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Prescribing patterns for upper respiratory tract infections in general practice in France and in the Netherlands

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ABSTRACT

Background: France and the Netherlands are often presented as two contrasting countries with regard to drug prescriptions and consumption. This study aimed to analyse general practitioners' (GP's) prescription patterns for upper respiratory tract infections (URTI). **Methods:** Data on diagnoses and prescriptions were derived from two databases recording daily electronic medical patient files: the 'Société Française de Médecine Générale' database (SFMG-DB) and the Dutch Landelijk Informatie Netwerk Huisatsenzorg database (LINH-DB). Logit regression models were developed to estimate and compare prescription patterns in both countries. We carried out a study including all the patients consulting for URTI in 2003. **Results:** French GPs had more URTI patients than their Dutch counterparts (372.1 URTI patients/GP versus 181.3). They prescribed higher volumes of URTI medications (3.55 per patient/year versus 0.82). Striking differences were observed in analgesic and symptomatic prescriptions (0.84 per patient/year versus 0.12 and 1.01 per patient/year versus 0.21, respectively). We did not observe important discrepancies in volume of antibiotic prescriptions (0.29 per patient/year in France versus 0.32). After adjustment for patient characteristics, the logit model showed that prescription patterns for antibiotic were quite similar and associated with a diagnosis of acute tonsillitis. **Conclusion:** The analysis per consultation in this study did not highlight important differences in antibiotic prescribing volumes and patterns. But symptomatic and analgesic prescriptions were significantly higher in the French database. This can be explained by differences

in help-seeking behaviour, medication perception, status of OTC medications and remuneration system.

INTRODUCTION

France and the Netherlands are often presented as two contrasting countries with regard to drug prescription and consumption. Compared to the Netherlands, France spends per inhabitant nearly twice as much of the national health budget on medication (506 versus 275 Euros per inhabitant)[1] whilst the part of the national health budget in the GDP is quite similar in both countries (10.5% for France[2] and 12% for the Netherlands[3]). For many years, France has been the European country with the highest antibiotic consumption rates with high seasonal variations, whilst the Netherlands have the lowest antibiotic consumption rates with the lowest seasonal variations.[4,5] This is in line with the significant differences across Europe with low antibiotic use and low seasonal variations in northern regions (Netherlands, Germany, UK, Denmark) and high antibiotic use and high seasonal variations in southern regions (France, Greece, Portugal, Italy).[4] Ninety percent of all antibiotics are prescribed in primary care in France[6] and respiratory tract infections account for more than 50% of these prescriptions.[7] However, in the Netherlands, even if prescription rates are low, recent Dutch studies highlight the problem of overprescribing of antibiotics for respiratory tract symptoms, i.e. prescriptions that are not in accordance with the Dutch national guidelines. This seems to be linked to the assumption of general practitioners (GPs) that prescribing will increase patient's satisfaction.[8–10] In both countries, GPs' prescribing patterns and patient behaviour with regard to upper respiratory tract infections (URTI) are thus important issues. URTI with a viral aetiology are often self-limiting, and inappropriate antibiotic use for these complaints generates unnecessary costs, increased risks of side effects and the development of antibiotic resistance.[11]

In this data-based study, our objectives were to analyse GPs' prescribing patterns in patients consulting for URTI in France and in the Netherlands and to identify potential differences between French and Dutch GPs. Before presenting our study design and the results, it is important to mention shortly the main differences in the organization of general practice between the two countries. In contrast to their French counterparts—at the time of the study in 2003—Dutch GPs had a gate-keeping role, and thus controlled the access to the specialist level. Dutch patients were registered with a GP whereas French patients had direct access to any GP and specialist of their choice. In France GPs were paid on fee-for-service basis, while in the Netherlands, in 2003, the remuneration system was mixed: fee-for-service and capitation fees.

METHODS

Data collection

[TABLE 1]

Data on diagnoses and prescriptions were derived from French and Dutch GP electronic medical records in 2003. In France, data were collected and stored in a database by the 'Société Française de Médecine Générale' (SFMG-DB), which collects data since 1993 in a network of 90 GPs working in 90 different surgeries. The participants in this network register these data routinely in their daily practice. GPs in the SFMG network are largely representative for the French GP population,[12] although a comparison with data from the Ministry of Health shows that there is an under-representation of doctors working in rural areas.[13] Similar data were provided by the 'Netherlands Information Network of General Practice' (LINH-DB).[14–16] This network consists of 178 GPs (91 surgeries with 361 507 registered patients in 2003). In France, in 2003, patients were not registered with their GP and we had only at our disposal information on consulting patients. As a consequence, a

population denominator for France and the Netherlands could not be found. We thus carried out a study including in both databases all the patients consulting for URTI in 2003.

Diagnoses codes

In the SFMG-DB, diagnoses are coded using the Dictionary of Consultation Results (DRC) that has been validated in France.[17] In the LINH-DB, diagnoses are coded using the International Classification of Primary Care (ICPC).[18] The following coded symptoms/diagnoses were included. According to the DRC: RC272 ('head cold'), RC273 ('rhinopharyngitis'), RC710 ('strep throat' and 'acute tonsillitis'), RC735 ('fever and URTI symptoms') and RC750 ('pharyngitis'). According to the ICPC: R07 ('sneezing/nasal congestion'), R21 ('symptom/complaint throat'), R72 ('strep throat'), R74 ('URTI/head cold'), R76 ('acute tonsillitis'). The consistency of the correspondence between the DRC and ICPC codes was established by our study group that included French and Dutch experts currently using these databases.

Patients' characteristics included were: age (≤15/>15 years old), sex, residence in rural (<10 000 inhabitants) or urban areas (≥10 000 inhabitants). Physicians' characteristics (age, sex, years of experience and rural/urban surgery) were also included into the study.

Prescription measurement

The prescriptions were coded according to the Anatomical Therapeutic Chemical (ATC) Classification System.[19] We retained three therapeutic categories. (i) Antibacterials for systemic use: ATC groups J01CA (penicillins with extended spectrum), J01CE (beta-lactamase sensitive penicillins), J01CR (combinations of penicillins including beta-lactamase inhibitors), J01FA (macrolide) and J01AA (tetracycline), which we refer to as 'antibiotics'. (ii) Nasal decongestants for topical use: ATC groups R01AA (sympathomimetics, plaine), R01AB (sympathomimetics, combinations excl. corticosteroids), R01AD (corticosteroids), nasal decongestants for systemic use: R01BA (sympathomimetics), R01AX (other nasal preparations) and throat preparations R02AB (antibiotics) which we call 'symptomatic medications' and (iii) Analgesics: ATC group N02AA (natural opium alkaloids), N02BA (salicylic acid derivatives), N02BE (anilides) and the anti-inflammatory products of ATC groups M01AE (propionic acid derivatives) and M01AB.(acetic acid derivatives and related substances).

Data analysis

Chi-square test and Student's *t*-test were used to compare respectively cross-classified and continuous variables in both databases. We developed three different logit regression models to estimate and compare prescription patterns, after adjusting for patient characteristics: age, sex and residence. In the first model the dependent variable was: whether or not an URTI patient received an antibiotic, in the second model: whether or not an URTI patient received a symptomatic medication, and finally in the third model: whether or not an URTI patient received an analgesic during the consultation. As we hypothesized that differences in prescribing patterns would emerge in patients with sore throat complaints,[20,21] we also adjusted for severity of these symptoms marked by the presence/absence of acute tonsillitis. The data have a two-level hierarchical structure, with individuals nested in GPs in the SFMG-DB or in surgeries in the LINH-DB. Within GP/surgery clustering was taken into account by estimating the fixed coefficients and their standard error using the method of generalized estimated equation (GEE).[22] SAS software was used for the analyses.[23]

RESULTS

GP characteristics

GPs in the French SFMG-DB were mainly men (88.9%), they had a mean age of 50.5 ± 7.7 years, and a mean experience length of 20 ± 7.9 years; 28.9% of them had a rural practice. In the Dutch LINH-DB there were fewer men (68%), GPs were younger (47.3 ± 5.8 years), and their mean experience length was shorter (16.8 ± 7.2 years); 41.1% of them had a rural practice. In the SFMG-DB, there were on average 372.1 ± 197.8 URTI patients per GP/year

and 1320.4 ± 952.5 URTI prescriptions per GP/year. In the LINH-DB, GPs dealt with significantly fewer URTI patients: 181.3 ± 82.1 URTI patients per GP/year and 311.9 ± 305.5 URTI-related prescriptions/GP/year.

Patient characteristics

URTI patients in the SFMG-DB were more often men (45.6% of 33 486 patients consulting for URTI) than in the LINH-DB (43.3% of 25 461 patients consulting for URTI). There were significantly more patients under 15 years of age (36.7% versus 25.7%), and there were fewer URTI patients from rural areas (28.9% versus 44.5%). URTI patient diagnoses are summarized in table 1.

[TABLE 2]

[TABLE 3]

GPs' prescription patterns (description and logistic models)

French GPs had 47 472 URTI consultations versus 34 541 for the Dutch GPs for, respectively, 33 486 versus 25 461 patients. This means 1.42 consultations per patient in the SFMG-DB and 1.36 in the LINH-DB, so not only do more patients visit their doctor for URTI in France, but those patients also have somewhat more consultations. French GPs prescribed significantly more medications for URTI: 93% of all URTI consultations were followed by prescriptions versus 54% in the LINH-DB, with on average 3.55 URTI-specific medications per patient per year versus 0.82 ($P < 0.0001$). The volume of URTI consultations and prescriptions per patient per year are summarized in table 2.

Antibiotics

In both countries, the probability of receiving an antibiotic prescription was higher in patients over 15 years old ($P < 0.05$), and in patients diagnosed with an 'acute tonsillitis' ($P < 0.0001$) and this was more particularly marked in the Netherlands. In France being a male ($P < 0.0001$) was positively associated with obtaining an antibiotic prescription, whereas sex did not have any significant impact on antibiotic prescription in the Netherlands ($P = 0.5$). No significant effect was found for rural/urban residence in either country.

Symptomatic medications

In both countries, the prescription of symptomatic medication was associated with the absence of acute tonsillitis ($P < 0.0001$) and the probability to have these medications was lower for children ($P < 0.01$). No significant effect was found for sex and rural/urban residence in either country.

Analgesic medications

In both countries, analgesic prescription was associated with being diagnosed with acute tonsillitis ($P < 0.0001$). In France, analgesic prescriptions were highly associated with young age (≤15 years) ($P < 0.0001$) whereas the probability of receiving an analgesic treatment was lower for Dutch children <15 years ($P < 0.0001$). The probability of being prescribed analgesic medications was higher in the Netherlands for women ($P = 0.02$) as well as for patients living in urban areas ($P < 0.05$).

The detailed results of the logit models are summarized in table 3. Intracluster correlation was estimated at $r = 0.13$ in France and at $r = 0.05$ in the Netherlands. The ICC reported is per GP in France and per surgery in the Netherlands. This explains why ICC is lower in the Netherlands as the main correlation is likely to be within a GP.

DISCUSSION

Principal findings

French GPs had considerably more URTI consultations than their Dutch counterparts. They also prescribed in general higher volumes of URTI medications (four times more) per patient/per year. Striking differences were highlighted in analgesic and symptomatic

prescriptions. In terms of antibiotic prescribing, we did not observe important discrepancies in the prescribed volume, in particular for penicillin. Moreover, once the patient has entered the consultation room, the French and the Dutch GPs have similar prescribing patterns with respect to antibiotic prescriptions. This is the main finding of the paper since most of the cross-national studies on antibiotic prescribing show contrasting results in this field between France and the Netherlands.

Similarities in prescribing patterns

We noticed interesting similarities between the French and the Dutch GPs. First, after adjustment for patient characteristics, antibiotic prescribing was in both groups associated with the diagnosis of acute tonsillitis. This result may be surprising when we compare it with data from population-based studies that show important discrepancies between France and the Netherlands in antibiotic use in terms of defined daily doses (DDD).[4] We can put forward the hypothesis that these discrepancies are not solely linked to the GP's decision to prescribe or not an antibiotic (which was the focus of our study), but also to differences that can exist in prescribed daily doses and/or in treatment length. As our study was not based on DDD measurements, this hypothesis could not be validated. The low consultation threshold in France may also play a role: our study demonstrated that the number of URTI patient per GP per year was nearly twice as much in the French SFMG-DB than in the Dutch LINH-DB (372.1 versus 181.3). This may explain that prescribing patterns can be similar even if discrepancies exist in terms of DDD. In both countries, the probability of receiving an antibiotic prescription was higher for patients over 15. This is in line with the study of Otters *et al.*[24] who reported that antibiotic prescribing for children remained very low in the Netherlands. It is also in line with a French study by Mousques *et al.*,[20] which shows that children under 16 received less antibiotics than working adults. The Dutch GPs had also the same prescribing pattern as their French counterparts with regard to symptomatic drugs even if the volume they prescribed was significantly lower.

Striking differences

We noticed interesting differences in prescribing patterns for analgesic medications. Actually, even if analgesic medications were associated in both databases with being diagnosed with acute tonsillitis, in the Netherlands they were more frequently prescribed in women >15 years old, living in urban areas. This may be related to the fact that Dutch physicians in general practice prescribe more medicines to women compared to men.[25]

Our study also highlights enormous differences in prescription volumes for symptomatic and analgesic medications. This can first be linked to differences in help-seeking behaviour of patients. In France, the threshold for consulting a GP is very low compared with the Netherlands. French patients perceive a greater need to consult for self-limiting diseases in general and for URTI in particular.[26] In contrast, Dutch GPs and Health Authorities have been involved in education campaigns for more than ten years, increasing patients' awareness that they do not need to consult in case of self-limiting diseases and minor symptoms. Information letters to patients and telephone advice from practice assistants and practice nurses, based on national guidelines, all discourage patients to consult their doctor earlier than necessary.[27] This important difference may also explain the higher number of consultations per patient per year that emerged from the SFMG-DB. Cultural differences in drug perception also plays a role: in the Netherlands, we observe a higher degree of scepticism towards drug use, which is associated with the idea that drugs may have toxic effects on the body.[28] In contrast, in France medicines are more 'popular'[28] and they are considered as accelerating the healing process. However, we also have to take into account differences in the extent to which drug expenses can be claimed with insurers and the availability of over-the-counter (OTC) alternatives. In the Netherlands, as opposed to France, most of the symptomatic and analgesic drugs for URTI were readily available as OTC medicines. GPs were therefore less likely to prescribe these drugs compared with their counterparts in France, where some symptomatic and analgesic drugs were still reimbursed by the French Social Security Organism in 2003.

The patient's help-seeking behaviour and the cultural differences cited above may be related to the variations in the health care system of both countries. As a consequence, some of these variations may explain differences in prescription volumes for symptomatic and analgesic medications. Indeed, in France, the remuneration of the GPs is based on fee-for-service and GPs are paid in cash by the patient, whereas in the Netherlands there was, in 2003, a combination of capitation fee (for publicly insured patients) and fee-for-service (for privately insured patients). However, Dutch GPs are never directly paid in cash by the patients. This difference may intervene on the interaction between French GPs and their patients during the consultation. The end of the medical encounter in France is strongly marked by a 'prescription ritual' linked to the direct fee-for-service remuneration system that tends to increase prescriptions.[26] Indeed, on completion of the consultation, when the patient pays the doctor, the latter generally—and simultaneously—gives a prescription in return for this payment. If there is no indication for prescribing an antibiotic, then symptomatic and analgesic medications may be prescribed as some sort of consolation[29] or as a consequence of the patient's insistent demand for this. Years of prescribing medications have created a 'cycle of supply and demand'[30] and breaking this will require, on the one hand, educating patients that self-limiting diseases do not necessarily require a prescribed medication, and, on the other hand, convincing doctors that patient satisfaction is primarily influenced by the time spent by the physician in listening and explaining the disease.[31]

Limitations of the study

First, in France, in 2003, patients were not registered with their GP and we had only at our disposal information on consulting patients. As a consequence, a population denominator for France and the Netherlands could not be found and thus we limited our study to an analysis per consultation for URTI. Secondly, data in the LINH-DB were available at the surgery level and not at doctor level.[14–16] This did not allow studying interactions between patient level and doctor level in a multilevel approach which could have been useful to compensate our third limitation: GPs in both databases were different in terms of age and sex. There were more female doctors in the LINH-DB. Dutch GPs were also younger and they had less experience. This may explain some of the differences in prescription patterns. Finally, there is an under-representation in the French sample of doctors working in rural areas, and consequently of rural patients. But this potential weakness did not influence our results since the rural population structure in our sample was representative for rural patients in France.

In conclusion, regarding antibiotic prescriptions, our study on GPs' prescribing in this particular group of patients consulting for URTI did not demonstrate large discrepancies per consultation between French and Dutch GPs. However, we noticed important differences in volumes of symptomatic and analgesic prescriptions. The causes of these discrepancies seem to be multifactorial and can be explained by differences in help-seeking behaviour of patients for self-limiting diseases, in medication perceptions, in status of OTC medications as well in the health care system regarding to the organization of general practice, in particular in GPs' remuneration system. In a context of limited financial resources, the appropriateness of symptomatic and analgesic prescriptions becomes a major issue in France. Policy health measures aim to stop financial reimbursement of an increasing number of these medications. In such a context, special emphasis could be put on the patients' help-seeking attitude in order to reduce consultations and prescriptions for self-limiting diseases. French GPs could contribute to this change by including patient education more systematically in their practice.

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KEY POINTS

Regarding antibiotic prescriptions, GPs' prescribing patterns for URTI patients did not demonstrate large discrepancies between French and Dutch GPs.

But French GPs prescribed four times more symptomatic and analgesic medications for URTI than their Dutch counterparts.

Differences in help-seeking attitudes, medication perceptions and remuneration system may explain the large differences in symptomatic and analgesic prescriptions.

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TABLES

Table 1 URTI patient diagnoses in the SFMG-DB (France) and in the LINH-DB (Netherlands) in 2003

	Database			
	SFMG-DB (France) Number of URTI consultations 33 486 (in 2003) Codes according to DRC		**LINH-DB (Netherlands) Number of URTI consultations 25 461 (in 2003) Codes according to ICPC**	
Acute tonsillitis (%)	Strep throat, acute tonsillitis (RC710)	14.1	Strep throat (R72) acute tonsillitis (R76)	15.8
Other diagnoses (%)	Head cold (RC272)	15.9	Upper respiratory infection, head cold (R74)	66.6
	Fever with URTI symptoms (RC735)	49.9		
	Rhinopharyngitis (RC273)	28.4	Sneezing/nasal congestion (R07)	5.6
	Pharyngitis (RC750)	8.8	Symptom/complaint throat (R21)	19.5

Table 2 Volume of URTI consultations and prescriptions per patient consulting for URTI in the SFMG-DB (France) and in the LINH-DB (Netherlands) in 2003

Per URTI patient in 2003	SFMG-DB (France)	LINH-DB (Netherlands)	*P*
Number of consultations per URTI patient/2003	1.42 (SD 0.90)	1.36 (SD 0.88)	<0.001
Number of consultations followed by a prescription per URTI patient/2003	1.39 (SD 0.85)	0.72 (SD 0.91)	<0.001
Number of URTI-specific medications/per URTI patient/2003	3.55 (SD 2.7)	0.82 (SD 1.57)	<0.001
Number of antibiotics prescriptions per URTI patient/2003	0.29 (SD 0.53)	0.32 (SD 0.54)	<0.001
- Penicillin	0.20 (SD 0.45)	0.20 (SD 0.45)	NS
- Macrolides	0.09 (SD 0.31)	0.04 (SD 0.21)	<0.001
- Tetracycline	0.003 (SD 0.06)	0.08 (SD 0.29)	<0.001
Number of symptomatic prescriptions/per URTI patient/2003	1.01 (SD 0.79)	0.21 (SD 0.52)	<0.001
Number of analgesic prescriptions per URTI patient/2003	0.84 (SD 0.77)	0.12 (SD 0.41)	<0.001

Table 3 Results of the logistic regression model for the three dependent variables (estimated coefficient, odds ratio and 95% confidence interval) in the SFMG-DB (France) and in the LINH-DB (Netherlands) in 2003

	SFMG-DB (France)				LINH-DB (Netherlands)			
	Coefficient	Odds ratio	95% CI		Coefficient	Odds ratio	95% CI	
Antibiotics								
Intercept	−1.5374	0.18			−1.212			
Age (ref=>15)	−0.1206	0.89	0.79	0.99	−0.3502	0.70	0.61	0.81
Sex (ref=female)	0.104	1.11	1.06	1.16	0.0188	1.02	0.96	1.08
Residence (ref=rural)	0.2251	1.25	0.78	2.02	−0.2587	0.77	0.57	1.05
Tonsillitis (ref=no)	1.9718	7.18	5.86	8.81	2.5355	12.62	10.56	15.09
Symptomatic medications								
Intercept	1.5914				−1.4346			
Age (ref=>15)	−0.1423	0.87	0.79	0.95	−0.7038	0.49	0.43	0.57
Sex (ref=female)	−0.0226	0.98	0.93	1.02	0.0106	1.01	0.93	1.10
Residence (ref=rural)	−0.111	0.89	0.53	1.50	0.1883	1.21	0.95	1.54
Tonsillitis (ref=no)	−1.2632	0.28	0.24	0.33	−1.5456	0.21	0.18	0.25
Analgesic medications								
Intercept	0.2344				−2.2931			
Age (ref=>15)	0.2921	1.34	1.18	1.51	−1.1649	0.31	0.26	0.37
Sex (ref=female)	0.0109	1.01	0.97	1.06	−0.1144	0.89	0.81	0.98
Residence (ref=rural)	0.2941	1.34	0.90	2.01	0.3312	1.39	1.02	1.90
Tonsillitis(ref=no)	0.5491	1.73	1.51	1.99	0.4965	1.64	1.38	1.95