



**STATISTICS DIRECTORATE**

**National Accounts and Financial Statistics Division**

Measuring Output from Primary Medical Care, with Quality Adjustment

This document will be presented under item 4.4 of the draft agenda and has been prepared by Aileen Simkins and Dr Christopher Little 6 UK Centre for Measurement of Government Activity, Office for National Statistics

Workshop on measuring Education and Health Volume

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Château de la Muette,  
Room Roger Ockrent

*Beginning at 9:30 a.m. on the first day*

## Measuring Output from Primary Medical Care, with Quality Adjustment

### Abstract

Two sources of English primary care consultation rate data for output index calculations are compared: the General Household Survey and a database of electronic general practice records, QRESEARCH. QRESEARCH is found to be superior to GHS in almost all respects. We also report on work to develop some of the QRESEARCH quality indicators and target data to calculate quality adjustment factors for the output of the primary care sector and present a quality adjusted primary care index.

### 1. Introduction

- 1.1. General practices in primary care are the first point of contact with the NHS for most patients; most healthcare episodes are self-contained within primary care. Primary care accounted for 11% of total NHS expenditure in England in 2004/05. Having an accurate measure of the output of this sector is important to understand the use of resources in the NHS and account for the results of government expenditure on health care.
- 1.2. Since about 2000, an annual NHS output series has been calculated by the Office for National Statistics for use in the National Accounts. Estimates of health output and productivity have been published in two Public Service Productivity articles (ONS 2004, 2006a) and iterative improvements continue to be introduced in the National Accounts. Work is also being done by ONS, DH and others to develop methodologies for taking account of changes in quality of NHS output (DH 2006, ONS 2007).
- 1.3. To date, English primary care activity, i.e. the number of general practitioner (GP) and practice nurse (PN) consultations, has been determined from data collected by the ONS General Household Survey (GHS). Consultations are not perfect as a unit of output, because a single consultation may or may not be a complete 'course of treatment'; some consultations may be more complex than others, if they include complex diagnostic tests or treatments. NHS administrative data are collected for the purpose of remunerating GPs and do not offer a complete view of the work done – there is no national count of NHS consultations. The GHS source has a number of limitations, recognised by Atkinson (2005), who recommended that

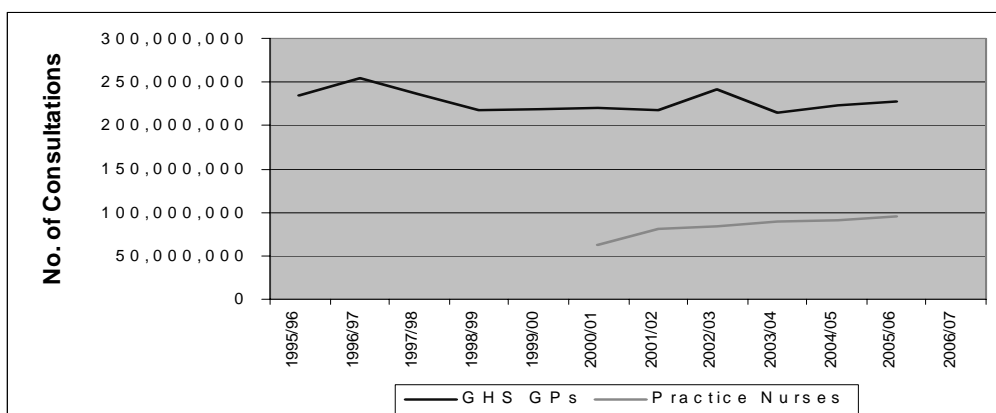
“... ONS should continue working with the four health departments to make use of information from computerised GP research databases to improve measurement of GP output ...”
- 1.4. A significantly better source of information on the activity of GPs and PNs, the QRESEARCH database, is held by the University of Nottingham, linked to patient data entered on computers in GP surgeries. This database is a rich source of information on primary care activity, patient characteristics, diagnoses, drug treatments and hospital referrals. DH and ONS, with the Health and Social Care Information Centre (IC), commissioned a time series of consultations, and also made use of information on some aspects of quality of care which can easily be derived from the QRESEARCH database.

- 1.5. This paper compares the GHS and QRESEARCH databases as sources of English primary care consultation data, and reports on work to use QRESEARCH data on selected clinical outcomes to calculate a quality index for primary care.

## 2. General Household Survey

- 2.1. Current estimates of consultation rates in England are taken from the General Household Survey of around 20,000 people living in Great Britain. One question asks respondents if they have made contact with their general practice in the previous two weeks. The questions identify whether the contact was with a GP or practice nurse, and whether it was in the surgery or health centre, at home or a telephone consultation. (The question about practice nurses was introduced in 2000.)
- 2.2. The estimate of the number of GP consultations per year is made by multiplying the number of reported consultations in the 14 days prior to interview, by 26. No allowance is made for seasonal factors - the date of the consultation varies across respondents and has also varied between rounds of the GHS. The survey information from the GHS is grossed up from the 20,000 Great Britain sample to the England population using age-banded estimates of consultation rates, which are rounded to an integer before grossing up to the whole population. An identical procedure is carried out to obtain the estimate of PN consultations. The GP consultation number is further subdivided, using GHS data, into consultations by location: surgery, home, health centre, telephone. The separate estimates of different types of consultation are then weighted into a single index using unit costs which are published annually by Personal Social Services Research Unit (PSSRU) at the University of Kent.
- 2.3. Calculations (Atkinson 2005) indicate that the precision of the growth rate for total GP consultations is not high; this is not surprising given that the GHS is a household survey that was not designed with longitudinal study in mind. For example, between 2001/02 and 2002/03, the estimated number of consultations with a general practitioner went up from 217m to 241m, an apparent increase of 11 per cent. However, the characteristics of the sampling scheme and the nature of the target population are such that the 95 per cent confidence interval around this growth rate is estimated at +/- 7 percentage points.
- 2.4. The numbers of consultations for GPs and PNs in England estimated from GHS data are shown in Figure 1. GP consultations display some fluctuations over the period 1995/96 to 2005/06. PN consultations have steadily increased since data became available in 2000/01. There have also been implausibly large changes, year on year, in the consultation rates estimated from the GHS for some age-gender groups. For all these reasons, it would be preferable to base estimates of primary care activity on actual records held by general practices rather than the recall based GHS.

Figure 1: GP and PN consultations in England estimated from the General Household Survey, 1995/96 to 2005/06



### 3. QResearch

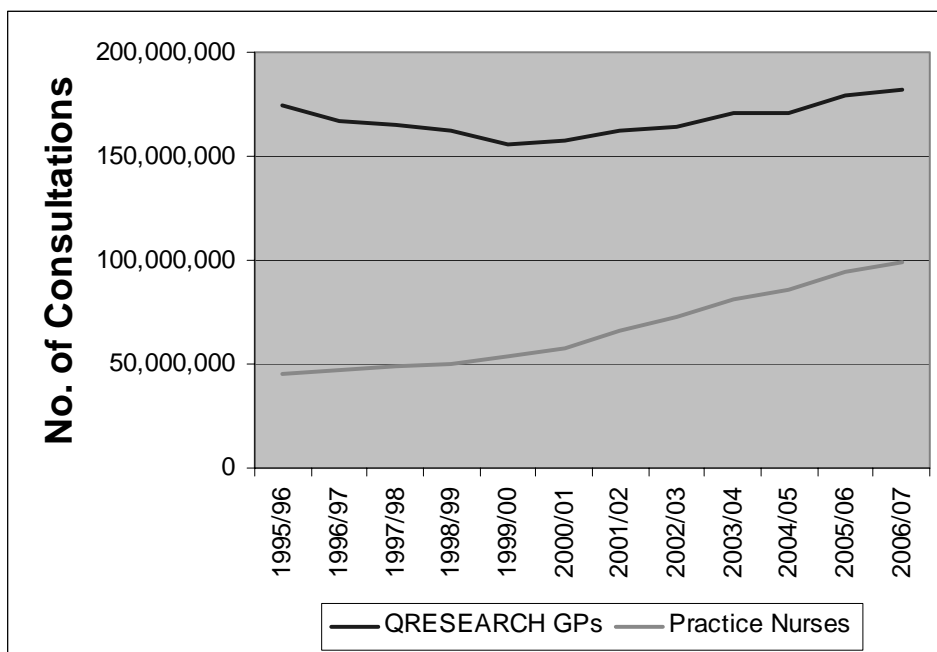
- 3.1. The new source of primary care data is a research database of electronic general practice records held by QRESEARCH (<http://www.qresearch.org/>), part of the University of Nottingham. Records are downloaded directly from the patient records used by practices for patient care and so a large range of information is held, and is kept very up to date. The database is one of the largest in the world, currently holding records from 519 general practices on over 9 million patients in the UK. The database holds historical records back to the early 1990s. The general practices covered are mainly in England with relatively few in the rest of the UK. For this reason, the analysis and results are currently limited to the 489 general practices in England. Similar sources of data are in development for general practices in the devolved administrations. A pilot scheme of a computerized GP database has just been completed in Northern Ireland.
- 3.2. Table 1 sets out the advantages of QRESEARCH, compared with the GHS. The QRESEARCH database is based on more reliable underlying data, more appropriate geographic coverage and an unrestricted collection period. The larger relative sample sizes in QRESEARCH lead to smaller confidence intervals on activity growth rates.

Table 1 Comparison of main characteristics of GHS and QRESEARCH sources of general practice consultations

	General Household Survey	QRESEARCH
Sample size	c. 20,000 respondents	489 practices (out of c. 8750); >>3,000,000 patients
Basis of record	Respondents recall whether they have been to a general practice over past 14 days (indirect)	Computer databases in general practice surgeries of individual consultations and records of patient diagnoses, treatment and prescriptions (direct)
Geographic coverage	Great Britain	UK but sample frame is best for England (similar sources being developed in devolved administrations)
Data collection period	Over specific 2 week period (varies between years)	Over entire year
Year basis	Calendar year (2003 data used for 2003/04 etc.)	Quarterly data, so can format as either financial year or calendar year
Confidence intervals (GP activity growth)	6%-7% (1996/97-2004/05)	7% falling to 3% (1996/97-2004/05)
Confidence intervals (PN activity growth)	12%-11% (2001/02-2004/05)	8%-6% (2001/02-2004/05)
GP disaggregation by location	Surgery, health centre, home, phone	Surgery, home, phone
GP data coverage	1971/72 to date	1995/96 to date
PN data coverage	2000/01 to date	1995/96 to date

- 3.3. QRESEARCH data are used to calculate the average number of consultations per person, subdivided by age and gender and location, as for GHS data. However, unlike the GHS consultation rate (which is multiplied by the ONS population figures to provide an estimate of the number of consultations in England), the QRESEARCH consultation rate is grossed up using the number of registered patients in England, on a regression equation which allows for the extent to which QRESEARCH practices are not completely representative.
- 3.4. The numbers of GP and PN consultations estimated from QRESEARCH are shown in Figure 2. QRESEARCH gives an estimated number of GP consultations which is about 25% lower than GHS (8% lower for practice nurse consultations). This is thought to be because of recall bias in the GHS – people may be remembering consultations which are more than 2 weeks ago, and are less likely to forget to report consultations within the last 2 weeks. The QRESEARCH series also has less abrupt fluctuation between years.

Figure 2: GP and PN consultations in England estimated from QRESEARCH for the period 1995/96 to 2006/07



3.5. In almost all respects the QRESEARCH database is a superior source for estimating consultations, compared with the GHS. After a formal peer review, it has been agreed that this source will be used in future for the UK National Accounts.

#### 4. Quality Adjusted Primary Care Output

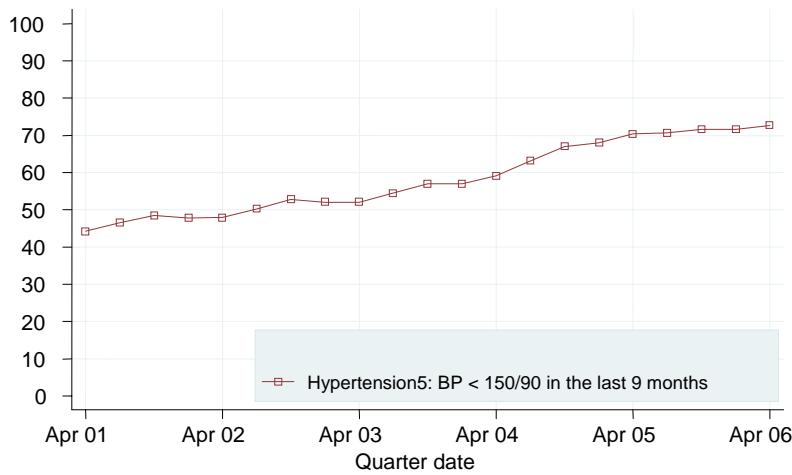
4.1. The QRESEARCH database also provides information on aspects of the quality of treatment. The approach reported in this article is linked to the quality and outcomes framework (QOF) used for payments to general practices since April 2004. QOF defines a large number of indicators of quality which have been agreed to be easily measurable in practices and susceptible to practice action. Most are process indicators – e.g. having a register of patients with a particular disease. The indicators considered in this paper are partial outcome indicators, where the results show that good quality care has had an impact. The main examples are for blood pressure and cholesterol levels, which are associated with increased risk of heart attack, stroke and other conditions, and which can be kept under control by a combination of changing life style and medication. These are examples which fit with the Atkinson principle B, that public service output should be measured as the incremental impact on outcomes arising from the activities of public services. Success in changing lifestyle depends on patients’ own activities, and pharmaceutical research underpins the health gain, but regular encouragement and monitoring by primary care health professionals is important.

4.2. QRESEARCH is a better source for this work than the national system for recording practices’ achievements under QOF, because it gives a time series before 2004, can be used for quarterly data, records are held at patient level rather than practice level, and there is scope for better linkage with other data (e.g. comorbidity between diagnoses). Eleven possible indicators were examined, for 5 years (21 quarterly data points). In a number of cases, changes in clinical coding systems meant

that data could not be used. The analysis in this paper therefore uses five indicators: blood pressure control for patients diagnosed with hypertension, blood pressure control and cholesterol control for patients diagnosed with heart disease, and blood pressure and cholesterol control for patients who have had a stroke.

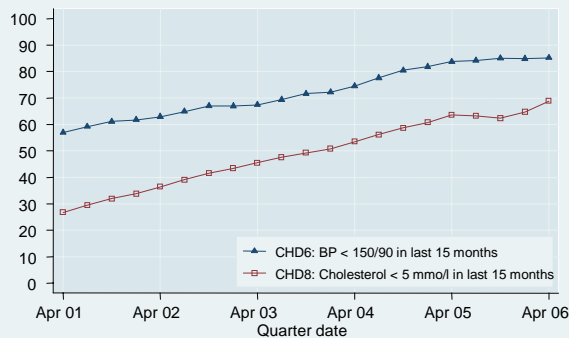
- 4.3. The evidence in Figures 3 – 5 is that the proportion of patients whose blood pressure or cholesterol is within the desired clinical range has improved, in each case.

Figure 3: Percentage of hypertension patients with blood pressure under control



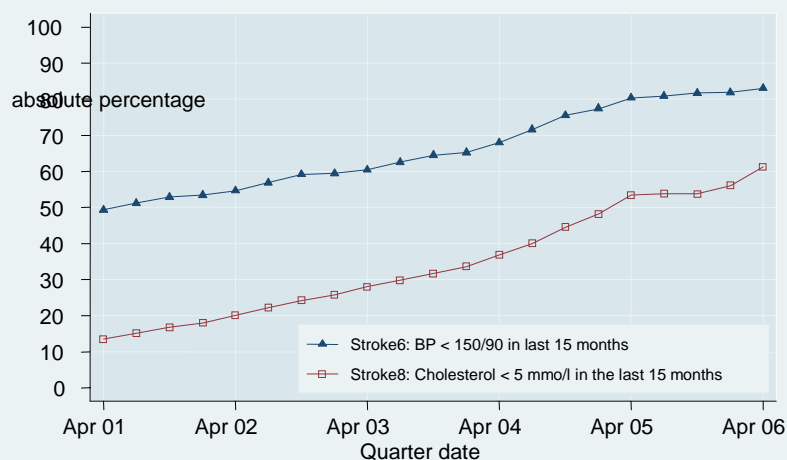
© QRESEARCH 2006 version 12, overall registered population 3.4 million

Figure 4: Trends in percentage of coronary heart disease patients achieving CHD6 and CHD8 indicators



© QRESEARCH 2006 version 12, overall registered population 3.4 million

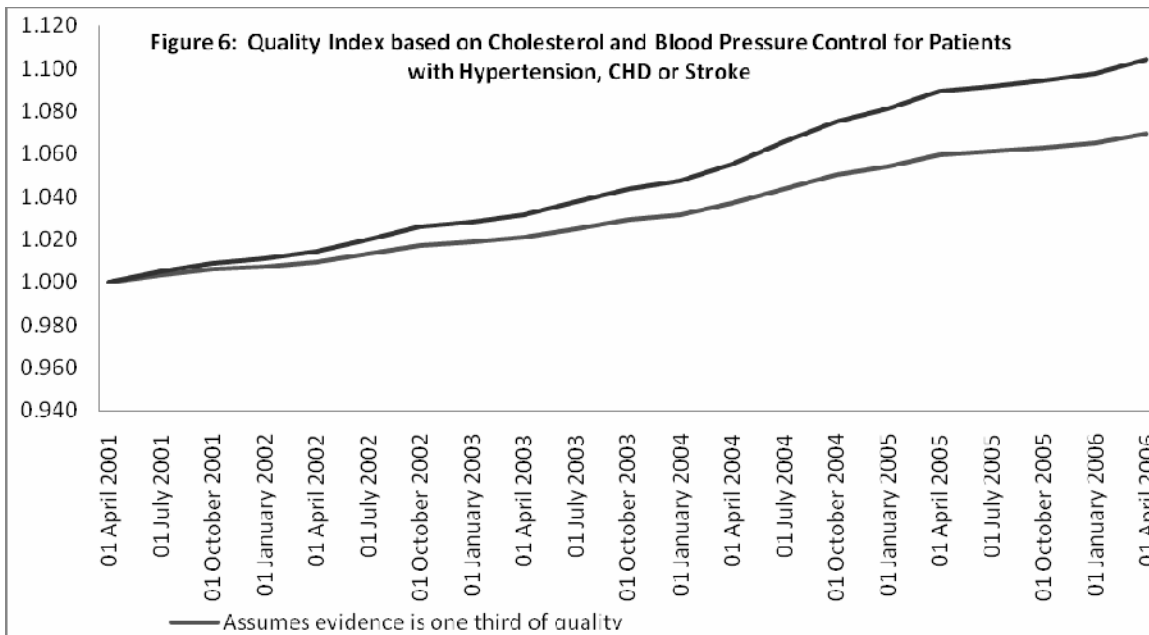
Figure 5: Percentage of stroke patients achieving Stroke6 and Stroke8 indicators



© QRESEARCH 2006 version 12, overall registered population 3.4 million

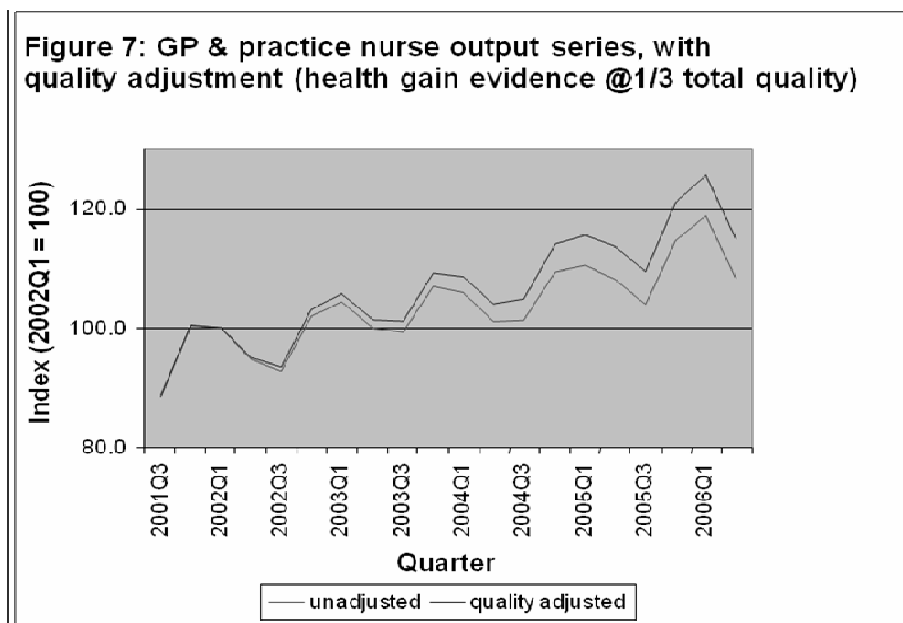
- 4.4. The rate of change has been fairly even over the period – this suggests that the increase is not purely a response to the financial incentives introduced in April 2004. Other data show that the recorded prevalence of each disease also increased, probably through increased screening – though population ageing and better recording are also factors. The likeliest interpretation is that practices were responding to ‘best clinical practice’ guidance over the last decade, which has put increased emphasis on the scope for preventing heart disease and stroke; better recording as computer systems improved may also be a factor. It seems reasonable to interpret this evidence as a genuine improvement in health, at least partly attributable to primary care activities. But it is also important to recognise that other areas of patient care have probably not improved by the same extent.
- 4.5. This evidence gives 5 separate series showing improvements in quality of some aspects of general medical practice. To use these as a quality adjustment to the consultation series, it is necessary to develop a single aggregate index. This involves weights for each of the separate indicators. The assumptions used are:
- Where a disease has more than one outcome indicator, they are each given equal weight;
  - Indicators for different diseases are combined in proportion to their prevalence;
  - The indicators are assumed to account for either one third or one half of the potential ‘quality’ received from general practice by patients with the specified conditions;
  - Patients with none of the specified diseases are assumed to have received care of a constant quality.
- 4.6. This results in a quality index, shown in Figure 6. There are two versions, depending on the assumption about ‘known unknowns’. Even patients who experience health gain as discussed will not regard this as the only way they would want to measure the quality of general practice. They also want good quality care for other conditions, and they want appointments at convenient times and friendly receptionists. To allow for these ‘known unknowns’, which are assumed to have stayed unchanged over time, the higher line in the graph assumes that the measured quality is half the ‘total quality’ which might be experienced by the patient. In this case, overall quality of

primary care for all patients has grown by 2% a year. The lower line assumes that measured quality is one third of 'total quality': this estimates overall quality as growing at 1.3% a year.



## 5. Quality Adjusted Output Series

- 5.1. Finally, the indices of the consultation series and the quality series are multiplied together, as shown in Figure 7. This just gives the more conservative version of the quality index. These figures will be used in a forthcoming ONS health productivity article, but not in the National Accounts.



## Conclusion

5.2. A new source for estimating primary care consultations in the National Accounts has been identified. Consultation estimates from QRESEARCH data have clear advantages over those from the GHS, because:

- Consultations in QRESEARCH are measured directly, but GHS estimates are dependent on respondents' recall at time of survey;
- GHS applies to a particular 2 week period, which is not consistent between years, while QRESEARCH data are obtained over the full year;
- GHS data reported on calendar year basis, whereas QRESEARCH data available in financial year form (the annual output index is calculated by financial year);
- Smaller confidence intervals for QRESEARCH data;
- A longer series of practice nurse activity data in QRESEARCH;
- Quarterly data now available in QRESEARCH (not possible using GHS);
- Sources of data similar to QRESEARCH becoming available in the devolved administrations;
- QRESEARCH data can be linked to other information about patient characteristics, diagnoses and treatments;
- Using QRESEARCH data for blood pressure and cholesterol control for patients diagnosed with hypertension, heart disease or having had a stroke, and allowing for 'no change' in quality in other aspects of primary care, it is estimated that the quality of primary care improved by 1 – 2% a year from 2001 to 2006.

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QRESEARCH analysis to be published shortly by the Health and Social Care Information Centre and DH, including a full report by Julia Hippisley-Cox on the data sets and methods.