcomes framework: qualitative study. BMJ 2009; 338:b663.
[36] Anderson SG, Narayanan P, Qureshi Z, Bujawansa S, Knapman H, Heald AH. Screening of cardiometabolic risk factors in patients with severe enduring mental illness: Results and potential. Conference abstract: 45th EASD Annual Meeting of the European Association for the Study of Diabetes, Vienna, Austria. Diabetologia 2009; 52:S400-S1.
[37] Blak BT, Thompson M. How does the health improvement network (THIN) data on prevalence of chronic diseases compare with national figures? Conference abstract: ISPOR 12th Annual European Congress, Paris France. Value in Health 2009; 12:A253.
[38] Wang Y, O'Donnell CA, Mackay DF, Watt GC. Practice size and quality attainment under the new GMS contract: a cross-sectional analysis. British Journal of General Practice 2006; 56:830-5.
[39] Coia D, Glassborow R. Mental health quality and outcome measurement and improvement in Scotland. Current Opinion in Psychiatry 2009; 22:643-7.
[40] Ivbijaro GO, Kolkiewicz LA, McGee LSF, Gikunoo M. Addressing long-term physical healthcare needs in a forensic mental health inpatient population using the UK primary care Quality and Outcomes Framework (QOF): An audit. Mental

Health in Family Medicine 2008; 5 (1):51-60.
[41] van den Heuvel HGJ, Simpson RG. Which quality and outcomes framework (QOF) clinical indicators are applicable for British Forces Germany Health Service (BFG HS) primary care? Journal of the Royal Army Medical Corps 2008; 154:224-6.
[42] Li Y, Glance LG, Cai X, Mukamel DB. Mental illness and hospitalization for ambulatory care sensitive medical conditions. Medical Care 2008; 46:1249-56.
[43] Marder SR, Essock SM, Miller AL, Buchanan RW, Casey DE, Davis JM, Kane JM, Lieberman JA, Schooler NR, Covell N, Stroup S, Weissman EM, Wirshing DA, Hall CS, Pogach L, Pi-Sunyer X, Bigger T, Friedman A, Kleinberg D, Yevich SJ, Davis B, Shon S. Physical Health Monitoring of Patients With Schizophrenia American Journal of Psychiatry 2004; August: 161:1334-49.
[44] McManus S, Meltzer H, Campion J. Cigarette smoking and mental health in England: Data from the Adult Psychiatric Morbidity Survey. National Centre for Social Research, 2010.
[45] Wanless D. Securing Our Future Health: Taking a long-term view. Report by Health Trends Review team at HM Treasury. London, 2002:1-123.
[46] Darzi A, Department of Health. High Quality Care for All: NHS next stage review final report. London: Department of Health, 2008.
[47] Department of Health. No health without mental health: A cross-Government mental health outcomes strategy for people of all ages. London: HM Government / Department of Health, 2011.
[48] Expert Advisory Panel on Preventative Health Spending. Definitions and Measures of Preventative Health Spending. London: Health England, 2007.
[49] Department of Health. Equity and excllence: liberating the NHS. Cmnd 7881. London: The Stationery Office, 2010.
[50] Shield T, Campbell S, Rogers A, Worrall A, Chew-Graham C, Gask L. Quality indicators for primary care mental health services. Quality & Safety in Health Care 2003; 12:100-6.
[51] Purdy S. Avoiding hospital admissions: What does the research evidence say? . London: The King's Fund, 2010.
[52] Blundell R, Griffith R, Windmeijer F. Individual Effects and Dynamics in Count Data Models. Journal of Econometrics 2002; 108:113-31.

This protocol refers to independent research commissioned by the National Institute for Health Research (NIHR). Any views and opinions expressed therein are those of the authors and do not necessarily reflect those of the NHS, the NIHR, the SDO programme or the Department of Health.