Previous consultation and self reported health status as predictors of future demand for primary care

K Jordan, B N Ong, P Croft

Study objective: There has been little prospective investigation of what predicts general practice consultation. The objective of this study was to investigate the extent to which previous primary care consultation and self reported health status are predictors of future primary care consultation.

Design: Population based cohort study in two phases. Firstly, a baseline survey (1995/96) to identify the cohort and to obtain self reported health status using the UK census limiting long term illness (LLI) question and the Short Form-36 (SF-36) health profile. Secondly, analysis of general practice medical records for two years (1994/1995) before the survey and for two years (1997/1998) after the survey. Analysis was performed on: (a) all contacts coded by the GP, (b) the subgroup of contacts given a diagnostic morbidity code by the GP.

Setting: One general practice in North Staffordshire, UK.

Participants: 738 survey respondents who had consented to viewing of medical records including all those who reported LLI together with an age-gender matched control group of those who reported no LLI.

Main results: High frequency consultants in 1994/95 were more likely than non-consulters or average consultants in that year to be high consultants in 1997/98 (odds ratio 5.6, 95% confidence interval 3.82 to 8.25, for all contacts; 4.4 for diagnostic coded consultations). Self reported role disability and physical limitation from the SF-36 at baseline increased the probability of being a future high consultant but the effects were weaker than for previous consultation. Previous consultation within a diagnostic group was the main predictor for future consultation within that group with weaker but significant prediction by self reported health status.

Conclusions: Reliable morbidity coding in general practice provides the best available basis for predicting future demand in primary care. Self reported health status survey instruments add to this information but on their own are weaker predictors of future consultation.
difference was that responders in the non-LLI group were slightly older than non-responders.

**Self report measures**
The LLI question asked: “Do you have any long-term illness, health problem or handicap which limits your normal daily activities or the work you can do? Include problems which are due to old age”. The SF-36 \({\text{SF-36}}\) consists of 36 questions on eight different dimensions of health. We categorised responders according to four dichotomous indicators: (1) The physical limitations indicator signifies the subject has reported “Yes, limited a lot” on at least one of the Physical Functioning questions. (2) The emotional limitations indicator signifies a subject has a score of 52 or less on the Mental Health scale. (3) The role disability indicator signifies a subject has reported a physical or emotional role limitation. For example, cutting down amount of time on work or other activities because of physical or emotional health. (4) The unfavourable personal evaluation indicator signifies a subject who has rated their health in general to be “poor” or “fair”.

**Demographic measures**
Apart from age and gender, the Townsend index \({\text{Townsend}}\) was incorporated as a proxy measure of social deprivation. This index is a composite score of the unemployment, overcrowding, non-car ownership, and non-home ownership variables from the UK census, calculated at the smallest geographical level of the census (the enumeration district). Enumeration districts were linked to the subjects’ postcodes and each district score calculated relative to the score for the total area covered by the practice. This score was then allocated to the individual as an “ecological measure”.

**Measures of consultation**
The Read code system is the standard for recording clinical information in the UK NHS. It allows primary health care workers to code consultations by diagnosis, presenting symptom or procedure undertaken. A “consultation” was defined in this study as any contact (surgery visit, telephone, home visit) recorded and given a Read code by a general practitioner. These will include process of care contacts (influenza vaccination, for example), contacts coded with non-specific symptom codes, and illness labels recorded by the GP under one of the diagnostic Chapters (Chapters A–R) in the Read Code system. Audits of the practice in 1998 showed that 99% of all consultations to a GP at the practice were given a Read Code and over 90% of patients taking selected drugs had the relevant morbidity code in their record.

An additional subgroup analysis was restricted to consultations coded into one of the diagnostic Chapters, which represents the broad presenting condition (for example, musculoskeletal, mental health). In 1997/98, 60% of all GP contacts in the study practice were recorded in the diagnostic Chapters.

**Analysis**
The first outcome was frequency of consultation in 1997/98 (non, average, or high) defined from the quartile distribution. For the “all contacts” analysis, high consultation was defined as nine or more over the two year period, based on the upper quartile value for the 1997/98 period; for the diagnostic Chapter subgroup analysis, five or more consultations was the upper quartile value. Average consultants were consultants below the upper quartile. Non-consulters had no contacts during the two year period.

Two types of analysis were performed. Firstly, baseline characteristics in high consultants 1997/98 were compared with non-consulters and average consulters using binary logistic regression. Self reported LLI, the four SF-36 indicators and whether the subject was a high consultant or not in 1994/95 were predictor variables. Age, gender, and Townsend deprivation score were included as potential confounders. Initially, previous consultation (1994/95) and the LLI indicator were included in the model with the potential confounders to explore how a simple, single health question might predict consultation behaviour. A second model was derived using a stepwise forward method of model selection, using all the variables, to determine any improvement in prediction from using the SF-36. A significance level of 0.05 was used to determine selection.

In the second analysis, ordered logit regression was used, with trichotomous consultation status in 1997/98 (non, average, or high) as the outcome. Consultation in 1994/95 was also trichotomised with two dummy variables (high and average consultation, with non-consultation as the reference category). The probability of being a high consultant in 1997/98 was then ascertained based on different combinations of the predictor variables.

These analyses were performed separately for all contacts and for the subgroup of consultations coded to a diagnostic Chapter. Finally, the first (stepwise) analysis procedure was repeated separately for each diagnostic Read Code Chapter to assess predictors of consultation in 1997/98 from baseline measures for each Chapter. Only Chapters with 50 or more consultants in 1997/98 were assessed.

Analyses were performed using SPSS for Windows 10.0\(^{10}\) and Stata 6.0\(^{11}\).

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**Table 1** Baseline characteristics by frequency of consultation in 1997/98

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<thead>
<tr>
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<th>Frequency of consultation 97/98</th>
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<tr>
<td></td>
<td>Total</td>
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<tr>
<td><strong>Number</strong></td>
<td>738</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>58.3 (14.28)</td>
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<tr>
<td><strong>Annual</strong></td>
<td>60</td>
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<tr>
<td><strong>Female</strong></td>
<td>404 (55%)</td>
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<tr>
<td><strong>High consultant 94/95</strong></td>
<td></td>
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<tr>
<td><strong>All contacts</strong></td>
<td>225 (30%)</td>
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<tr>
<td><strong>A–R only</strong></td>
<td>249 (34%)</td>
</tr>
<tr>
<td><strong>Report LLI</strong></td>
<td>361 (49%)</td>
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<tr>
<td><strong>SF-36 indicators</strong></td>
<td></td>
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<tr>
<td><strong>Physical limitations</strong></td>
<td>353 (48%)</td>
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<tr>
<td><strong>Emotional limitations</strong></td>
<td>106 (15%)</td>
</tr>
<tr>
<td><strong>Role Disability</strong></td>
<td>397 (54%)</td>
</tr>
<tr>
<td><strong>Unfavourable Personal Evaluation</strong></td>
<td>236 (32%)</td>
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</table>

*Number will be lower for the SF-36 indicators because of missing data on the questionnaire, percentages relate to the percentage of the total number for that column.*
**RESULTS**

**Frequency of consultation**

Table 1 gives details of the study cohort. There were significant differences (p<0.01) between high and non-high consultants at baseline (defined either by all contacts or by diagnostic Chapter consultations only) for all baseline variables in univariate analyses.

Table 2 shows that a high consulter in 1994/95 was more likely than a non-consulter or average consulter to be a high consulter in 1997/98, independent of LLI (odds ratio 5.61 for all contacts, 4.44 for the diagnostic Chapter subgroup). After the effect of the 1994/95 consultation frequency is taken into account, there was an added predictive effect of reported LLI.

In the stepwise model (table 2), a high consultation rate in 1994/95 was the strongest predictor. The other significant predictor was role disability. Physical limitations was also a predictor for the diagnostic subgroup only. LLI status, emotional limitations, and unfavourable personal evaluation were not selected as predictors in either of the final models.

Table 3 shows the estimated probability (expressed as a percentage) of being a high consulter in 1997/98 for a 50 year old woman residing in an area with Townsend score 0 together add to the consultation data; having neither a physical limitation nor a role disability reduces the likelihood of being a subsequent high consulter to 41%, having both increases it to 55%. The models for the diagnostic subgroup are similar.

**Individual diagnostic Chapters**

Predictors of subsequent consultation within the individual diagnostic Chapters are shown in tables 4 and 5. Table 4 shows the models with previous consultation in that Chapter and reporting of LLI as the predictor variables (adjusted for age, gender, and Townsend score). Consultation at baseline was significantly associated with future consultation in the same Chapter for all but infectious and parasitic diseases. For example, consulter in 1994/95 under a musculoskeletal code had 2.6 times the odds (than someone who did not) of consulting with a musculoskeletal code in 1997/98. Reporting LLI was significantly associated with future consultations within some individual Chapters, but associations were weaker than for previous consultation.

The link between LLI and subsequent consultation for musculoskeletal, circulatory, and nervous conditions persisted significantly associated with future consultation in the same Chapter for all but infectious and parasitic diseases. For example, consulter in 1994/95 under a musculoskeletal code had 2.6 times the odds (than someone who did not) of consulting with a musculoskeletal code in 1997/98. Reporting LLI was significantly associated with future consultations within some individual Chapters, but associations were weaker than for previous consultation.

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was the best predictor for subsequent infectious disease consultations. Role disability predicted injuries and poisoning consultations best of the self report health related variables.

DISCUSSION

Previous consultation frequency is a stronger predictor for subsequent consultation frequency than measures of self reported health status. The simple conclusion is that future health demand, as measured by consultations with the general practitioner, is most usefully estimated from routinely collected general practice data than from one off general population surveys. The implication for planning by primary care groups and public health departments is that adequate resources should be directed towards supporting and improving routine primary care data collection.

There are caveats to this. Firstly, the need for health care among those who do not consult requires a different measure. Our earlier work indicated that there are groups of people who report LLI and score poorly on the SF-36, particularly to the physical dimensions.

The similar results for the all contacts and the subgroup analyses highlight the predictive strength of contact data in general. However, the strong association within diagnostic Chapters between past and future consultations also emphasises that specificity of morbidity coding will improve the quality of prediction. The practices within the North Staffordshire General Practice Network are increasingly being encouraged to record consultations under a diagnostic code. This still allows for uncertainty, for example, when consultations are about symptoms whose cause is unclear, but encourages standard classification of such symptoms.

While the LLI question predicted consultations in certain disease categories in the subsequent two years, it is not a major predictor of overall consultation. The physical and emotional limitation indicators of the SF-36 did show a link with the corresponding disease Chapters and the physical limitation and role disability indicators did improve prediction of frequency of overall consultation. However, the SF-36 is more complicated, takes longer to complete, and is more likely to result in missing data than the LLI question. The LLI question is related to the SF-36, particularly to the physical dimensions. The SF-36 physical limitation indicator was more strongly related to subsequent frequency of consultation.

### Table 4

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Consulted 94/95 OR (95% CI)</th>
<th>LLI at baseline OR (95% CI)</th>
<th>Physical Limitation OR (95% CI)</th>
<th>Emotional Limitation OR (95% CI)</th>
<th>Role Disability OR (95% CI)</th>
<th>Unfavourable Personal Evaluation (v favourable)</th>
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<tbody>
<tr>
<td>A: Infectious</td>
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<td>E: Mental</td>
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<td>F: Nervous</td>
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<td>G: Circulatory</td>
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<td>H: Respiratory</td>
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<td>I: Digestive</td>
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<td>J: Genitourinary</td>
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<td>L: Skin</td>
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<td>M: Musculoskeletal</td>
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<td>P: Injury/poisoning</td>
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</table>

*Adjusted for age, gender, and Townsend deprivation score and other variable shown. Bold indicates CI does not include 1.00. †Number consulting under diagnostic Chapter in 1997/98. ‡Consultation in same Chapter, compared with no consultation in that Chapter. § Compared with reporting no LLI.

### Table 5

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Consulted 94/95 (v no consult)</th>
<th>LLI at baseline (v no LLI)</th>
<th>Physical Limitation (v no limitation)</th>
<th>Emotional Limitation (v no limitation)</th>
<th>Role Disability (v no disability)</th>
<th>Unfavourable Personal Evaluation (v favourable)</th>
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<td>A: Infectious</td>
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*Adjusted for age, gender, and Townsend deprivation score and other variables in model.
within the non-LLI group (among non-consulters in 1997/98
15% had a physical limitation at baseline, average consulters
22%, high consulters 37%, \( \chi^2 \) test for trend \( p=0.001 \)) than in
the LLI group (71%, 73%, and 80% respectively, \( \chi^2 \) test for trend
\( p=0.12 \)). The interaction term for LLI and physical limitations
did not, however, improve the final models shown in table 2.

The multitage design of the study reduced response in
terms of those who had their records reviewed. However, the
only difference between those consenting to record review and
those not is that the consenters were slightly older (difference
in means 3.7 years, 95% CI 2.3 to 5.1). There is no reason to
believe that the baseline non-response affects our conclusions.
More relevant to this cohort study was the low loss to follow
up, an advantage of using consultation data as an outcome
measure.

It would be beneficial to repeat this work in the UK within
other practices. Although the study practice resides in an area
reflecting a wide range of socioeconomic status, ethnic
minorities, for example, are under-represented. Although the
results of our study are likely to be generalisable to other gen-
eral practices in the UK, a more difficult question is their rel-
ance to other countries and healthcare systems. The unique
reliance on general practice as the point of access to the whole
healthcare system in the UK means that our data can provide
a reasonably complete account of illness for which health care
is sought in a general population. In countries where people
can access health care from a variety of sources, general prac-
tice data may be an incomplete picture of morbidity and be
less useful for health planning. However, if data are available
on the full range of healthcare use, then the findings from our
study are likely to be generalisable—namely that current con-
sultation patterns are a strong predictor of future consul-
tation—with the same practical implications for policy
and planning as we have outlined for the UK situation.

The implication of this study is that good morbidity record-
ing is needed to help plan for future demands on health care.
Opportunistic use of the LLI question or periodic surveys may
usefully improve practice records but their main function
might be to identify poor health in non-consulters.

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part in the survey and the anonymous referees who gave helpful com-
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Conflicts of interest: none.

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