Perceptions and attitudes of French general practitioners towards rapid antigen diagnostic tests in acute pharyngitis using a randomized case vignette study

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Objectives: This study had three objectives: (i) to assess the use of rapid antigen diagnostic tests (RADTs) and their impact on the antibiotic prescribing behaviour of general practitioners (GPs) for acute pharyngitis; (ii) to study the barriers to the use of RADTs; and (iii) to identify GPs’ characteristics associated with non-compliance with French guidelines.

Methods: We conducted a cross-sectional survey of a representative sample of 369 self-employed GPs in southeastern France using a randomized case vignette study.

Results: The availability of an RADT allowed a 44% relative reduction in the rate of antibiotic prescriptions. Of GPs for whom the test was available, 34% did not use an RADT in our acute pharyngitis vignette and 13% of those who used the test prescribe an antibiotic despite a negative RADT result. Non-compliance with French guidelines (i.e. not using an RADT and/or prescribing an antibiotic despite a negative RADT result) was independently associated with the following factors: less reading of medical journals, less benefits/risks discussion with patients about vaccinations and higher perception that clinical examination was sufficient to prescribe antibiotics. The three main declared barriers to RADT use were: time to perform the test, patient expectations regarding antibiotics and the perception that clinical examination was sufficient to decide to prescribe an antibiotic.

Conclusions: RADTs are a useful but not sufficient tool to reduce antibiotic prescribing in general practice. The results of this study increase understanding of the factors underlying clinical decision making for acute pharyngitis and may contribute to the development of interventions to improve practice.

Keywords: antibiotic prescription, barriers, medical practice, primary care, survey

Introduction

Acute pharyngitis/tonsillitis (AP) is a leading cause of antibiotic prescriptions in the outpatient setting, with a high proportion of unnecessary prescriptions.1 Reducing these prescriptions is important to curb bacterial resistance. The benefit of antibiotics in AP is modest and is limited to group A streptococcal infections, which cause only 10%–15% of AP cases in adults and 15%–30% in children; the majority of AP infections are caused by viruses and do not require antibiotics.1,2 Near-patient tests are an attractive way to help physicians reduce their antibiotic prescriptions.3 Rapid antigen diagnostic tests (RADTs) detecting group A streptococcal infections are recommended by the US, Finnish and French guidelines in order to reduce antibiotic prescriptions.4 In France, RADTs are recommended in all cases of AP in children ≥3 years old, and in adults presenting with a score ≥2 using the modified Centor criteria.5 Antibiotics are recommended only in proven group A streptococcal infections, in order to slightly shorten the clinical evolution, relieve symptoms, limit the spread of Streptococcus pyogenes and prevent suppurative complications and acute rheumatic fever. This is quite different from other guidelines (for example in Belgium, the Netherlands, England and Scotland), where AP is considered a self-limiting disease, and antibiotics are not recommended except in high-risk and very ill patients.6 Appropriate testing for children with AP is nonetheless included as a quality indicator by the US National Committee for Quality Assurance (http://www.ncqa.org/). In France,
RADTs have been freely distributed to all French general practitioners (GPs) since 2002 as part of a national campaign to improve and reduce antibiotic use.\(^6\)–\(^8\) The sensitivity of the RADTs used in France has been assessed by the French Health Products Safety Agency, and it ranges between 92% and 97%.\(^9\) These tests have proven to be a cost-effective strategy,\(^10\) provided that clinicians follow guidelines, since a negative result can avoid unnecessary antibiotic prescriptions. A prospective before/after study conducted in two French regions in 1998–99 showed a high utilization rate of these RADTs (93%) and a dramatic decrease (from 83% to 43%) in the rate of antibiotic prescriptions for AP, after implementation of training sessions regarding guidelines and the use of RADTs.\(^11\) However, more recent studies conducted in the USA and in France have suggested that RADTs are underused in patients presenting with AP: they are performed in only half of the patients.\(^12\)–\(^14\) This could explain why antibiotic-prescribing levels decreased only modestly for tonsillitis (from 93% to 87% between 1984 and 2009) in France.\(^8\) Knowledge of the barriers to RADT use could help us understand the reasons of this underuse, but these barriers have not been widely studied.\(^12\),\(^13\),\(^15\)

Our survey using a randomized case vignette study aimed at assessing: (i) the use of RADTs and their impact on the antibiotic prescribing behaviour in a representative sample of GPs in southeastern France; (ii) the barriers to the use of RADTs; and (iii) GPs’ characteristics associated with non-compliance with French guidelines.

**Methods**

**Participants**

The present study was part of the second cross-sectional survey conducted under the framework of the French Regional Panel of General Practices. This panel survey was initiated in 2010 with the objective to study the medical practice of self-employed GPs in the Provence–Alpes–Côte d’Azur region, which had a population of 4.88 million in 2008 [French National Institute for Statistics and Economic Studies data (INSEE)]. GPs were selected using stratified random sampling from the ADELI (‘Automatisation des Listes’) database of the Ministry of Health, which contains exhaustive information on the activity of French physicians. The ADELI database was stratified for the location of the general practice (urban, suburban or rural area), gender, age (\(<=49\), \(49-56\) or \(>=56\)) and volume of activity (\(<Q1\), \(Q1-Q3\) or \(>=Q3\)). Since French GPs work on a fee-for-service basis, participants received a compensation equivalent to two consultation fees for their participation in each survey. Of the 1108 GPs invited to participate in the French Regional Panel of General Practices in 2010, 67 (6%) could not be contacted and 134 (12%) were not eligible [GPs practicing exclusively in hospitals or long-term care facilities, GPs practicing exclusively alternative medicine (such as homeopathy or acupuncture) and GPs planning to move out of their present region in the following 6 months]. Of the 907 remaining physicians, 444 (49%) agreed to participate. GPs who refused did not differ from participants according to gender, age or volume of activity, but they were less likely to practice in a rural area (\(P=0.035\)). Lack of time was their main reason for refusal. The results presented in this study are based on the 369 GPs who participated in the cross-sectional survey conducted between January and March 2011 [response rate, 369/444 (83%)].

**Procedure and questionnaire**

The survey was conducted among GPs by professional investigators with computer-assisted telephone interviewing. The questionnaire was pilot-tested for clarity, length and face validity with 10 GPs.

Respondents were randomly allocated by the computer to two different clinical scenarios, depending on availability (or not) of an RADT for the diagnosis of a typical AP vignette in a 10-year-old presenting with three Centor criteria (see the Supplementary data available at JAC Online). They were also asked questions about RADT use, antibiotic prescribing and barriers to RADT use. Potential barriers to RADT use were identified using a literature review.\(^3\),\(^12\),\(^13\),\(^16\)

The questionnaire also collected data on individual and occupational characteristics of respondents: gender, age, solo/group practice and training practice (i.e. being in charge of junior doctors in training at the surgery). GPs were also surveyed on the following topics: vaccinations, organization of the surgery (availability of a computer, of the internet and of a secretary), workload, mode of training (continuing medical education (CME) and reading medical journals) and mode of practice (discussion of clinical cases with colleagues, visits from pharmaceutical representatives). In parallel with the survey, observational data on the GP activity in 2010 were obtained from the Social Security exhaustive reimbursement database that includes the total number of consultations and home visits per year for each GP. The survey was approved by the National Data Protection Authority (Commission Nationale Informatique et Libertés (CNILT)), which is responsible for ethical issues and the protection of individual data collected in France.

**Statistical analysis**

**Descriptive analysis**

In order to correct potential bias in participants, a computing method to weight the sample was used to obtain a representative database of the regional GP population regarding age, gender, location of practice and volume of activity. All presented percentages are weighted results.

**Factors associated with a practice not compliant with the guidelines**

To identify the factors associated with non-compliance with French guidelines, we studied the GPs randomly allocated to the second scenario (RADT available). The main outcome variable was GP compliance with French guidelines, with a compliant attitude being defined by two characteristics: (i) use of the RADT; and (ii) absence of antibiotic prescription (RADT available). The main outcome variable was GP compliance with French guidelines, with a compliant attitude being defined by two characteristics: (i) use of the RADT; and (ii) absence of antibiotic prescription given that the result of the test was negative. Univariate explanatory variables (\(P<=0.15\)) were introduced in a backward multivariate logistic model (\(P<=0.05\)) to identify independent predictive factors associated with the compliance. The model was adjusted for the variables used to stratify the sample (volume of activity, location of general practice, gender and age). To measure the importance of the variables for the outcome, the Akaike information criteria (AIC) allowed us to compare 2 models (\(k\) is the number of explanatory variables) with the model having the lowest AIC value (model averaging). Weights were calculated for each of the \(k\) models. The Akaike weights for each model that contained the parameter of interest were summed. To interpret the results, a scale was used: an importance weight (\(x\)) of \(0.50 \leq x < 0.75\), \(0.75 \leq x < 0.95\), \(0.95 \leq x < 0.99\) or \(x \geq 0.99\) indicated ‘weak’, ‘positive’, ‘strong’ or ‘very strong’ importance, respectively.\(^18\)

Data were analysed using SAS 9.2 (SAS Institute, Cary, NC, USA) and R version 2.13.0 (http://www.r-project.org/). All reported \(P\) values were two-tailed, and a \(P\) value <0.05 was considered to be significant.
Results

Clinical scenarios

A total of 369 GPs participated in the survey and were presented with a typical AP vignette in a 10-year-old boy (see the Supplementary data for details). In the first scenario (RADT not available) 112/182 (61.6%) GPs prescribed an antibiotic. In the second scenario (RADT available) 107/184 GPs (58.0%) complied with the French guidelines, since they used the RADT and did not prescribe any antibiotic given that the result of the test was negative. Overall, the availability of the RADT allowed a 26.9% absolute decrease and a 43.7% relative decrease in the rate of antibiotic prescriptions (112/182 = 61.6% versus 63/182 = 34.7%). These results are summarized in Figure 1.

For the 175 GPs who prescribed an antibiotic (in both scenarios), the principal antibiotics prescribed were: amoxicillin (72.8%), non-specified penicillins (10.3%), macrolides (7.0%) or cephalosporins (4.0%).

Perceptions of barriers to the use of an RADT

Of 367 GPs who responded, 315 (85.8%) declared that they usually had RADTs in their surgeries. Of these, 151 (47.8%) declared that they used these tests often or always in cases of AP in children over 3 years old. The declared barriers limiting the use of an RADT are presented in Table 1.

Factors associated with a practice not compliant with the guidelines

We focused on the 185 GPs allocated to the second scenario. The results are presented in Tables 2 and 3. The perception that clinical examination was sufficient to decide to prescribe an antibiotic for AP was the most important factor independently associated with non-compliance.

Discussion

Of 185 GPs who had access to an RADT, 34% did not use it in our AP vignette, and of those that did, 13% prescribed an antibiotic despite a negative RADT result. The availability of an RADT allowed a 44% relative reduction in the rate of antibiotic prescription. The three main declared barriers to RADT use were: time to perform the test, patient/parent expectations regarding antibiotics and the perception that clinical examination was sufficient to prescribe an antibiotic.

We surveyed a representative sample of GPs practicing in a large French region (~5 million inhabitants). Our randomized-controlled design used a clinical vignette to measure the quality of physician practice, since vignettes have been shown to be a valid tool for this purpose.19,20 Our study has some limitations. Firstly, our findings might not be applicable to other settings, and they refer to GPs' declared attitudes, not to what they do in practice; however, they are very similar to published results that have assessed GP clinical practices, some of which had included self-employed GPs. Secondly, even if GPs who refused to participate in this study did not differ from participants according to gender, age or volume of activity, they might have differed in their perceptions and attitudes concerning RADT use and antibiotic prescription in AP; however, this topic was not mentioned to GPs before they were asked to participate in the panel, and our findings are in accordance with other studies. Finally, we focused on the GPs' characteristics, not on the patients or the patient–doctor relationship.

In our study, 86% of GPs declared that they usually have RADTs in their surgeries, which is in line with the 84%–88% rates found in the literature.13,15 When an RADT was available to GPs in our vignette, 34% of GPs did not perform an RADT.
This high prevalence of RADT underuse has also been reported in the literature (7% to 54%).

The proportion of GPs prescribing an antibiotic when the RADT result was negative (13%) is in the lower half of the range of other studies’ results (3%–40%), perhaps because we measured a declared attitude in a vignette, and not the real practice. An American study published in 2007 reported a very low prevalence rate of antibiotic prescriptions in cases of negative RADT result (0.95%), but prescriptions were made by nurse practitioners and physician assistant staff, with adherence to AP guidelines clearly targeted as an indicator of clinical quality. 27

Few interventional studies assessing the impact of RADTs on antibiotic use have been published. Two were monocentric randomized controlled trials (Greece and Canada), one was a cluster randomized controlled trial in primary care centres in Spain and two were before-and-after uncontrolled studies (France and the USA). Only one, to the best of our knowledge, included children with AP consulting their GPs. Overall, the impact of RADTs was a relative reduction in antibiotic prescriptions, ranging from 32% to 61%. In our study, the availability of an RADT allowed a 44% relative reduction of antibiotic prescription, which is quite low compared with that in the literature, since the result of the test was negative in our typical vignette, whereas all cases of AP (viral and bacterial) were included in the literature.

In our study, non-compliance with the guidelines (i.e. either no RADT performed or an antibiotic prescribed despite a negative RADT result) was noted in 42% of the GPs. Adherence was no better in younger doctors, a worrying fact that has also been noted by others. Putting a high value on clinical examination to decide when to prescribe antibiotics was an independent factor in non-compliance, a finding that has also been reported in the literature.
One-third of GPs expressed doubts concerning the validity of RADT results. This may explain why some GPs prescribed antibiotics even if the RADT result was negative, since of the GPs allocated to the second scenario, 43% prescribed an antibiotic and expressed doubts regarding the validity of RADTs, whereas 29% prescribed an antibiotic while not perceiving validity as a barrier ($\chi^2 = 3.56, P = 0.059, n = 176$). The use of high-sensitivity RADTs without back-up cultures for negative test results is recommended by the French guidelines for children and adults, provided that the patient does not present any risk factor for acute rheumatic fever. This recommendation is consistent with the US 2002 guidelines that state that a negative RADT result for a child or adolescent should be confirmed by a throat culture, unless the physician has ascertained in his/her practice that the RADT being used is comparable in sensitivity to a throat culture. However, the reported sensitivities of the RADT currently used in France, Streptatet$^{36}$ (Dectrapharm, Strasbourg, France), differ quite widely in the literature: from 79% in a study conducted in the UK to 95% in the study performed by the French Health Products Safety Agency. This finding deserves further investigation. Furthermore, guidelines on the management of AP are very different from one country to another, and this lack of harmonization could contribute to the doubts expressed by GPs regarding the validity of RADTs. A uniform approach to the management of AP would be of help for clinicians who face this issue in everyday practice.

In conclusion, the results of this study increase our understanding of the factors underlying clinical decision making and antibiotic prescribing. Limiting antibiotic overuse will likely continue to require focus on many aspects of clinical practice rather than on any single factor (education of the GPs and the public, reduction of the perceived barriers, development of more specific clinical scores etc.). We suggest the following to improve GP management of AP in France: (i) the National Health Insurance could automatically send RADTs to GP surgeries; and (ii) a national campaign, targeting the physicians and the public, is necessary to convince people of the validity of RADTs and the inaccuracy of clinical examination in distinguishing between viral and bacterial AP. Implementing quality indicators on the management of AP could hasten the process, as in the USA.

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Transparency declarations
None to declare.

Author contributions
C. P. designed the study and wrote the protocol and the article. L. P. performed the statistical analysis and reviewed the article. A. P., P. V. and B. V. reviewed the study protocol and the article.

Supplementary data
Supplementary data are available at JAC Online (http://jac.oxfordjournals.org/).

References

