Differences in prescribing between GPs. Impact of the cooperation with pharmacists and impact of visits from pharmaceutical industry representatives

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Background. Community pharmacists, pharmaceutical industry and differences in prescribing between GPs.

Objective. To explore the role of the pharmacists and pharmaceutical industry representatives.

Methods. A cross-sectional survey was undertaken of 1434 GPs in The Netherlands in 2001. Prescribing indicators based on general practice guidelines were used to assess the quality of prescribing. Three constructs, based on survey questions, were used as possible determinants for the quality of prescribing: cooperation with the pharmacist; quality of the Pharmacotherapeutic audit meeting (PTAM); and the GP’s attitude towards the pharmacist’s role. Data were collected about the frequency of visits by pharmaceutical industry representatives. Responses from 324 solo GPs were analysed using multiple linear regression.

Results. Response rate: 71%. For the 324 solo GPs the average score for the 20 prescribing indicators was 64% (SD 3.7). For the non-solo GPs this score was 65% (SD 3.8, P<0.05). The differences between solo and group practices were: the number of visits from pharmaceutical industry representatives (5.7 versus 3.8 visits per month), full time GPs (93% versus 50%), the number of patients per GP (2151, SD 693 versus 1506, SD 742), and the presence of a GP trainer (21 versus 38%). Of the solo GPs, 4.6% are female, compared with 26% of the GPs in non-solo practices. The quality of prescribing in solo practices was not correlated with the GP's attitude towards the pharmacist’s role, the way in which GPs cooperated with pharmacists or the quality of the PTAM. More frequent visits from pharmaceutical industry representatives was associated with a lower quality of prescribing.

Conclusion. There was a negative correlation between quality of prescribing by solo GPs and frequency of visits by pharmaceutical industry representatives. In day-to-day practice, no measurable effects of the cooperation between solo GP and pharmacist on the quality of prescribing were observed.

Keywords. Co-operation, GP, indicators, pharmaceutical industry, pharmacist.

Introduction

Drugs play an important role in the treatment of patients in the general practice setting. In Western Europe, a drug is prescribed in more than 60 percent of the cases that a patient consults a GP.1 Due to an ageing population and the increasing possibility of treating many chronic diseases with drugs, it is becoming increasingly difficult to provide adequate pharmacotherapy.2 In many countries, evidence-based guidelines are
available to support GPs in making a choice from the extensive range of drugs available, although the compliance with these varies. There are considerable variations between GPs with respect to the prescription of drugs. Prescribing indicators derived from existing evidence-based guidelines can make this variation visible and also provide an impression of the quality of the prescribing.

The pharmacist usually supplies the drugs prescribed by the GP. In recent years, the pharmacist has increasingly focused on advising patients and physicians. A number of studies have shown that recommendations and interventions from pharmacists can lead to an optimisation of drug use and to a better prescription policy.

The advice provided to physicians is based on the pharmacist’s expertise and concerns drug-related problems seen in the pharmacy on a day-to-day basis. In various countries, this has led to a closer cooperation between GPs and pharmacists and to pharmacotherapeutic audit meetings (PTAMs) between GPs and pharmacists being held on a regular basis. However, GPs have differing attitudes towards the role of the pharmacist and the extent to which they wish to cooperate with pharmacists. In the literature, little attention has yet been paid to the extent to which differences in prescribing between GPs are actually correlated with differences of opinion concerning the pharmacist’s role, differences in how the GP cooperates with the pharmacist, and differences in how this cooperation is experienced by GPs. Earlier research has revealed, however, that GPs with a positive attitude towards the pharmacist’s care-providing function have a better relationship with pharmacists than GPs with a less positive attitude in this respect. We therefore hypothesise that a positive attitude has a favourable effect on the cooperation between GPs and pharmacists and accordingly a positive effect on prescribing behaviour.

In addition to advice from pharmacists, GPs receive information from the pharmaceutical industry. Together with a wide range of favours (e.g. presents, money), an efficient form of providing information, the one-to-one outreach visit, is used to increase the turnover of branded drugs. It is known that GPs who receive regular visits from pharmaceutical industry representatives are responsible for higher prescribing costs and prescribe in a less rational manner. We therefore hypothesised that frequent visits from pharmaceutical industry representatives have a negative effect on the quality of the prescribing behaviour.

In view of this influence of pharmacists and pharmaceutical industry representatives on the quality of prescribing, our study set out to answer the following question: Is the quality of the prescribing of drugs by GPs correlated with their attitude towards the pharmacist’s role and how they cooperate with the pharmacist on a day-to-day basis and in the PTAM, and is there a correlation between the quality of prescribing and the frequency of visits from pharmaceutical industry representatives?

Methods

General design and study population
We carried out a cross-sectional study into differences between GPs (n = 1434) in the south of The Netherlands with respect to their prescribing behaviour and the possible determinants thereof. We did this by means of a survey and by using prescribing indicators to analyse the quality of prescribing in existing pharmacy data. As the prescription figures in pharmacy databases cannot be traced back to individual GPs within group practices, we used responding solo practices for the study on possible determinants.

Variables, instruments and data
We used 20 prescribing indicators based on general practice guidelines of the Dutch College of General Practitioners to gain an impression of the variation in prescribing behaviour between GPs (see Box 1). An expert panel assessed the indicators to be valid and they were found to have sufficient discriminating power to characterise the prescribing behaviour of GPs. The indicators were evaluated by the panel for three characteristics: relevance for health gain, relevance for efficiency, and providing an adequate reflection of the central recommendations in the guideline. The panel considered the majority of the indicators (>80%) relevant for both health gain and efficiency gain. The guidelines, on which the prescribing indicators are based, mainly concern medicines available in both brand and generic form. General practice guidelines are widely supported by GPs and community pharmacists. For further information concerning the prescribing indicators used, see our previous publication.

The general construct ‘adherence to guidelines’ was formed as the dependent variable by calculating a weighted average score on these prescribing indicators per GP (see the analysis).

The prescribing indicators were calculated using a prescription database compiled by linking pharmacy databases from 379 pharmacies, which was made available as a prescribing analysis database by health insurers with due consideration to the existing privacy legislation. Each month, health insurers in The Netherlands receive electronic declarations from the pharmacies; these are provided in a standardised format and contain detailed information about the patient, the prescriber and the drug delivered. The database contained information on all drugs supplied to three million patients in the year 2000 by 379 pharmacies as prescribed by 1434 GPs.
First of all, three constructs were formed as independent variables. The first construct concerns the actual cooperation and is based on seven survey questions related to the frequency of various forms of cooperation between GPs and pharmacists on a day-to-day basis. The second construct concerns the quality of the PTAM and is based on nine survey questions about a number of elementary quality requirements that can be applied to this meetings. The third construct concerns the GP’s attitude towards the pharmacist’s care-providing function. For this, use was made of a previously-developed attitude scale based on 17 statements. These statements enquired about the attitudes of GPs concerning the task, role, responsibility and expertise of the pharmacist. We have previously published an article on this attitude scale.

The frequency of visits by pharmaceutical industry representatives also served as an independent variable. This was expressed as the number of visits made by pharmaceutical industry representatives to a GP per month. It indicates the current level of interaction between individual physicians and sales representatives from the pharmaceutical industry. In addition to this, the following data were collected: the frequency of pharmacotherapeutic postgraduate training, the use of an electronic formulary, perceived workload, age, gender, practical experience, part-time work, practice size, degree of urbanisation, and whether the respondent was a general practice trainer.

The data on GPs and pharmacists were collected by means of a survey that was sent in 2001 to GPs (n = 1434) practising in the south of The Netherlands. We have already published an article about the survey, the response to it and the results it yielded.

**Analysis**

The general construct ‘adherence to guidelines’ was formed by calculating the weighted average of the score on the 20 prescribing indicators per GP. A weighing factor was calculated based on the percentage of the total number of prescriptions for which an indicator is applicable. Before the calculation of the weighted average, the scores pertaining to the prescribing indicators for drugs for which a lower score is desirable were inverted (100% minus the score). Consequently, the average score can be interpreted as: the higher the score, the more the GP complies with existing guidelines. In order to verify whether there was sufficient internal consistency (homogeneity of the items) of the construct ‘adherence to guidelines’ a reliability analysis was performed (Cronbach’s alpha = 0.59). So that GPs could be readily compared, the prescription figures were standardised for the age and gender profile of the practice, whereby the total population was the standard.

A reliability analysis was also performed to verify whether there was enough internal consistency for the

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**Box 1 Prescribing indicators**

**Prescribing indicators for which a high score is desirable:**

- DDDs chlorothalidone and hydrochlorothiazide divided by DDDs for all diuretics ×100%.
- FNA prescribed eardrops divided by number of all prescribed eardrops for the treatment of otitis externa ×100%.
- Patients who were prescribed a PPI (proton pump inhibitor) and who had been prescribed an H2 antagonist prior to this, divided by number of the patients who received a PPI ×100%.
- DDDs atenolol and metoprolol divided by DDDs of all β-blockers ×100%.
- DDDs enalapril and captopril divided by DDDs of all ACE inhibitors ×100%.
- DDDs sub-50 single-phase preparations of the 2nd generation divided by DDDs of all oral contraceptives ×100%.
- DDDs tolbutamide and metformin divided by DDDs of all oral antidiabetics ×100%.
- Prescriptions for imidazole derivatives divided by number of all prescriptions for topical dermatological antymycotics ×100%.
- Prescriptions for triaminolonacetonide 0.1%, flumethasone pivalate and hydrocortisone butyrate cream/ointment/lotion divided by number of all prescriptions for class-2 topical corticosteroids ×100%.
- Prescriptions for betamethasone dipropionate, betamethasone valerate and fluocinonide ointment /cream/gel/solution/lotion divided by number of all prescriptions for class-3 topical corticosteroids ×100%.
- Patients (18–45 yr) who received 0.25 DDD or more β mimetics per day and in addition to this 0.5 DDD or more inhaled corticosteroids or cromones, divided by number of patients (18–45 yr) who received 0.25 DDD or more β mimetics per day ×100%.
- Patients (18–45 yr) who received 0.5 DDD or more β mimetics per day and more than 0.5 DDD inhalation corticosteroids, divided by number of patients (18–45 yr) who received 0.5 DDD or more β mimetics on average per day ×100%.
- Patients treated with antidiabetics and statins divided by number of patients treated with antidiabetics ×100%.
- Patients who were prescribed an angiotensin II-antagonist (AT-2) and prior to this an ACE inhibitor, divided by number of patients who received an AT-2 ×100%.

**Prescribing indicators for which a low score is desirable:**

- DDDs ferrosulphate ‘slow release’ divided by DDDs for all iron supplements ×100%.
- DDDs cyclo-oxygenase-2 divided by DDDs for all NSAIDs ×100%.
- Prescriptions for amoxicillin/clavulanic acid divided by number of prescriptions for all oral antibiotics ×100%.
- Prescriptions for quinolones divided by number of prescriptions for all oral antibiotics ×100%.
- Percentage of patients in the practice who were prescribed a benzodiazepine more than 6 times per year.
- Percentage patients in the practice who were prescribed mebeverine.

DDD = Defined Daily Dose.

*a Standardized pharmacy compounded ear drops containing acetic acid, corticosteroids and/or antibiotics according to ‘Formulary of Dutch Pharmacists’ (FNA).
three constructs ‘cooperation with the pharmacist’, ‘quality of the PTAM’, and ‘attitude regarding the pharmacist’s care-providing function’ (Cronbach’s alpha 0.79, 0.75, and 0.84, respectively).

In order to determine which factors were correlated with the differences in prescribing between GPs, an analysis was performed for the variables hypothesised to be correlated with these differences. So as to allow for possible clustering in the data, caused by the cooperation of GPs in PTAM groups, a mixed model with a random intercept was chosen. Simple regression analyses were performed separately for each predictor. A multiple regression analysis that simultaneously included all predictors at once was carried out to obtain adjusted coefficients. *P*-values lower than 0.05 were considered to be significant. All of the analyses were performed using SAS version 8.02 (SAS Institute Inc., Cary, North Carolina).

**Results**

The response to the survey was 71% (1434 GPs, 1019 respondents of which 324 were solo GPs). Table 1 shows the personal and practice characteristics investigated as well as the differences between solo and non-solo practices.

For the 324 solo GPs, the weighted average score for the 20 prescribing indicators was 64% (SD 3.7). For the non-solo GPs this score was 65% (SD 3.8, *P* < 0.05). It is interesting to note that 4.6% of the solo GPs are female, compared with 26% of those working in non-solo practices. Other striking differences between solo and non-solo practices are the number of reported monthly visits from pharmaceutical industry representatives (5.7 versus 3.8 times monthly), full time GPs (93% versus 50%), the number of patients per GP (2151, SD 693 versus 1506, SD 742), and being a GP trainer (21 versus 38%).

Table 2 shows the results of the univariate and multivariate analyses of the solo GPs. In the univariate analysis, more frequent visits from pharmaceutical industry representatives, a higher age, a larger practice, and running a practice in suburban areas (1000–1500 addresses/km²) were found to have a significant negative correlation with adherence to guidelines. In the same analysis, the use of an electronic formulary was found to have a significant positive correlation with adherence to prescription guidelines. In the multivariate analysis, more frequent visits from pharmaceutical industry representatives and running a practice in suburban areas were found to have a significant negative correlation with adherence to guidelines for qualitatively good prescribing.

‘Adherence to guidelines’ was not found to correlate with one or more of the constructs developed with regard to cooperation with the pharmacist, the quality of the PTAM, and the GP’s attitude towards the pharmacist’s care-providing function. There was also no correlation with gender, practical experience, perceived workload, part-time work, being a trainer of GPs, or the frequency of pharmacotherapeutic postgraduate training.

**Discussion**

First of all we found a negative relationship between prescribing according to evidence-based general practice guidelines and the frequency of visits by pharmaceutical industry representatives: more contact with pharmaceutical industry representatives is associated with less prescribing in accordance with professional guidelines.

In contrast to our hypothesis we found no relationship between prescribing according to guidelines by GPs and how they cooperated with pharmacists on a day-to-day basis.

In other studies a correlation has been found between contacts with pharmaceutical industry representatives and the unnecessary and more frequent prescription of drugs. The negative correlation between contacts with pharmaceutical industry representatives and
the score on prescribing indicators is probably due to the marketing strategy of the pharmaceutical industry, which is focused on promoting new products and has undergone a longer and stronger development than the care providing function of the pharmacist.

The quality of prescribing based on compliance with general practice guidelines was not associated with the GP’s attitude towards the pharmacist’s care-providing function or the degree of cooperation with pharmacists, i.e. the regularity in which the pharmacist’s advisory and feedback role takes place. There was also no correlation with the quality of the PTAM. Other Dutch studies, which did not use prescribing indicators but did use the same assessment criteria for the functioning of the PTAM, have found that a well-structured PTAM led to a more consistent prescribing policy. Although there was less variation within groups that made agreements, this did not result in less frequent or cheaper prescriptions.

The lack of a correlation between prescribing according to guidelines by GPs and their cooperation with pharmacists is surprising. A number of studies have revealed that recommendations and interventions from pharmacists can result in an optimisation of drug use and a better prescribing policy. In our study, however, we observed no effects of the recommendations and interventions on day-to-day practice, such as that described under controlled conditions. Contrary to what we expected, the quality of prescribing shows no correlation with the GP’s attitude towards the pharmacist’s role, the way in which GPs and pharmacists cooperate, and the quality of the PTAM. There is a gap between the potential and actual influence of the pharmacist on the GP’s prescribing behaviour. This might be due to the considerable degree of freedom that characterises the current cooperation between GPs and pharmacists. In both day-to-day practice and the PTAM, there is a high level of permissiveness in which the responsibilities are not clearly assigned.

Since positive results of the cooperation between GPs and pharmacists have been observed under controlled conditions, we recommend that a well-organized structure, with a lower level of permissiveness, be sought for implementing the pharmacist’s advisory and intervening role. A favourable circumstance with respect to this is the widespread support amongst GPs for the feedback given by pharmacists on prescriptions and the advice they give to GPs and

<table>
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<tr>
<th>Predictor</th>
<th>Simple linear regression</th>
<th>Multiple linear regression</th>
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<tbody>
<tr>
<td></td>
<td>Intercept (se)</td>
<td>β</td>
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<tr>
<td>Attitude of GP (construct) *</td>
<td>65 (1.1)</td>
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<tr>
<td>Cooperation GP–CP (construct) *</td>
<td>65 (0.91)</td>
<td>-0.038</td>
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<td>Performance of PTAM (construct) *</td>
<td>64 (1.2)</td>
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<tr>
<td>Visits by pharmaceutical industry representatives (represent/month) *</td>
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<td>-0.26</td>
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<tr>
<td>Age (years) *</td>
<td>68 (1.5)</td>
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<tr>
<td>Gender (1 = female) *</td>
<td>64 (0.25)</td>
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<td>Work experience (years) *</td>
<td>65 (0.54)</td>
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<td>Workload *</td>
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<td>Full/part-time (1 = fulltime) *</td>
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<td>Size of practice (in hundreds of patients) *</td>
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<td>Rural (&lt;500 addresses/km²)</td>
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<tr>
<td>Suburban (1000–1500 addresses/km²)</td>
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<td>-3.4; -0.82*</td>
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<tr>
<td>Urban (&gt;2500 addresses/km²)</td>
<td>0 (ref)</td>
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<td>Trainer of GPs (1 = trainer) *</td>
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<td>Postgraduate education * (1 = never, occasionally, regularly)</td>
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<td>Electronic formulary * (1 = using an electronic formulary) *</td>
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<td>0.88</td>
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<tr>
<td>Intercept *</td>
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</table>

*Included as continuous variables (see also Table 1).

b Included as categorical variable, indicated as 0/1, 0 = reference category (see also Table 1).

* P < 0.05.
patients. Moreover, a close working relationship with GPs in which the pharmacist’s recommendations are followed is probably preferable to a medication review by pharmacists of which the results from recent studies are found to be less effective than expected.

The cross-sectional nature of our study and the nature of the data, achieved partly by self-reporting, can be regarded as a limitation. The differences between solo and non-solo practices are considerable, with regard to a number of features (gender distribution, proportion of working full-time, visits by pharmaceutical representatives, number of patients, and the presence of GP trainers). The results of the multivariate analysis cannot be generalised to physicians in non-solo practices, nor can the results be generalised to female GPs as less than one in twenty physicians working in solo practices is female.

The strong points of our study are: the real-life character of the data, the large number of GPs, the good response to the survey, and the large number of validated prescribing indicators that we could calculate for each GP over an entire year.

We found no relationship between prescribing according to guidelines by solo GPs and how they cooperated with pharmacists on a day-to-day basis. In view of the important role that drugs play in the treatment of patients and the significant effect that the cooperation between GP and pharmacist may have herein, a clear position for the pharmacist is desirable. Further research, preferably prospective, into the optimal form of cooperation between GPs and pharmacists is therefore necessary.

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Declaration

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Ethical approval: n/a

Conflicts of interests: none.

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