Chapter 5

Treatment of uncomplicated urinary tract infections: exploring differences in adherence to guidelines between three European countries.

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Summary
Objective: To evaluate adherence of general practitioners (GPs) to treatment guidelines regarding urinary tract infections in three European countries and to investigate whether differences in adherence at the prescribing level within and between countries could be explained by GPs’ knowledge and attitudes, characteristics, or national setting.

Design: Prescribing data collected in 1994-1995 were analysed regarding use of first-choice drugs and duration of treatment, knowledge and attitudes were assessed with a questionnaire, and multiple regression analysis was used to explain differences in prescribing behaviour within and between countries.

Results: Our study is based on data from 85.6% of the 584 GPs who were scheduled to participate in a continuing education programme. The mean proportion of responses in agreement with the guidelines regarding first-choice drugs was 0.69 in Sweden, 0.78 in The Netherlands, and 0.79 in Norway; regarding duration of treatment, the mean proportion was 0.56 in Sweden, 0.67 in The Netherlands, and 0.59 in Norway. The proportion of first-choice drugs prescribed for women (18-75 years) was 0.55 in Sweden, 0.83 in The Netherlands, and 1.00 in Norway (patients > 16 years). The duration of treatment was 7.6 defined daily doses per prescription in Sweden, 5.9 in The Netherlands, and 6.6 in Norway. Knowledge and attitudes explained 0-17% of the variation in prescribing. Years in practice explained 0-11%, and GPs’ gender had no explanatory value. The national setting explained most of the variation between countries.

Conclusions: Differences in prescribing behaviour can be explained only to a small extent by deviations from the guidelines in terms of knowledge and attitudes. Between countries, differences in regulation, marketing and distribution of drugs seem to be of much greater importance.
5.1 Introduction

Uncomplicated urinary tract infections (UTIs) are among the most common bacterial infections seen in general practice. Appropriate treatment of uncomplicated UTIs requires selection of a drug and determination of the length of treatment. Many countries have developed guidelines or recommendations regarding the treatment of UTIs. To improve the quality of care, however, passive dissemination of guidelines has little or no effect on the behaviour of physicians, and specific educational interventions are needed to disseminate and implement the guidelines in practice.

Many possible factors may influence guideline adherence. The physicians’ incorrect knowledge or attitudes may explain nonadherence. The physicians’ personal characteristics also seem to be of influence, but it is not clear to what extent they are related to incorrect knowledge or attitudes. Patients, as well as structural and organisational factors can form barriers to implementing guidelines. These factors are determined in part by regional or national differences in culture and regulations.

Despite a growing awareness that improving knowledge is not enough to improve adherence to practice guidelines, most educational programmes are still primarily designed to plug supposed gaps in knowledge. The question is to what extent interventions should focus on this aspect. Furthermore, there is a movement towards increased transnational continuing educational projects and a growing exchange of methods and programmes between countries. There are concerns, however, that the variations in training and culture, plus the disparity in economic and healthcare organisations, might impede this process. In the European Drug Education Project (DEP), GPs’ adherence to treatment guidelines regarding UTIs was evaluated in three European countries (The Netherlands, Sweden, Norway). In these countries, GPs are always physicians. We investigated to what extent differences in adherence at prescribing level could be explained by the GPs’ knowledge and attitudes, their personal characteristics, or the national setting. This information can be used to tailor interventions aimed at implementing the guidelines in practice.

5.2 Methods

5.2.1 Sample

GPs (n=584) who had registered for a continuing drug education programme participated in our study. Data were collected before the educational intervention, when the GPs did not yet know on which subject they would receive education. One hundred seventy-six (88.4%) of 199 Norwegian GPs returned the knowledge
and attitudes questionnaire, and prescribing data were available for 197 GPs (99.0%). In The Netherlands, knowledge and attitudes data were received from 157 of 181 GPs (86.7%), and prescribing data from 164 (90.6%). In Sweden, knowledge and attitudes data were collected for 179 of 204 GPs (87.8%), and prescribing data for 201 (98.5%).

5.2.2 National setting
The three countries differ in several respects. Although the GPs from these three countries are certified physicians, there are national differences in their education, sources of information, and organisation of their practice. In The Netherlands, for example, most GPs participate in local peer groups to exchange information about pharmacotherapy. Such a system does not exist in the other countries. In Sweden, most GPs work in health care centres, whereas in the other two countries most work in one-doctor practices. In The Netherlands, there are still quite a number of dispensing GPs. Average age and gender distribution of the GPs also differ. In Sweden, GPs are more often women and younger in comparison to the other countries, while the percentage of male GPs is especially large in The Netherlands.

There are also obvious differences in the regulation, reimbursement, and organisation of health care in the three countries. Drugs (table 5.1), as well as

<table>
<thead>
<tr>
<th>ATC codea</th>
<th>Name</th>
<th>NLb</th>
<th>Sb</th>
<th>Nb</th>
</tr>
</thead>
<tbody>
<tr>
<td>G04AA</td>
<td>Methenamine</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>G04AB</td>
<td>Quinolone derivatives</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>G04AC</td>
<td>Nitrofuran derivatives</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>J01EA</td>
<td>Trimethoprim and derivatives</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>J01EB</td>
<td>Short-acting sulfonamides</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>J01CA08</td>
<td>Pivmecillinam</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>J01CA20</td>
<td>Combinations with pivmecillinam</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>J01MA</td>
<td>Fluoroquinolones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>. ofloxacin up to 200 mg</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>. ciprofloxacin up to 250 mg</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>. nefloxacin 400 mg</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>. enoxacin 200 mg</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>. norfloxacin up to 400 mg</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>J01XX01</td>
<td>Fosfomycin</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

a ATC = Anatomical Therapeutic Chemical classification index
b NL = The Netherlands, S = Sweden, N = Norway
+ = available on the market; - = not available on the market
strenghts and package sizes available, differ from country to country (table 5.2). In The Netherlands any number of tablets can be dispensed, whereas in the other countries the available package sizes determine the amount being dispensed. In Norway, contrary to The Netherlands and Sweden, treatment of UTIs is not reimbursed.

5.2.3 Guidelines
In all three countries, recommendations regarding the treatment of UTIs were published at approximately the same time in a national medical journal and sent to

<table>
<thead>
<tr>
<th>Table 5.2</th>
<th>Comparison of national guidelines for first-choice drugs, recommended duration of treatment, and packages sizes available for uncomplicated urinary tract infections</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First-choice drugs</strong></td>
<td><strong>Recommended duration of treatment (days)</strong></td>
</tr>
<tr>
<td>The Netherlands</td>
<td>3</td>
</tr>
<tr>
<td>• Trimethoprim</td>
<td></td>
</tr>
<tr>
<td>• Nitrofurantoin</td>
<td></td>
</tr>
<tr>
<td>• Sulfamethizol</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>(3) - 7</td>
</tr>
<tr>
<td>• Trimethoprim</td>
<td>100 mg → 30, 50, 100</td>
</tr>
<tr>
<td></td>
<td>160 mg → 14, 20, 100</td>
</tr>
<tr>
<td></td>
<td>300 mg → 7, 50, 98</td>
</tr>
<tr>
<td>• Nitrofurantoin</td>
<td>50 mg → 25, 100</td>
</tr>
<tr>
<td>• Pivmecillinam</td>
<td>200 mg → 20, 30, 40, 100</td>
</tr>
<tr>
<td>• Cephalosporins a</td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>3</td>
</tr>
<tr>
<td>• Trimethoprim</td>
<td>100 mg → 30</td>
</tr>
<tr>
<td></td>
<td>160 mg → 6, 10, 14, 100</td>
</tr>
<tr>
<td></td>
<td>300 mg → 3, 7, 50</td>
</tr>
<tr>
<td>• Nitrofurantoin</td>
<td>50 mg → 25, 50, 100</td>
</tr>
<tr>
<td>• Pivmecillinam</td>
<td>100 mg → 20</td>
</tr>
<tr>
<td></td>
<td>200 mg → 10, 20, 30, 40, 100</td>
</tr>
<tr>
<td>• Cotrimoxazol a</td>
<td></td>
</tr>
<tr>
<td>• Aminopenicillins a</td>
<td></td>
</tr>
</tbody>
</table>

a not included in the main analysis, because mostly used for indications other than UTI
all GPs. In each country, a group of experts is responsible for the quality of the recommendations; these guidelines are both highly regarded and appreciated by the GPs in the countries. The status of the Dutch guidelines may be somewhat different, as they are developed and issued by the Dutch College of General Practitioners, whereas in Sweden and Norway, they are issued by or with financial support of health authorities.

Recommendations regarding first-choice drugs and duration of treatment for uncomplicated UTIs are included in all three countries, yet are not identical (table 5.2). First-choice drugs recommended are trimethoprim, nitrofurantoin, and sulfamethizol in The Netherlands; trimethoprim, nitrofurantoin, pivmecillinam, and cephalosporins in Sweden; trimethoprim, nitrofurantoin, pivmecillinam, cotrimoxazol, and aminopenicillins, such as amoxicillin and ampicillin, in Norway. Fluoroquinolones are not considered first-choice drugs in any of these countries. The recommended duration of treatment is three days in The Netherlands and Norway, and three to seven days in Sweden.

5.2.4 Primary outcomes
Guideline adherence was established with regard to the main recommendations given in the existing national guidelines for the treatment of uncomplicated UTIs. The primary outcomes measured were 1) the proportion of prescribed first-choice drugs from all prescribed UTI drugs, and 2) the average duration of treatment for prescribed first-choice UTI drugs. GPs’ knowledge and attitudes were determined separately for both parameters; their personal characteristics were years of practice experience and gender.

5.2.5 Prescribing behaviour
To assess prescribing behaviour, data from automated pharmacy databases containing information on all dispensed drugs were used. The periods covered were June - November 1995 for The Netherlands, September 1994 - February 1995 for Sweden, and May 1994 - April 1995 for Norway. All prescriptions for drugs with UTI as the main indication were selected for each country (table 5.1). Regarding fluoroquinolones, only the low strength preparations were included because only these are indicated for UTIs. To focus on the treatment of uncomplicated UTIs, only prescriptions for women, ages 18-75, were included in the analysis in The Netherlands and Sweden. In Norway, all prescriptions for patients > 16 years were included, due to the lack of more specific information on gender and age.

The duration of treatment was expressed as the average number of defined daily doses (DDD) per prescription. For trimethoprim a correction on the international DDD of 400 mg was used, namely 300 mg, because this is the advised daily dosage in all participating countries. Prescriptions for maintenance
treatment (i.e. prescriptions including > 14 DDDs) were excluded.

5.2.6 Validation of drug selection
Aminopenicillins, cephalosporins, and cotrimoxazol were not included in the analysis, because treatment of UTIs is not their main indication. As they may be used for UTIs and are even considered first-choice drugs in some of the countries, it is important to assess the implications of their exclusion. In each country, available data on prescribing linked to diagnosis were used to validate our selection of drugs.

In The Netherlands, the inclusion criteria were validated in a pilot study using an automated database of 16 GPs. This source contained information on both diagnosis and drugs prescribed in 1995. Of all selected drugs prescribed to women, ages 18-75 (table 5.1), 93.8% were prescribed for uncomplicated UTIs (International Classification of Primary Care (ICPC)-code: U71). Of all treated uncomplicated UTIs (ICPC-code U71), 88.2% were treated with one off the selected drugs (either first- or second-choice). Amoxicillin was the most frequently prescribed drug not included in this study (7%; recommended as first-choice during pregnancy) followed by cotrimoxazol (2.6%). In Sweden, a national survey of diagnoses and treatments showed that at least 92% of all diagnosed UTIs in primary care were treated with the selected drugs; 5% were treated with cephalosporins or aminopenicillins and 3% were treated with cotrimoxazol. In Norway, survey data from the Norwegian Medical Wholesale Merchant from the period September 1995 to September 1996 showed that 75-80% of all diagnosed UTIs (International Classification of Diseases (ICD-9)-code 590) were treated with the selected drugs; 10-15% were treated with cotrimoxazol, and approximately 5% were treated with aminopenicillins (all first-choice drugs according to Norwegian recommendations).

In addition, GPs included in the study received a series of at least 18 written cases regarding the treatment of uncomplicated UTI questioning them on what they would prescribe. These cases were sent to the GPs after the collection of knowledge and attitudes data. The Dutch, Norwegian and Swedish GPs chose the drugs included in table 5.1 (89.8%, 95.1% and 97.6% respectively). Most of the remaining prescriptions were for cotrimoxazol in The Netherlands (7.4%) and Norway (3.5%) and for cephalosporins in Sweden (1.5%).

5.2.7 Knowledge and attitudes questionnaire
A questionnaire (see appendix) was developed to assess to what extent GPs’ knowledge and attitudes regarding the treatment of uncomplicated UTIs were in agreement with the national guidelines. The methodology used to develop this content specific questionnaire, as well as its format has been validated in The Netherlands. The content validity of the questionnaire was determined by...
including all elements that were deemed relevant for good clinical practice by an international group of GPs and experts in the field. The applicability of the questionnaire was tested in The Netherlands in a pilot study of 25 GPs. The original English questionnaire was translated for all countries by experienced translators. The GPs’ knowledge and attitudes were assessed concerning first-choice drugs (four questions) and duration of the treatment (six questions). Data were collected between November 1994 and September 1995. Scores were calculated for each GP, expressing the proportion of responses in agreement with the national recommendations (excluding missing data); no scores were deducted for incorrect replies.

5.2.8 Physician characteristics
Physician characteristics included in the analysis were years in practice and gender. Physician’s age or years in practice has repeatedly been found to be related to the quality of prescribing behaviour ²⁵,²⁶,²⁷,²⁸. Physician gender also seems to explain some of the variation in prescribing patterns ²⁷,²⁹,³⁰. The influence of other personal characteristics has been studied in the past, such as working attitudes, membership in professional organisations and school of medical training, but most were not consistently related to the quality of prescribing ²⁵,²⁶. The willingness to take risks, however, does seem to be related to prescribing ³¹,³², but this attitude is again associated with the physician’s age ³³.

5.2.9 Analysis
Student’s t-tests were used for the comparison of knowledge, attitudes, and prescribing behaviour between countries. Within countries, the knowledge-attitudes scores regarding drug choice and duration of treatment were compared by using paired t-tests. Multiple regression models were used to determine whether differences in prescribing behaviour within countries were dependent on physicians’ knowledge and attitudes or their characteristics. Multiple regression analysis using dummy coding for each country was used to explain differences in prescribing behaviour between countries. For assessing the relative importance of the different variables, the increase in explained variance was calculated ($R^2_{\text{increase}} = R^2 - R^2_{(i)}$, where $R^2_{(i)}$ is the square multiple correlation coefficient when all independent variables except the $i$th are in the equation).

5.3 Results
Only GPs who completed the knowledge and attitude questionnaire and whose prescribing data were available were included in the analysis (147 from The Netherlands (81.2%), 177 from Sweden (86.8%), and 176 from Norway (88.4%)).
In The Netherlands, physicians had an average of 15.8 ± 8.1 years in practice; in Sweden the average was 9.9 ± 6.2 years; in Norway it was 14.4 ± 7.8 years. The percentage of female GPs was 9.5% in The Netherlands, 42.4% in Sweden, and 22.2% in Norway. These statistics reflect national differences regarding GP characteristics at the time of data collection.  

Table 5.3  Knowledge/attitude-scores (A) and prescribing behaviour (B) regarding first-choice drugs and duration of treatment

<table>
<thead>
<tr>
<th>A</th>
<th>Knowledge/attitude (K/A)-score (proportion of correct answers)</th>
<th>First-choice drugs (mean (SD))</th>
<th>Duration of treatment (mean (SD))</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands (n = 147)</td>
<td>0.78 a (0.21)</td>
<td>0.67 c (0.26)</td>
<td></td>
</tr>
<tr>
<td>Sweden (n = 177)</td>
<td>0.69 b (0.21)</td>
<td>0.56 (0.24)</td>
<td></td>
</tr>
<tr>
<td>Norway (n = 176)</td>
<td>0.79 a (0.21)</td>
<td>0.59 (0.22)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>Prescribing behaviour</th>
<th>Proportion of first-choice drugs (mean (SD))</th>
<th>Duration of treatment (mean DDD/prescription (SD))</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Netherlands (n = 147)</td>
<td>0.83 (0.19)</td>
<td>5.9 (1.4)</td>
<td></td>
</tr>
<tr>
<td>Sweden (n = 177)</td>
<td>0.55 (0.27)</td>
<td>7.6 (0.7)</td>
<td></td>
</tr>
<tr>
<td>Norway (n = 176)</td>
<td>1.00 (0.03)</td>
<td>6.6 (1.2)</td>
<td></td>
</tr>
</tbody>
</table>

SD = Standard Deviation; DDD = defined daily dose; can be seen as a proxy of the number of days for which the drugs are prescribed

a score significantly higher as compared with K/A-score for duration of treatment; paired Student’s t-test, 2-tailed, p<0.05
b score significantly lower as compared with NL and N; Student’s t-test, 2-tailed, p<0.05
c score significantly higher as compared with all other countries; Student’s t-test, 2-tailed, p<0.05
d all countries differ significantly from each other; Student’s t-test, 2-tailed, p<0.05

The GPs in all three countries had a significantly higher knowledge and attitudes score (K/A-score) regarding first-choice drugs than the duration of treatment (table 5.3A). K/A-scores of Dutch and Norwegian GPs regarding first-choice drugs were considerably higher than those of their Swedish colleagues primarily because, contrary to the guidelines, a high proportion of Swedish GPs judged norfloxacin as a first-choice drug. Dutch GPs also scored high on
knowledge and attitudes regarding the duration of treatment (table 5.3A); it was found that knowledge about the duration of treatment for recurrent infections in Norway was especially low.

Analysis of prescribing data indicated large differences between the GPs of the different countries concerning the frequency of use of first-choice drugs and duration of treatment (table 5.3B). Only 55% of the UTI drugs in the Swedish data concerned first-choice drugs according to the Swedish guidelines. Fluoroquinolones were the most often prescribed second-choice drugs in Sweden and The Netherlands.

For Swedish GPs selecting first-choice drugs was in part explained by having better K/A-scores, whereas in Norway it was related to being in practice for fewer years (table 5.4). None of these variables determined the prescribing of first-choice drugs in The Netherlands. The same analysis was conducted for the duration of treatment (table 5.4). This analysis indicated that variations in the duration of treatment prescribed by GPs in The Netherlands and Norway were partly dependent on their knowledge and attitudes; the higher the K/A-score, the shorter the duration of treatment. In Sweden, the GPs with fewer years in practice tended to prescribe shorter treatments.

Half of the variation in the proportion of first-choice drugs prescribed between countries could be explained. Most of the variation was explained by differences in the setting, that is, country-specific aspects (table 5.4); differences at GP level were negligible. Differences in knowledge and attitudes of the GPs in different countries increased the explained variance by only 1%; differences in other GP characteristics between countries did not have any explanatory value. Regarding duration of treatment, a third of the variation between the countries could primarily be explained by the country setting (table 5.4). Differences in K/A scores explained only 6%, and differences in the average number of years in practice 1% of the variance.

5.4 Discussion

A study of adherence to guidelines requires consideration of the quality, status and distribution of the guidelines. All three countries provide national treatment recommendations which are highly regarded and appreciated by the GPs. Recommendations on the treatment of UTI were first published in 1989 and 1990 in national medical journals and sent to all GPs in each country; therefore, all GPs were made aware of the existence of the guidelines, but some may not have fully read the recommendations. There were no national programmes to enhance their implementation in practice. Our study demonstrates to what extent

Table 5.4 Differences in prescribing of first-choice drugs and duration
of treatment within countries and between countries

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Country</th>
<th>Variables explaining better prescribing (p&lt;0.05)</th>
<th>Increase in explained variance in prescribing (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-choice drugs</td>
<td>within The Netherlands</td>
<td>none</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>within Sweden</td>
<td>higher K/A-score</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>within Norway</td>
<td>fewer years in practice</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>between countries(^a)</td>
<td>which country</td>
<td>41</td>
</tr>
<tr>
<td></td>
<td></td>
<td>higher K/A-score</td>
<td>1</td>
</tr>
<tr>
<td>Duration of treatment</td>
<td>within The Netherlands</td>
<td>higher K/A-score</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>within Sweden</td>
<td>fewer years in practice</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>within Norway</td>
<td>higher K/A-score</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>between countries(^b)</td>
<td>which country</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td>higher K/A-score</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>fewer years in practice</td>
<td>1</td>
</tr>
</tbody>
</table>

\(^a\) total explained variance between countries was 50%

\(^b\) total explained variance between countries was 34%

knowledge, attitudes and prescribing behaviour were in accordance with these recommendations approximately five years after first publication, and whether non-adherence at the prescribing level could be explained by inadequate knowledge and attitudes at that moment.

Generally speaking, the GPs’ knowledge and attitudes about drugs of first-choice were more in agreement with the various national recommendations than their knowledge and attitudes about duration of treatment. Looking at actual prescribing behaviour, GPs from Norway prescribed mostly first-choice drugs; this is remarkable, because inclusion criteria regarding age and gender of the patient (to limit the data mostly to uncomplicated UTIs) could not be met in this country. GPs from The Netherlands prescribed first-choice drugs in > 80% of cases. Swedish GPs deviated more from their national recommendations and prescribed relatively more fluoroquinolones, which are not drugs of first-choice in any of the countries. Prescriptions for aminopenicillines, cephalosporins, and cotrimoxazol, which were not included in the analysis, may have affected these figures; however, it is expected that inclusion of these drugs would not significantly change the
overall pattern of (non-)adherence in these countries. Based on the estimated use of these drugs for UTI as reported in the method section, the reported proportion of first-choice drugs in Sweden might be 1% or 2% higher when first-choice cephalosporins are included. For Norwegian GPs, the proportion would probably not be affected by including any of these drugs, because the ones prescribed for UTI (i.e., aminopenicillins and cotrimoxazol) are considered to be first-choice drugs. In The Netherlands, inclusion of cotrimoxazol (considered second-choice in this country) could reduce the proportion of first-choice drugs by approximately 2.5% to 7.5%.

Variation in prescribing within the countries can in part be explained by the degree to which the GPs’ knowledge and attitude levels are in agreement with the guidelines, but this depends on the issue. In Sweden, prescribing of first- or second-choice drugs is related to the GPs’ knowledge and attitude levels, while in Norway and The Netherlands, duration of the prescriptions is related to their knowledge and attitudes regarding this subject.

Variation in prescribing of first-choice drugs between the GPs in The Netherlands, Norway, and Sweden can only to a very small extent be explained by differences in their knowledge and attitudes. The finding that fewer Swedish GPs knew that fluoroquinolones were not first-choice drugs seems of influence. Most variation, however, is the result of other differences between the countries; these differences do not seem to originate from differences in the nature, dissemination or acceptance of the national guidelines. In Norway, where the acceptance and status of the guidelines are the least clear, GPs prescribed the highest proportion of first-choice drugs. One explanation for the difference in prescribing of first-choice drugs could lie in the reimbursement of the drugs. In Norway, contrary to The Netherlands and Sweden, the treatment of UTIs is not reimbursed. In general, first-choice drugs are less expensive as compared with (second-choice) fluoroquinolones; this may explain the low use of fluoroquinolones in Norway. In addition, only two low strength fluoroquinolones are available in Norway. The popularity of fluoroquinolones in Sweden may have been enhanced by the fact that the introduction of norfloxacin in this country coincided with the medical debate concerning the safety of nitrofurantoin, pivmecillinam and sulfonamides. Norfloxacin rapidly became an important drug in the treatment of UTIs in Sweden, first in hospitals and later in general practice.

Prescriptions differ greatly in terms of the estimated duration of treatment in the three countries. This variation can only to some extent be explained by differences in knowledge, attitudes and number of years in practice. More important is the difference in recommendations given for duration of treatment in each country; the national guidelines of Sweden allow a longer duration of treatment. In The Netherlands and Norway, short 3-day regimes are recommended, whereas in Sweden, the precise duration is not an issue. Another
relevant factor is the ability to dispense small quantities or packages of UTI drugs. In The Netherlands it is common practice for pharmacists to dispense the exact amount of tablets prescribed; if necessary, large package sizes are opened enabling the dispensing of small amounts of tablets. This is not the case in other countries, and may also explain why the duration of treatment in The Netherlands is shorter than in the other countries.

The generalisability of these findings is limited due to voluntary participation. In this study, non-adherence to treatment guidelines was evaluated to develop tailored educational interventions. Therefore, the study focussed on a group of GPs who were going to participate in an educational programme on pharmacotherapy; this selection procedure was similar in all three countries. At the time of our data collection the GPs did not yet know the subject of the programme. One may speculate that these physicians were more interested in pharmacotherapy in general, and therefore might have been more current in this area compared with their colleagues; yet one could also argue that GPs who felt most in need of education regarding pharmacotherapy were more eager to participate. The differences in physicians’ general characteristics (gender, years in practice) reflect the existing demographic differences between the three countries.

In conclusion, this study demonstrates that the non-adherence of GPs to existing national treatment guidelines can be explained only to a small extent by deviations from those guidelines in terms of knowledge and attitudes. Given the K/A scores of our study, additional education should focus on removing barriers to put the existing knowledge to practice. The educational programmes should not be transferred from one setting to another, but custom tailored for each country. Differences in regulation, marketing and distribution of drugs, and possibly concurrent differences in traditions among the health professionals, limit the potential of global learning programmes. In the case of UTI treatment, even the main subject of the intervention should vary between different countries. Choice of drugs, especially the prescribing of fluoroquinolones needs attention in Sweden, whereas focusing on the duration of treatment seems more relevant in Norway and The Netherlands.

References

6 Bero L, Grilli R, Grimshaw JM, Harvey E, Oxman AD, Thomson MA. Closing the gap between research and practice: an overview of systematic reviews of interventions to promote the implementation of research findings. BMJ 1998;317:465-468.
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34 Data on national demographics of general practitioners were collected for the Netherlands from the registration database of the Dutch Institute for Research on Health Services (NIVEL) in Utrecht, for Sweden from the Swedish Medical Association in Stockholm, and for Norway from the Norwegian Medical Association in Oslo.
Appendix

Knowledge and Attitude questionnaire
(answers considered in agreement with the guidelines are marked with Ø)

Below six cases or situations are described related to urinary tract infections. Several statements are presented regarding these cases. Please answer if you think the statement is true or false or when you do not know whether it is true or false.

Mrs A, age 32, is 11 weeks pregnant. The general practitioner has diagnosed an urinary tract infection. Mrs A is allergic to amoxicilline.

1a Trimethoprim (BRAND NAMES) is one of the drugs of choice in this case.
 Ø true 0 false 0 don't know

1b Nitrofurantoin (BRAND NAME) is one of the drugs of choice in this case.
 Ø true 0 false 0 don't know

Mrs B, age 41, has had painful and frequent micturition for the past two days. Her body temperature is normal (no fever). The urine nitrite test is negative, but the dipslide culture is positive. The general practitioner concludes she has an uncomplicated urinary tract infection and considers prescribing norfloxacin (BRAND NAME).

2 In this case, this is one of the drugs of first choice.
 0 true Ø false 0 don't know

Mrs C, age 30, has been diagnosed with an uncomplicated urinary tract infection. The general practitioner treats her with trimethoprim 300mg once daily [NOR: 200mg twice daily] for 3 [SWE: 5] days.

3a The duration of treatment is correct.
 Ø true 0 false 0 don't know

After 1 month Mrs C returns to the general practitioner with similar complaints. Again an uncomplicated urinary tract infection is diagnosed. The general practitioner decides to prescribe trimethoprim 300mg once daily [NOR: 200mg twice daily] for 7 [SWE: 10] days.

3b Increasing the duration of treatment is in this case correct.
 0 true Ø false 0 don't know

Mrs D, age 27, received a 3-day course [SWE: 5-day] of 1dd 300 mg trimethoprim in response to an uncomplicated urinary tract infection. Immediately after the prescribed course she visits your surgery again, because she still has a painful micturition.

4 It is possible that Mrs E still has complaints of painful micturition although the infection has been sufficiently treated.
 Ø true 0 false 0 don't know

General practitioner E discusses the treatment of urinary tract infections in women with a trainee (= a GP in training). According to the trainee a 3 [SWE: 5] day course is to be
preferred in uncomplicated cases. It results in fewer side effects and improves the compliance. General practitioner E prefers a 5 [SWE: 7] day course. According to the general practitioner, the higher efficacy of this course outweighs the advantages the trainee has mentioned.

5 The opinion of the general practitioner is correct.

0 true Ø false 0 don't know

Below you can find some general statements regarding urinary tract infections in women. Please state whether you agree or disagree with these statements, and whether you act accordingly in your daily practice.

6 Uncomplicated urinary tract infections in women between 18 and 45 years of age should be treated with a 3-day course [SWE: 5-day].
0 in most cases I agree 0 in most cases I disagree
Ø in many cases I agree 0 in many cases I disagree

7 Post-menopausal women with uncomplicated urinary tract infections should be given a longer course of drug treatment than younger women.
0 in most cases I agree Ø in most cases I disagree
0 in many cases I agree Ø in many cases I disagree

8 When a woman contracts another uncomplicated urinary tract infection after a few months, one should choose a different drug than that prescribed for the first episode.
0 in most cases I agree Ø in most cases I disagree
0 in many cases I agree Ø in many cases I disagree