

# Delivering generics without regulatory incentives? Empirical evidence from French general practitioners about willingness to prescribe international non-proprietary names

A. Paraponaris<sup>a,b,c,d,\*</sup>, P. Verger<sup>a,b</sup>, B. Desquins<sup>a,b,d</sup>, P. Villani<sup>a,e</sup>,  
G. Bouvenot<sup>a,e</sup>, L. Rochaix<sup>c,d</sup>, J.C. Gourheux<sup>f</sup>, J.P. Moatti<sup>a,c,d</sup>, &  
the Panel MG Paca

<sup>a</sup> *Inserm Research Unit 379, Epidemiology and Social Sciences Applied to Medical Innovation,  
232 Boulevard Sainte Marguerite, 13273 Marseille Cedex 09, France*

<sup>b</sup> *South-Eastern France Regional Center for Disease Control, ORS PACA, Inserm 379—ORS Paca,  
23 rue Stanislas Torrents, 13006 Marseille, France*

<sup>c</sup> *Department of Economics, University of the Mediterranean, 14 Avenue Jules Ferry, 13621 Aix-en-Provence Cedex, France*

<sup>d</sup> *Institute of Public Economics, IDEP, Centre de la Vieille Charité, 2 rue de la Charité, 13002 Marseille, France*

<sup>e</sup> *Laboratory of Therapeutics, Department of Medicine, University of the Mediterranean,  
270 Boulevard Sainte Marguerite, 13009 Marseille, France*

<sup>f</sup> *South-Eastern France Regional Union of Private Practitioners, URML PACA,  
37-39 Boulevard Vincent Delpuech, 13006 Marseille, France*

Received 23 June 2003; accepted 17 January 2004

## Abstract

France presents a unique situation in which the take-off of a generic drug market depends, out of regulatory incentives, on whether physicians choose a prescription method (international non-proprietary names, INN) that can lead to the delivery of these drugs and on whether patients accept them. This paper is aimed at pointing out factors explaining general practitioners' (GPs') willingness to prescribe in INN through data collected from a South-Eastern France representative sample of 600 GPs in March 2002. The main results shed light on the key-role played by GPs' information about drugs and the source which they take it from, by GPs' volume of services and caseloads, and slightly by socio-economic characteristics of patients.

© 2004 Elsevier Ireland Ltd. All rights reserved.

**Keywords:** International non-proprietary names; Generic drugs; General practitioners' prescribings; General practitioners' knowledge; Incentive rules

## 1. Introduction

Although drugs do not account for the highest share of health care expenditures in developed countries, public policies to control escalation of health

\* Corresponding author. Tel.: +33-4-91-59-89-02;  
fax: +33-4-91-59-89-24.

E-mail address: [paraponaris@marseille.inserm.fr](mailto:paraponaris@marseille.inserm.fr)  
(A. Paraponaris).

care costs have focused considerable attention on pharmaceutical costs that have often been perceived as more amenable to reduction than other cost components such as hospital expenditures [1]. In many countries, policies to reduce pharmaceutical costs have included incentives and regulations to encourage the substitution of cheaper generic drugs to the prescription of their usually more expensive brand-name counterparts. Results of policies to encourage prescription of generic drugs however widely differ from one country to another [1–3]. In developed countries, diffusion of generic prescriptions seem to depend on the existence and types of financial and regulatory incentives that have been offered to physicians [4–6] and pharmacists [7]. It also depends on pressure exerted by patients in their role as consumers, which in turn varies with the amount of the co-payments required when their health insurance schemes do not offer total coverage of their drug costs [8–10].

In France in 2001, generic drugs represented only 6.7% of the volume and 3.5% of the value of prescribed drugs, a market totalling €14.760 thousand million [11]. And yet, the French market of pharmaceuticals has historically been highly regulated, especially through drugs price containment [12,13]. Attempts to develop and promote generics have been very poor in the past, because of the potential competition it would have especially involved against brand-name drugs produced by the main domestic firms that the French government previously encouraged to merge, eventually through direct financial participation. In this context, price competition for drugs turned into product competition, giving rise to wide products differentiation strategies by pharmaceutical companies [12]. In the same time, the French health insurance, which is supposed to cover the whole population living legally in the country since January 2000, through either employers and employees contributions for salaried people or specific social funds for deprived people, did not have used its potential bargaining power that its almost monopsonistic position should have helped it to exert. Instead, it has historically had a poor influence over the choice of goods it however paid for, and product selection has been largely and almost exclusively given to physicians who remained free to prescribe what they considered to be the most ap-

propriate drug [12]. Unlike other European countries (for example, the United Kingdom, The Netherlands, and Germany), France does not include explicit incentives for encouraging physicians to prescribe generic drugs [14]. Teaching of drugs prescribing and therapeutics to future physicians in the faculty of medicine still now uses brand names rather than the drug most general denominations, i.e. their international non-proprietary name (INN). Most often, French physicians have only a faint idea about the cost of the drug they prescribe. They do not earn, nor lose through penalties, any money from the prescription of drugs. At the time of the survey, three key situations could arise from drugs prescribing by the physician. First, the physician might prescribe a brand-name drug, and the pharmacist was then free to give either the brand-name drug or to substitute an existing generic version for it, if and only if the patient agreed. Second, the physician might straightforwardly prescribe a generic, and the pharmacist provided it. Third, the physician might prescribe INN, and the pharmacist might deliver either the brand-name drug or one of its existing generic. In this framework, drug expenditures are very large, especially those prescribed by general practitioners (GPs) [15]. Thus, the choice by a GP to prescribe generics and especially INN, rather than brand-name drugs, may be viewed as a practice-style choice which French health authorities and French health insurance try to promote, expecting GPs' to demonstrate goodwill or altruism rather than using financial incentives.

In this respect, according to the literature, various factors may directly or indirectly influence physicians' willingness (or reluctance) to prescribe generic drugs [16,17]. In order to avoid potential bias coming from impossibility for practitioners to prescribe INN due to the unavailability of generic drugs [17,18], we preferred to question physicians about their willingness to prescribe INN rather than about their actual prescriptions in INN. As long as the French legal framework gives free rein to physicians for prescribing INN, it seems crucial to acknowledge whether the weakness of the French generics market relies on practitioners' lack of motivation and, as a result, to identify physicians' key-characteristics explaining it. In that case, the French strategy to promote generics

through INN prescribing should have to be reconsidered.

A survey carried out in 2002 in a representative sample of general practitioners of South-Eastern France gave us the opportunity to test if these features play a similar (or different) role when it comes to prescribing by INN. Physicians' socio-demographic and training characteristics, as well as their major sources of information and level of knowledge about drugs and their beliefs about the comparative merits of brand-named drugs and their generic versions may determine their prescribing behaviours. In addition, in an health care system such as the French one where ambulatory physicians are paid on a fee for service basis, prescribing by INN may require more time for each consultation and consequently negatively affect practitioners' revenue (or may create fear that this will happen if they change their prescribing habits from brand-named drugs to INN). Finally, patients' demand may influence physicians' patterns of prescription. On the one hand, patients who have limited out of pocket co-payments for drugs may exert pressure to obtain the brand-name drug. On the other hand, patients with low income and less insurance coverage for drugs may have an incentive to ask for prescriptions based on the least expensive drugs.

## 2. Material and methods

### 2.1. Data

#### 2.1.1. Socio-economic and health characteristics of the survey region

This article uses data collected from a representative regional panel of 600 ambulatory general practitioners in Provence (South-Eastern France), initiated in March 2002. In this region, the number of private practitioners in ambulatory medicine is, respectively, 140 for GPs and 131 for medical specialists per 100 000 inhabitants (which corresponds to a higher density of medical practitioners compared to the national average—114.6 and 85.2, respectively). Reimbursed healthcare expenditures averaged €1777 per year per inhabitant (national mean, €1439) in 2002. Total non-hospital healthcare costs account for €669 per year per inhabitant (national mean, €534), and

drugs prescribed by general practitioners €337 (national mean, €258) [19].

#### 2.1.2. The physician sample

Approximately 5450 GPs work in this region. Physicians who planned to move or retire within the next 6 months and those unwilling to report the income from their medical practice were also excluded. The sample was constructed within a stratified random sampling strategy that took into account age, sex, and size of the urban unit of practice (Table 1).

Overall, 1076 physicians were asked to participate, first by mail and then by telephone, in a panel study and a sample of 600 respondents was successfully enrolled (response rate, 55.76%). These physicians agreed to complete surveys twice a year for three consecutive years about their behaviours, attitudes, and beliefs in treating specific populations or diseases and their prescription of specific drugs. This article is based upon results from the first survey wave.

#### 2.1.3. Data collected

The panel was asked to complete a 53-item questionnaire (mean completion time, 35 min) that asked for information about GPs' professional and social characteristics, opinions and representations of public health problems and the specific nature of their work activities. The survey was initially tested over a random sample of 40 GPs who did not belong to the final sample of 600 GPs, and the questionnaire has been definitely validated after a session of the technical and the scientific committees handling the survey. In the questionnaire, one question specifically concerned GPs' willingness to prescribe drugs by their INN ("Are you willing to prescribe INN?").

We also used information extracted from municipal statistic databases concerning the physicians' practice settings, socio-economic (population characteristics), and competition (physician prevalence and density) [20]. The crude mortality rate in each physician's area of practice was also recorded.

A binary variable of physicians' availability for more work was constructed from the hours of weekly work they reported and their expressed desire to reduce or increase their work time. This variable was coded as 0 if the working time weekly was less than desired, 1 if it was equal to or more.

Table 1  
Sample structure

Age (years)	Size of urban unit	Sex			
		Men	Total (%)	Women	Total (%)
Younger than 42	Fewer than 20 000 inhabitants	11	1.83	3	0.50
	20 000–200 000 inhabitants	39	6.50	11	1.83
	More than 200 000 inhabitants	66	11.00	20	3.33
Total		116	19.33	34	5.67
42–52	Fewer than 20 000 inhabitants	23	3.83	7	1.17
	20 000–200 000 inhabitants	75	12.50	21	3.50
	More than 200 000 inhabitants	142	23.67	39	6.50
Total		240	40.00	67	11.17
Older than 52	Fewer than 20 000 inhabitants	10	1.67	3	0.50
	20 000–200 000 inhabitants	34	5.67	9	1.50
	More than 200 000 inhabitants	69	11.50	18	3.00
Total		113	18.83	30	5.00
Overall		469	78.17	131	21.83

Overall, we considered six groups of variables that could potentially affect GPs willingness to prescribe INN ([Appendix A](#)). These were basic fundamental demographic characteristics (age, sex, time in practice, size of town), determinants of their professional practice (billing sector, that is, if their fees are controlled or not, organisation of work, relation with other health-care professionals), their continuing education activities (additional degrees, participation in CME courses, reading of medical journals, meetings with pharmaceutical sales representatives), their reported activity, the competitiveness of their environment (prevalence of specialists, prevalence and density of general practitioners), and the socio-economic environment of their practice (social and economic characteristics of the patient population).

## 2.2. Method

We carried out a logistic regression with willingness to prescribe INN as the dependent variable. Univariate regressions of the willingness to prescribe INN on each of the above mentioned regressors have been first computed. Explanatory variables which were related to the willingness to prescribe INN with a *P* value of 0.20 or less were then introduced into a multiple logistic model. It in turn was estimated by the maximum likelihood method, in a backward procedure.

The threshold for excluding variables from the model was set at 0.10. Sex and age were forced as control variables in the final model.

The variables related to the local socio-economic environment were chosen from a group of variables with possible (multi-)colinearity problems. A principal component analysis with Varimax rotation and Kaiser normalisation [21] enabled us to determine the principal factors and to retain for each of them the most significant item.

## 3. Results

A total of 458 out of the 600 respondents (76.2%, 95% weighted confidence interval, [72.1; 79.4%]) declared that they were willing to write their prescriptions using INN. The null hypothesis of simultaneous nullity of all parameters in the equation was rejected, since the *P* value of the likelihood ratio test associated to the final version of the estimated model equalled 0.001. The fit of the model was equal to 81.3% which meant that variables in the model helped to explain GPs' willingness to prescribe INN, compared to the naive model which considered that every GP was willing to prescribe INN and performs 76.2% of good fit.

Their sex, age, billing sector, length of practice, and additional degrees were not associated with this willingness. Nor were any of the following factors:

competitiveness of the practice environment (private general practitioners per 100 000 inhabitants and per immediate square kilometre), socio-economic composition of the local population (proportion of managers and professionals), unemployment rate or crude mortality rate.

On the reverse, several factors were associated with a greater reluctance to prescribe INN. Physicians who could and wanted to work more, did not consult guidelines made by the French Agency of Health Security and Products (AFSSAPS), did not have paid subscription to at least two medical journals, did not participate in care networks, did not have a computer or worked in their private practice exclusively were significantly more likely (threshold of 5 or 10%) to be reluctant to prescribe INN (Table 2). Meeting with many pharmaceutical sales representatives (more than 10 a week) was also associated with greater reluctance to prescribe by INN. In the physicians' socio-economic environment, a larger percentage of public housing in

the local municipality was associated with less reluctance to prescribe by INN.

## 4. Discussion

### 4.1. Relation between willingness and actual prescription in INN

This paper examines physicians' reports about their propensity to prescribe by INN. Some studies reported figures very close to ours [18,22]. Nevertheless, willingness to prescribe by INN is different from actual prescribing behaviour. The substantial differences between self-reported intent and real behaviour by physicians give some support to the necessity to distinguish GPs' motivation to prescribe INN through willingness to prescribe from actual declared prescriptions [18,23]. In this study, three physicians in four state that they were willing to prescribe INN, but physicians'

Table 2  
Factors associated with GPs' willingness to prescribe INN ( $n = 600$ )

Characteristic	Categories	N	INN (%)	Simple logistic regression		Multiple logistic regression	
				OR [95% IC]	P	OR [95% IC]	P
Sex	Men	470	77.40	1.34 [0.86–2.08]	0.20	1.24 [0.76–2.02]	0.39
	Women	130	71.50	1.00		1.00	
Age (years)	<44	168	74.40	0.74 [0.43–1.27]	0.27	0.62 [0.35–1.11]	0.10
	44–48	152	76.30	0.82 [0.47–1.43]	0.49	0.72 [0.40–1.29]	0.27
	49–52	142	74.60	0.75 [0.43–1.31]	0.31	0.65 [0.36–1.18]	0.65
	≥53	138	79.70	1.00		1.00	
Working as much as desired	No	160	69.90	0.67 [0.44–1.01]	0.05	0.71 [0.45–1.10]	0.12
	Yes	440	77.80	1.00		1.00	
Private practice exclusively	No	111	84.70	1.92 [1.10–3.34]	0.02	1.84 [1.03–3.29]	0.04
	Yes	489	74.20	1.00		1.00	
Uses AFSSAPS guidelines	No	183	71.00	0.68 [0.46–1.00]	0.46	0.70 [0.46–1.08]	0.10
	Yes	417	78.40	1.00		1.00	
Number of journal subscriptions	None	352	73.00	0.33 [0.16–0.68]	0.00	0.34 [0.16–0.73]	0.00
	1	165	76.40	0.39 [0.18–0.86]	0.02	0.36 [0.16–0.81]	0.01
	2 or more	83	89.20	1.00		1.00	
Has a computer	No	81	65.40	0.54 [0.33–0.89]	0.02	0.56 [0.33–0.96]	0.04
	Yes	519	77.80	1.00		1.00	
Drug reps (week)	<10	462	78.60	1.72 [1.13–2.62]	0.01	1.56 [0.99–2.43]	0.05
	≥10	138	68.10	1.00		1.00	
Public housing (multiple dwellings) in municipality (%)	<15.05	450	75.08	0.79 [0.50–1.01]	0.05	0.72 [0.45–1.00]	0.05
	≥15.05	150	79.30	1.00		1.00	

prescriptions lead to the sale of generics in this region in only 30.6% of the cases where a generic version exists [24]. Obviously, GPs are to cope with difficulties to prescribe INN which are not exclusively due to a lack of interest and which further studies will have to explore.

#### 4.2. *The role of information*

By requiring the use of the name of the active ingredient rather than the brand name of the drug, prescription by INN requires doctors to change their prescribing habits substantially. It places the ultimate use of generic drugs at the end of a chain of decisions (physician's prescription by INN, pharmacist's suggestion of generic drugs, patient's consent).

It has been shown that the series of decisions by physicians and pharmacists that lead to the delivery of generic drugs depends on the physicians' knowledge of drugs that can be substituted for a brand-name drug [25,26]. In this survey, several informational variables were found to affect the physicians' intention to prescribe by INN: consultation of the leading prescription practice guidelines (AFSSAPS guidelines), regular reading of several medical journals, availability of a computer, which promotes access to critical information through the consultation of distant electronic resources. Other processes involved in the acquisition of professional knowledge may also promote a more favourable attitude towards INN prescriptions: participation in collaborative professional practices within health networks, a not exclusively private practice (that is, working some shifts in hospital departments). GPs seem to take information about drugs from two quite different channels depending on drugs' age. GPs essentially use guidelines and hospitals recommendations when drugs are old, and more especially information from pharmaceutical representatives when drugs are new [27,28]. And yet, firms producing generics, which most often are newer than equivalent brand-name drugs, devote much less money to inform GPs than firms producing brand-name drugs [29]. On the reverse, the information physicians obtain from visits from drug company sales representatives seems to contribute to a greater reluctance by physicians to prescribe by INN. Specifically, physicians are much more sensitive to arguments about a drug's efficacy than about its price [30,31]. Their represen-

tations of the efficacy of the brand-name drug and the generic drug often remain different. The information strategies, or marketing, directed at physicians by pharmaceutical companies, lead doctors to differentiate between these products, whether on an objective basis or not, and probably contributes to the belief that the brand-name is associated with better efficacy [32–35].

#### 4.3. *Patient influence in the drug decision*

This article sought, for the most part unsuccessfully, to uncover a direct relation between the occupational and economic structure of the population in the neighbourhood of the physician's practice and his or her reluctance to use INN in prescribing. Only a few studies had clearly demonstrated the importance of the patient in the choice of drug [30,36]. Despite the widespread belief that medical decisions are sensitive to patients' expectations [37], the choice of prescribed drugs appears to result essentially from the physician's own decision-making process [38–40]. At best, GPs consider alleged rather than actual patients' preferences when prescribing drugs [41]. As patients with lower socio-economic status are more diffident about expressing their preferences, GPs may feel free to prescribe INN more easily, thus leading to the delivery to generic (and cheaper) drugs, because they imagine that those patients face budget constraints [9,42,43].

In that way, only the prevalence of (multiple-dwelling unit) public housing in the GP's neighbourhood was found to be related with a practitioner's greater willingness to prescribe INN. Of course we cannot exclude that the other variables we have used as proxies to describe characteristics of GPs' clientele were too crude to capture effective factors related to demand for drugs. But the concentration of this type of housing is statistically associated with a lower per capita disposable income and is often an expression of local poverty [20]. The entire French population is supposed to be covered by mandatory health insurance financed on a national basis by payroll and self-employment taxes. The mean reimbursement rate for healthcare expenditures is approximately 75%. The reimbursement for drugs ranges, according to the type of drug and disease, from 35 to 65 to 100%. This insured population can also obtain supplementary voluntary insurance coverage that minimises the amount



of the co-payment for incomplete reimbursement by the mandatory public insurance. In situations where the individuals do not have any supplementary insurance, the physician may choose to prescribe the INN so that the patient receives a generic, less expensive, drug.

As for the patients' preference about the type of drug prescribed (brand-name versus generic), no real empirical evidence supports the common belief that patients refuse to accept generic drugs after receiving an INN prescription [30,38,44]. Some papers suggest that patient demand for prescriptions may not only be overestimated but also perpetuated by GPs' in order to maintain a good doctor–patient relationship, whereas GPs choose drugs alone [45]. In addition, the principal obstacle to prescriptions being filled by a generic rather than brand-name drug is the physicians' failure to provide information or explanation to the patient about this choice [40,46,47]. A paper in this review showed that individual educational intervention in patients with repeat prescribing resulted in a high rate of generic acceptability [48]. In a recent survey in France, 40% of those questioned said they were inadequately informed and 60% that they would like more information about the prescription and provision of generics. 83% said they would agree to have their prescription filled by a generic product after a prescription by INN [49].

#### *4.4. Caseloads, volume of services, and variety of clinical situations*

INN prescribing has been presented as requiring additional time for French GPs by its profound modification of their deeply ingrained prescribing habits. Logically then, physicians who declare having reached an appropriate working time should be more reluctant to prescribe INN, to the extent that they would either have a lower number of consultations and consequently a lower income or would be obliged to work longer time to maintain their income. Quite interestingly, we observed a reverse phenomenon: physicians who declared to work more time than they would want turned out to be more disposed to prescribe by INN. These physicians were the ones with the greatest volume of consultations. In the literature, proofs are given that GPs with high activity level are likely to use drug prescriptions as a major form of patient management,

in terms of their division of time between examination and discussion on the one hand and prescription on the other [50]. In that way, the results, which have to be supported by more empirical evidence, suggest that GPs with higher workload and who may prefer prescribing rather than counselling, are more willing to prescribe INN.

Moreover, delivering generics is only possible when such a drug exists. If the opportunity for GPs to prescribe INN depends from the existence of generics (GPs will directly prescribe brand names otherwise), willingness to prescribe INN will rely on the variety of clinical situations encountered by GPs, which, as a matter of fact, can be assumed to increase with their caseloads. In this framework, the large volume of activity may increase learning effects, also making willingness to prescribe INN more likely, or at least more efficient [51].

Lastly, prescribing may be viewed by GPs beginning a professional activity or opening a new surgery as one of the arguments of the competition they have engaged with other GPs [36,42]. For those GPs whose workload is not yet as high as their competing GPs' one, prescribing brand-names may be considered as attracting rather than moving away patients [31,45,50].

## **5. Conclusion**

France presents a unique situation in which the take-off of a generic drug market depends basically on whether physicians choose a prescription method (INN) that can lead to the delivery of these drugs and on patients' willingness to accept them. The French experiment has been one of the rare attempts to develop the generics market without initiating various regulatory incentive plans. Retrospectively and in comparison with other countries, this method may have slowed the development of generic drugs in France.

The French situation seems to make the sharing of information by physicians and patients the principal vector for the spread of generics. Other studies in other types of regulatory contexts have pointed out the need to reduce the suspicion that physicians and patients may be supposed to have towards these drugs [17,25,26,48,52,53]. This survey reveals that in France

the physicians' sources of information have a crucial importance in the decision to prescribe INN and that different forms of access to information can generate either willingness or reluctance to do so. As a matter of fact, GPs appear to be less reluctant to prescribe INN when they have high workloads, regularly use practice guidelines, pay for medical journals, have a personal computer to get distant electronic materials or have some activities in an hospital or a health centre. Moreover, in some extent, they seem to be sensitive to patients' deprivation and difficulties to give out-of-pocket money for brand-name drugs. Indeed, the results suggest that, as far as prescribing INN leads to the dispensing of generics, GPs working in low income areas look ahead economic barriers to drugs delivery, which they try to prevent when they prescribe INN [41,43,54].

Since the end of the survey (March 2002), the private general practitioners in France have been required, as part of their contract with the national health insurance system, to prescribe more often INN in exchange for the fee increases granted to them (agreement of 5 June 2002). More recently, reference pricing has been introduced in October 2003 for a list of drugs which can be substituted by generics, involving co-payment for patients when they prefer the brand-name drug instead of the generic drug. From now on, France is handling several kinds of tools aimed at physicians (right to prescribe INN instead of trademarks), pharmacists (right to substitute), and patients (reference price) in order to promote the use of equivalent cheaper generics. This paper may be considered as a first attempt to disentangle the three concomitant arguments by focusing on GPs' willingness to prescribe INN. The extent to which physicians' beliefs and practices have changed in this evolving context has to be put on the agenda.

## Acknowledgements

This work benefited from technical and financial support from the South-Eastern France Regional Union of Private Practitioners (URML PACA) through the South-Eastern France Regional Union of Health Insurance (URCAM PACA) Funds for Quality in Ambulatory Health Care (FAQSV). Béa-

trice Desquins benefited from a financial support of PACA Regional Council. Participants to the ALASS 14th Congress held in Lugano in 25–27 September 2003, and to the first Franco-British meeting in health economics held in Paris in 14–16 January 2004, are thanked for particularly stimulating discussions. Comments from an anonymous referee are greatly acknowledged.

## Appendix A. List of explanatory variables

### *Physicians' demographic characteristics*

- Sex
- Age
- Time in practice
- Number of offices
- Size of municipality where office is located

### *Medical practice*

- Billing sector
- Solo practice/group practice
- Member of a network
- Relations with other health professionals
- Particular type of practice
- Has a computer
- Has an internet connection
- Has a secretary or answering service
- Satisfaction with practice

### *Training and information sources*

- Other degrees
- Consults AFSSAPS (French Health Products Safety Agency) guidelines
- Paid subscription to medical journals
- Number of drug reps seen weekly
- Number of CME sessions

### *Reported activity*

- Weekly work hours
- Exclusively private practice
- Works as much as desired

### *Competitive situation in municipality*

- Prevalence of general practitioners (per 100 000 inhabitants)
- Prevalence of specialists (per 100 000 inhabitants)
- Geographic density (general practitioner/km<sup>2</sup>)
- Proportion of market (active caseload/potential caseload)



### *Socio-economic environment of practice municipality*

Percentage of population with low educational level  
 Percentage of managers and professionals in the population  
 Percentage of temporary jobs in the total population  
 Percentage of foreigners in the population  
 Unemployment rate  
 Percentage of public housing in the municipality  
 Mean area per person in housing  
 Percentage of unemployed more than one year among the total unemployed  
 Percentage of families with four or more children  
 Mortality rate (deaths/municipal population) per 1000 inhabitants

## References

- [1] Garattini L, Tediosi F. A comparative analysis of generics markets in five European countries. *Health Policy* 2000;51:149–62.
- [2] Danzon PM, Chao LW. Cross-national price differences for pharmaceuticals: how large and why? *Journal of Health Economics* 2000;19:159–95.
- [3] Danzon PM, Chao LW. Does regulation drive out competition in pharmaceutical markets? *Journal of Law Economics* 2000;43:311–57.
- [4] Delnoij D, Brenner G. Importing budget systems from other countries: what can we learn from the German drug budget and the British GP fundholding? *Health Policy* 2000;52:157–69.
- [5] Gosden T, Torgerson DJ. The effect of fundholding on prescribing and referral costs: a review of the evidence. *Health Policy* 1997;40:103–14.
- [6] Wilson RP, Hatcher J, Barton S, Walley T. General practice fundholders' prescribing savings in one region of the United Kingdom 1991–1994. *Health Policy* 1997;42:29–37.
- [7] Culkin TT, Mendell S. Generic substitution in New Jersey, 1979–1987. *American Pharmacology* 1989;NS29:25–30.
- [8] Joyce GF, Escarce JJ, Solomon MD, Goldman DP. Employer drug benefit plans and spending on prescription drugs. *JAMA* 2002;288:1733–9.
- [9] Kasje WN, Timmer JW, Boendermaker PM, Haaijer-Ruskamp FM. Dutch GPs' perceptions: the influence of out-of-pocket costs on prescribing. *Social Science & Medicine* 2002;55:1571–8.
- [10] Lopez-Casasnovas G, Puig-Junoy J. Review of the literature on reference pricing. *Health Policy* 2000;54:87–123.
- [11] CNAMTS. Medic'Am. Les médicaments remboursés par le Régime Général d'Assurance Maladie au cours des années 2000 et 2001. Caisse Nationale d'Assurance Maladie des Travailleurs Salariés, Paris, 2002.
- [12] Hancher L. Regulating for competition. Government, law, and the pharmaceutical industry in the United Kingdom and France. Oxford: Clarendon Press; 1990.
- [13] Trumbull J. Institutions and industrial performance: the pharmaceutical sector in France, Germany, Britain, and the US. IPC Working Paper-00-0002, 2000. Massachusetts Institute of Technology, Cambridge.
- [14] Bouvenot G, Villani P, Bouvenot J. Generic drugs in the medical-economic context of drug prescriptions. *Presse Medicale* 2002;31:1109–14.
- [15] Delattre E, Dormont B. Health care demand induced by French self-employed doctors: a microeconomic study based on panel data. *Economie et Prevision* 2000;142:137–61.
- [16] Lopez Bastida J, Mossialos E. Pharmaceutical expenditure in Spain: cost and control. *International Journal of Health Services* 2000;30:597–616.
- [17] Mott DA, Cline RR. Exploring generic drug use behavior: the role of prescribers and pharmacists in the opportunity for generic drug use and generic substitution. *Medical Care* 2002;40:662–74.
- [18] Bower AD, Burkett GL. Family physicians and generic drugs: a study of recognition, information sources, prescribing attitudes, and practices. *The Journal of Family Practice* 1987;24:612–6.
- [19] Balsan D. Analyse des disparités inter-régionales de dépenses de santé. Etudes et Résultats 2, 2000. Direction de la Recherche, des Etudes, de l'Evaluation et des Statistiques. Ministère de l'Emploi et de la Solidarité, Paris.
- [20] Insee. Bases de données locales Communes Profils. Institut National de la Statistique et des Etudes Economiques, Paris, 2002.
- [21] Krzanowski W. Principles of multivariate analysis. Oxford: Clarendon Press; 1988.
- [22] Tilyard MW, Dovey SM, Rosenstreich D. General practitioners' views on generic medication and substitution. *The New Zealand Medical Journal* 1990;103:318–20.
- [23] McGettigan P, McManus J, O'Shea B, Chan R, Feely J. Low rate of generic prescribing in the Republic of Ireland compared to England and Northern Ireland: prescribers' concerns. *Ireland Medical Journal* 1997;90:146–7.
- [24] IMS-Health. La délivrance de génériques par région. Panel Xponent, Paris, 2001.
- [25] Banahan III BF, Kolassa EM. A physician survey on generic drugs and substitution of critical dose medications. *Archives Internal Medicine* 1997;157:2080–8.
- [26] Bearden WO, Mason JB, Smith EM. Perceived risk and elderly perceptions of generic drug prescribing. *Gerontologist* 1979;19:191–5.
- [27] Prosser H, Almond S, Walley T. Influences on GPs' decision to prescribe new drugs-the importance of who says what. *Family Practice* 2003;20:61–8.
- [28] McGettigan P, Golden J, Fryer J, Chan R, Feely J. Prescribers prefer people: the sources of information used by doctors

- for prescribing suggest that the medium is more important than the message. *British Journal of Clinical Pharmacology* 2001;51:184–9.
- [29] Jones MI, Greenfield SM, Bradley CP. Prescribing new drugs: qualitative study of influences on consultants and general practitioners. *BMJ* 2001;323:378–81.
- [30] Denig P, Haaijer-Ruskamp FM, Zijlsling DH. How physicians choose drugs. *Social Science & Medicine* 1988;27:1381–6.
- [31] Roberts SJ, Bateman DN, Smith JM. Prescribing behaviour in general practice: the impact of promoting therapeutically equivalent cheaper medicines. *British Journal of Genetics and Practice* 1997;47:13–8.
- [32] Hammersley V, Hippisley-Cox J, Wilson A, Pringle M. A comparison of research general practices and their patients with other practices—a cross-sectional survey in Trent. *British Journal of Genetics and Practice* 2002;52:463–8.
- [33] Hudson J. Generic take-up in the pharmaceutical market following patent expiry. A multi-country study. *International Review of Law and Economics* 2000;20:205–21.
- [34] Peay MY, Peay ER. Differences among practitioners in patterns of preference for information sources in the adoption of new drugs. *Social Science & Medicine* 1984;18:1019–25.
- [35] Scott Morton FM. Barriers to entry, brand advertising, and generic entry in the US pharmaceutical industry. *International Journal of Industrial Organization* 2000;18:1085–104.
- [36] Hemminki E. Review of literature on the factors affecting drug prescribing. *Social Science & Medicine* 1967;9:111–5.
- [37] Weiss M, Fitzpatrick R. Challenges to medicine: the case of prescribing. *Sociology of Health and Illness* 1997;19:297–327.
- [38] Hellerstein JK. The importance of the physician in the generic versus trade-name prescription decision. *Rand Journal of Economics* 1998;29:108–36.
- [39] Stevenson FA. General practitioners' views on shared decision making: a qualitative analysis. *Patient Education Counsels* 2003;50:291–3.
- [40] Stevenson FA, Barry CA, Britten N, Barber N, Bradley CP. Doctor–patient communication about drugs: the evidence for shared decision making. *Social Science & Medicine* 2000;50:829–40.
- [41] Scott A, Shiell A, King M. Is general practitioner decision making associated with patient socio-economic status. *Social Science & Medicine* 1996;42:35–46.
- [42] Lundin D. Moral hazard in physician prescription behavior. *Journal of Health and Economics* 2000;19:639–62.
- [43] Huttin C, Andral J. How the reimbursement system may influence physicians' decisions results from focus groups interviews in France. *Health Policy* 2000;54:67–86.
- [44] Hellerstein JK. The demand for post-patent prescription pharmaceuticals. NBER Working Paper 1994.
- [45] Stevenson FA, Greenfield SM, Jones M, Nayak A, Bradley CP. GPs' perceptions of patient influence on prescribing. *Family Practice* 1999;16:255–61.
- [46] Dowell JS, Snadden D, Dunbar JA. Changing to generic formulary: how one fundholding practice reduced prescribing costs. *BMJ* 1995;310:505–8.
- [47] Dowell JS, Snadden D, Dunbar JA. Rapid prescribing change, how do patients respond? *Social Science & Medicine* 1996;43:1543–9.
- [48] Valles JA, Barreiro M, Cereza G, Ferro JJ, Martinez MJ, Escriba JM, et al. A prospective multicenter study of the effect of patient education on acceptability of generic prescribing in general practice. *Health Policy* 2003;65:269–75.
- [49] Ministère de la Santé de la Famille et des Personnes Handicapées. Les médicaments génériques: tout le monde y gagne. Ministère de la Santé, de la Famille et des Personnes Handicapées, Paris, 2003.
- [50] Stern S, Trajtenberg M. Empirical implications of physician authority in pharmaceutical decision making. 1998. NBER Working Paper 6851, Cambridge.
- [51] Scott A, Shiell A. Do fee descriptors influence treatment choices in general practice? A multilevel discrete choice model. *Journal of Health Economics* 1997;16:323–42.
- [52] Keith LG, Oleszczuk JJ, Ahranjani M. A critical assessment of generic substitution for the obstetrician-gynecologist. *International Journal of Fertilisation of Womens Medicine* 2001;46:286–95.
- [53] Lesser RP, Krauss G. Buy some today: can generics be safely substituted for brand-name drugs? *Neurology* 2001;57:571–3.
- [54] Healey AT, Yule BF, Reid JP. Variations in general practice prescribing costs and implications for budget setting. *Health Economics* 1994;3:47–56.