Why do they keep coming back? Persistent frequent attenders in primary care
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chapter 4

PREDICTABILITY OF PERSISTENT FREQUENT ATTENDANCE: A HISTORIC 3-YEAR COHORT STUDY

Frans T. Smits, Henk J. Brouwer, Henk C. van Weert, Aart H. Schene, Gerben ter Riet

ABSTRACT

Background
Few patients who attend frequently continue to do so. While transient frequent attendance may be readily explicable, persistent frequent attendance often is not. Besides chronic morbidity, persistent frequent attenders may have hidden illness. They increase GPs’ workload while reducing work satisfaction. It is neither reasonable, nor efficient to target diagnostic assessment and intervention at transient frequent attenders.

Aim
To develop a prediction rule for selecting persistent frequent attenders using readily available information from GPs’ electronic medical records.

Design
A historic 3-year cohort study

Method
We used data on 28,860 adult patients from 2003 to 2005. Frequent attenders were patients whose attendance rate ranked in the (age and sex adjusted) top 10 percent during 1 year (1-year frequent attenders) or 3 years (persistent frequent attenders). Using bootstrapped multivariable logistic regression analysis, we determined which predictors contained information on persistent frequent attendance.

Results
Out of 3045 1-year frequent attenders 470 (15.4%) became persistent frequent attender. The prediction rule could update this prior probability to 3.3% (lowest value) or 43.3% (highest value). However, the 10th and 90th centile of the posterior probability distribution were 7.4% and 26.3%, respectively, indicating that the model performs modestly. The area under the receiver operating characteristics curve was 0.67 (95% confidence limits 0.64 and 0.69).
Conclusions
Among 1-year frequent attenders, six out of seven are transient frequent attenders. With the present indicators our rule performs modestly in selecting those at risk of becoming persistent frequent attender. More information or complementary diagnostic tests seem needed to construct a rule with sufficient performance for efficient risk stratification in clinical trials.
**Introduction**

It is estimated that about 80% of a GP’s clinical work is spent on 20% of his/her patients, and that one in every seven consultations is with patients who rank in the top 3% of the attendance rate.\(^1\) Frequent attendance is often defined as an age and sex-adjusted attendance rate ranking in the top 10 centile within a time frame of one year.\(^2,3\)

Although longitudinal studies on frequent attenders are scarce, we know that most frequent attenders frequently attend their GP for a short period of time only.\(^4,7\)

**Loss to follow-up**

368 patients (12%) were lost at some point over the two years of follow-up. We argued that, in theory, a potential frequent attender might move out of the practice due to dissatisfaction with care. The resulting selection bias may attenuate associations found between the selected indicators and frequent attendance. We tested our hypothesis in a multivariable logistic regression analysis with an indicator variable “1 = moved house” and “0 otherwise” as the dependent variable and 9 independent indicators (see below). Our hypothesis was not confirmed. On the contrary, we found some evidence that those with at least one chronic somatic illness were less likely to have moved out of the practice (odds ratio 0.73 (95% CI from 0.54 to 0.99)); all other associations were neither strong nor significant. These results support the view that important selection bias is unlikely. Sixty-eight patients (2.2%) had died over the two year follow-up period, but since, by definition, these patients cannot become 3-year frequent attenders, selection bias by death is impossible.

**Variable selection**

Frequent attendance during all three years, coded as 1, and zero otherwise was the dependent variable. Independent variables: Continuous variables (age and the number of problems on the GP’s problem list) were assessed for linear association with the dependent variable using a graphical method proposed by Harrell to avoid model mis-specification\(^1\). Presence of diabetes mellitus and/or chronic respiratory illness and/or chronic cardiovascular illness was coded as 1, absence of any of the above as zero (52 had all three, 316 had two, 891 one, 1786 none).

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**Box 1. Approach to the multivariable analysis**

Trials on the effect of (mainly psychiatric) interventions on morbidity and attendance rates showed conflicting results.\(^8\) No study showed convincing evidence that an intervention improves quality of life or morbidity of frequent attending primary care patients, although an effect might exist in a subgroup of depressed frequent attenders.\(^5-11\) For this subgroup one trial concluded that, in the year following the intervention, patients in the intervention...
Similarly, presence of psychological and/or social problems including (feelings of) anxiety, (feelings of) depression, and/or substance abuse were combined (0 had all five, 1 had four, 33 three, 371 two, 285 one, and 2355 none). The use of antidepressants, anxiolytics, and/or hypnotics was similarly combined (118 patients used all three types of drugs, 290 two, 408 one, and 2107 none).

Thus, the 9 candidate predictors, modelled as 11 variables, included:
1. age at baseline (continuous),
2. sex,
3. number of problems on the problem list (continuous),
4. any of the three chronic somatic illnesses just mentioned (yes/no),
5. any psychological/social problem (yes/no),
6. any medically unexplained physical problem (yes/no),
7. psychoactive medication (yes/no),
8. average monthly number of prescriptions for antibiotics (0 = reference category; 1-2; >2),
9. average monthly number of prescriptions for analgesics (0 = reference category; 1-4; >4).

A final model was selected using bootstrapped forward stepwise logistic regression analysis which was performed 100 times. The p-values for entry of variables into and removal from the model were 0.10 and 0.15, respectively. Candidate predictors had to be selected 70 times or more to be eligible for the final model. The final model's fit was tested using the Hosmer-Lemeshow test (10 groups) and accounted for intracluster correlation within general practices by using robust variance estimation according to Huber and White. Adding interaction terms to the final model, we assessed subgroup effects in the following subgroups requiring a p-value < 0.10 for significance: coexistence of a documented somatic and psychosocial problem; coexistence of a psychosocial problem and prescription of pain medication; female sex and prescription of pain medication. The regression coefficients of the final model were used to compute the probabilities of being a three year FA. The final model's area under the receiver operating characteristics (AUC_{ROC}) curve was calculated as a summary of predictive power. The final model was fitted 500 times using bootstrap methodology and the corresponding ROC curves were used to construct a more robust confidence interval (CI) around the area under the curve thus counteracting the influence of observations unique to our data set.

Reference List
WHY DO THEY KEEP COMING BACK?

Methods

Patient population

Five primary health care centres in Amsterdam provided data for this study. These centres participate in the GP-based continuous morbidity registration network of the Department of General Practice, Academic Medical Centre - University of Amsterdam. In this network EMR data are extracted for research purposes. The studied patients have a lower socio-economic level, are of more non-western descent and are slightly younger than the Dutch population. The participating GPs use a problem-oriented registration method. For this study we used the numbers of face-to-face consultations with the GPs, the lists of current medical problems as registered and coded by the group had, on average, 47 depression-free days more (5% CI from 27 to 68). There is no evidence that it is possible to influence health care utilization of frequent attenders. All trials except one included patients that attended frequently during one year.

Using information readily available in GPs’ electronic medical records, we set out to develop a prediction rule to help GPs to identify, among 1-year frequent attenders, those at extremely low or high risk of becoming persistent frequent attender. Such a rule, in addition to being clinically useful, may also support the selection of more homogeneous patient groups in future randomized trials among (subgroups of) persistent frequent attenders.
GP using the International Classification of Primary Care (ICPC) and the number of a selection of prescriptions of all patients from 1 January 2003 through 31 December 2005.

Selection of one-year frequent attenders and persistent frequent attenders

Frequent attenders were defined as those patients whose attendance rate ranked nearest to the top 10th centile of their sex and age group (15-30; 31-45; 46-60; 61+). Frequent attenders were determined for each of the years 2003, 2004 and 2005. We took as a starting point the selected frequent attenders of 2003. We defined persistent frequent attenders as those patients who were both registered and a frequent attender during all three years.

Only face-to-face consultations with GPs (consultations in the office and house calls) were included. Consultations with other practice staff were excluded because these contacts are mostly initiated by the GP or his/her staff and are related to controlling chronic diseases. We determined the mean number of consultations per age and sex group for frequent attenders and non-frequent attenders. Patients younger than 15 years were excluded, because their consultations often depend on their parents.

Definition and extraction of predictor information

In the problem-oriented approach to medical record keeping a patient may have a list of current medical problems, also called problem list. Different from the definition used in the UK, in the Netherlands a current medical problem is defined by the GP as:

1. Any medical problem (disease or complaint) which needs continuing medical attention or monitoring.

2. Any complaint or disease present for more than 6 months (excluding all (minor) short episodes).

Every problem on this list was coded by the GPs using the International Classification of Primary Care.13

Problem lists were extracted at the end of 2003 and 2005. The prevalence of each medical problem was calculated for 1-year frequent attenders at the end of the first year, for persistent frequent attenders at the end of the third year. From the electronic medical record we extracted those prescriptions and medical problems in which, according to the literature, frequent attenders and non-frequent attenders differed most: Number of prescriptions (for analgesics, tranquilizers, antidepressants and antibiotics), diabetes mellitus, chronic cardiovascular disease, chronic respiratory disease, (feelings of) anxiety, (feelings of) depression, addictive behaviour, any psychological/psychiatric problem, all social problems and medically unexplained physical symptoms (MUPS).

MUPS were defined according to Robbins et al and complied with the definition of the Problem List.15 (See appendix 1 for the used ICPC-codes)

Statistical analysis

We applied a multivariable analysis using all above-mentioned information
as predictors for persistence of frequent attendance (See box 1). After checks for errors and consistency we assessed the potential for selection bias due to loss to follow-up and death and used bootstrapped stepwise logistic regression to select the variables for the final model.

Box 1 provides a detailed description of our analytical approach. Statistical analyses were performed in Stata (version 9.2).

Results

(Persistent) frequent attenders

Of the 2609 frequent attenders in 2003 who could be followed for three years, 1008 (38.6%) also frequently attended in 2004, while 470 (18.0%) continued to do so in 2004 and 2005 and were persistent frequent attender according to our definition (See figure 1). These persistent frequent attenders comprised 1.6% of all registered patients of 15 years and older in 2003. We studied selection bias, but found (virtually) none for moving out of practice or for death (see box 1).

<table>
<thead>
<tr>
<th>Predictor</th>
<th>(crude) Odds ratio</th>
<th>95% confidence interval limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age¶</td>
<td>1.01</td>
<td>1.00 - 1.017</td>
</tr>
<tr>
<td>Sex, female</td>
<td>1.46</td>
<td>1.14 - 1.87</td>
</tr>
<tr>
<td>Number of active problems¶</td>
<td>1.21</td>
<td>1.16 - 1.25</td>
</tr>
<tr>
<td>Any chronic somatic illness</td>
<td>1.97</td>
<td>1.67 - 2.33</td>
</tr>
<tr>
<td>Any psychological problem</td>
<td>2.18</td>
<td>1.73 - 2.76</td>
</tr>
<tr>
<td>Medically unexplained complaint</td>
<td>2.02</td>
<td>1.55 - 2.62</td>
</tr>
<tr>
<td>Any psychoactive medication</td>
<td>1.50</td>
<td>1.21 - 1.86</td>
</tr>
<tr>
<td>Mean monthly number of analgesic prescriptions: 0</td>
<td>1</td>
<td>Reference category</td>
</tr>
<tr>
<td>1-4</td>
<td>1.83</td>
<td>1.48 - 2.25</td>
</tr>
<tr>
<td>&gt;4</td>
<td>2.56</td>
<td>1.98 - 3.30</td>
</tr>
<tr>
<td>Mean monthly number of antibiotic prescriptions: 0</td>
<td>1</td>
<td>Reference category</td>
</tr>
<tr>
<td>1-2</td>
<td>1.21</td>
<td>0.99 - 1.48</td>
</tr>
<tr>
<td>&gt;2</td>
<td>1.46</td>
<td>0.98 - 2.18</td>
</tr>
</tbody>
</table>

* Based on 3045 observations; 470 pFAs (dependent variable = 1);
¶ modelled as a continuous variable; All other variables were modelled as dummies.
Table 2. Associations between the five predictors retained in the final model and persistent frequent attendance (pFA), the dependent variable.*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>(adjusted) Odds ratio</th>
<th>95% confidence interval limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.99</td>
<td>0.98 – 1.00</td>
</tr>
<tr>
<td>Number of active problems</td>
<td>1.13</td>
<td>1.05 – 1.22</td>
</tr>
<tr>
<td>Any chronic somatic illness</td>
<td>1.55</td>
<td>1.25 – 1.93</td>
</tr>
<tr>
<td>Any psychological problem</td>
<td>1.72</td>
<td>1.30 – 2.27</td>
</tr>
<tr>
<td>Mean monthly number of analgesic prescriptions: 0</td>
<td>1</td>
<td>Reference</td>
</tr>
<tr>
<td>1-4</td>
<td>1.77</td>
<td>1.41 – 2.23</td>
</tr>
<tr>
<td>&gt;4</td>
<td>2.06</td>
<td>1.59 – 2.66</td>
</tr>
</tbody>
</table>

* Based on 3045 observations; 470 pFAs (dependent variable = 1); ¶ modelled as a continuous variable; All other variables were modelled as dummies.

Prediction of persistent frequent attendance

Table 1 shows the univariate associations of all candidate predictors with the dependent variable, persistent frequent attendance. Five predictors were retained in the final model: age, the number of problems on the GP’s problem list, presence of any of three chronic somatic illnesses (diabetes mellitus, cardiovascular illness, and respiratory illness), presence of a psychological/social problem, and the use of pain medication (Table 2). None of the interaction effects proved significant at the 10% level. The prior probability of 15.4% (470/3045) of persistent frequent attendance could be updated, using the model, to at best 3.3% (lowest value) or 43.3% (highest value). The 10th and 90th centile of the posterior probability distribution were 7.4% and 26.3%, respectively, indicating that the model performs neither very good to rule out persistent frequent attendance nor to rule it in. The Hosmer-Lemeshow test showed a p-value of 0.254, thus indicating no strong evidence against good model fit. As a summary of the model’s overall discrimination, the \( \text{AUC}_{\text{ROC}} \) was 0.67 (bootstrapped bias corrected 95% CI from 0.64 to 0.69).

Discussion

Summary of main findings

In a historic 3-year cohort study, we found that 15.4 percent of all 1-year frequent attenders persisted in this behavior during two consecutive years. Persistent frequent attenders constituted less than 2% of all registered patients 15+ of age. It proved difficult to predict which 1-year frequent attender persists in frequent consulting behaviour using present readily available information from GPs’ electronic medical records.
Comparison with existing literature

There is substantial literature about the characteristics and morbidity of frequent attenders.\textsuperscript{3,14} It is striking that almost all descriptive literature about frequent attendance is produced in countries with some kind of list system: the United Kingdom, the Scandinavian countries, and Health Maintenance Organizations in the US.\textsuperscript{3,14} Most research on frequent attenders however is cross-sectional and uses one-year attendance rates. In particular, 1-year frequent attenders have been reported to use more analgesics, more antibiotics and more tranquilizers.\textsuperscript{18,19} High attendance rates are also found for patients with medically unexplained somatic symptoms, health anxiety and perceived poor health.\textsuperscript{20-22} The few longitudinal studies show attendance rates to regress to the mean in the longer run, with only 20-30\% of frequent attenders continuing to attend frequently in the following year.\textsuperscript{4-7} These studies on persistent frequent attendance however use different definitions of frequent attenders and lack the power to detect factors associated with transient frequent attendance becoming persistent. In one study psychological distress, as measured with two psychometric scales, was found to increase the risk of future daytime frequent attendance of adult patients in family practice.\textsuperscript{23} As frequent attendance proves to be mostly a transient problem, interventions in 1-year frequent attenders do not seem worthwhile.

Strength and limitations of this study

An important strength of our study is the size and the longitudinal character of the dataset and the experience of the participating GPs in recording and coding the problem lists. Most GPs have participated in the registration network for over 10 years and are used to feedback on their registration activity. The problem lists have been monitored over the years and differences between doctors have been regularly discussed.\textsuperscript{16} Prescriptions are extracted from the electronic medical record and reflect the number of actual prescriptions. Prescription data in general practice may be generally considered to be of higher quality than diagnosis-oriented data.\textsuperscript{17} Our study was based on routinely collected data reflecting everyday general practice in The Netherlands. As far as we know our study is the first predicting persistence of frequent attendance with information readily available to GPs.

Routine data that are readily available have their limitations. For example, problem lists may be inflated (by not removing resolved problems) or subject to underreporting. Moving out of practice was a reason for exclusion, as follow-up of these patients was not possible. Unfortunately, ethnicity and socio economic-level are not (sufficiently) registered in the current electronic medical record. This precluded an analysis of the interaction between ethnicity and several other predictors to explore the role of ethnicity in more detail.

Several trials have been conducted to test interventions to change consultation behaviour and/or morbidity of frequent attenders.\textsuperscript{8} Only one study used frequent
attendance during 2 years.\textsuperscript{10,11} All others included 1-year frequent attenders.\textsuperscript{24-26} Although none of the studies found evidence that it is possible to influence health care utilization by frequent attenders, the one that included frequent attenders during two years did find evidence that treatment of major depressive disorder in a subgroup of depressed frequent attenders improved their symptoms and quality of life.\textsuperscript{10,11}

**Implications for future research or clinical practice**

From the viewpoint of delivering good care GPs do not have the reason or the instruments to look for unmet health-care needs among one year frequent attenders. Both psychological and somatic chronic diseases and complaints predispose modestly a one-year frequent attender to become a persistent frequent attender. However, as the predictive power (for inclusion as well as for exclusion) of our rule proved to be small there might be other reasons for persistence of frequent attendance. Because our study was not a prospective cohort-study, we cannot exclude the existence of ‘hidden morbidity’ among persistent frequent attenders. Further studies are needed to decide, first, whether there exist undiscovered morbidity among persistent frequent attenders and, secondly, whether it is possible and worthwhile to construct a rule with sufficient performance for risk stratification by using more information about the patient or from diagnostic tests.

**Conclusion**

Among 1-year frequent attenders, about six out of seven are transient frequent attenders. Information from GPs’ electronic medical records may be used to identify those at low and higher risk of becoming persistent frequent attender. With the present indicators, available in the electronic medical record, our rule performs modestly in selecting those at risk of becoming persistent frequent attender.

**Ethics committee**

According to the Medical Research Involving Human Subjects Act (WMO), formal approval for this research project by a Medical Ethics Committee was not necessary. The academic GP network extracts data according to strict guidelines for the privacy protection of patients and GPs. In addition we sought and obtained permission for this work from the board of the network.

**Competing interests**

None.

**Acknowledgments**

We thank the GPs involved in the Network of General Practitioners of the Academic Medical Centre/University of Amsterdam (HAG-net-AMC) for their continuous efforts to keep the electronic medical records updated.
References


