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Knowledge, attitudes and practices around urinary tract infections of general practitioners in the Netherlands: a cross-sectional internet survey

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ABSTRACT

Objectives Urinary tract infections (UTIs) are the most common reason for women to consult a general practitioner (GP). Current diagnostic tests are inadequate, complicating diagnosis and treatment decisions for GPs. To understand how this influences GPs in managing UTI, we aimed to determine GPs' knowledge, attitudes, and practices around UTI care.

Design Cross-sectional internet-based survey.

Setting General practice in the Netherlands between December 2021 and February 2022.

Participants We distributed invitations to participate via email to 126 practices. Additionally, we distributed invitations via social media and newsletters.

Outcomes The survey included 15 questions covering GPs' sociodemographic information, knowledge, attitudes and practices. Data analysis was based on frequencies and descriptive statistics.

Results Among the 190 eligible respondents, 172 (90.5%) chose dysuria and 140 (73.7%) chose urinary frequency as a symptom likely indicating UTI in healthy women. One in three GPs would diagnose a UTI based on non-specific complaints with positive leucocyte and erythrocyte tests, discordant with established guidelines. GPs indicated that better point-of-care diagnostics would help improve antibiotic prescribing (72.6%) and would conserve time (60.0%). GPs considered a positive test result the most important factor to prescribe antibiotics while patient expectation was considered least important. Half of GPs indicated that the most urgent need in UTI care is improved diagnostics.

Conclusion GPs often act in discordance with established guidelines, rely on non-specific symptoms for the diagnosis of UTI and rank patient expectation as less important in comparison to symptom recognition and culture result when deciding on antibiotic treatment.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Involvement of general practitioners as well as persons not among our target audience during construction of the survey ensured its readability and face validity.
⇒ General practices in the Dutch province of Limburg were emailed directly to improve the number of responses to the survey.
⇒ Responses from general practitioners from the rest of the Netherlands were obtained by distributing the survey via multiple social media platforms (LinkedIn, Twitter, Facebook, Instagram).

INTRODUCTION

Urinary tract infections (UTIs) are the most common reason for women to consult a general practitioner (GP). More than 75% of women will have at least one episode of UTI during their lifetime.[1 2] One in eight female patients consult their GP due to a UTI every year.[1] In female patients over 60 years of age, this number increases up to one in five every year.[3 4]

The diagnosis of UTI in general practice and out of hours (OOH) in the Netherlands relies mainly on urinary dipstick testing together with medical history taking.[4 5] Customarily, patients with urinary symptoms contact the general practice by phone, by which they first speak with a doctor's assistant (DA), who takes the patient's medical history and decides whether they should submit a urine for diagnostic testing. The DA tests the sample using the urinary dipstick test and subsequently relays the result of the test together with the patient's medical history to the GP, who decides on the course of action according to the decision algorithm shown in figure 1.

The result of the urinary dipstick carries significant weight in the diagnosis of UTI in the Netherlands. However, the urinary dipstick is suboptimal in both its sensitivity and specificity.[3 6 7] Furthermore, urinary culture, the diagnostic golden standard, is laborious, costly, takes 2–3 days and requires samples to be analysed at a clinical laboratory. Moreover, urinary culture is unable to distinguish between an actual UTI and asymptomatic bacteriuria. Therefore, the results

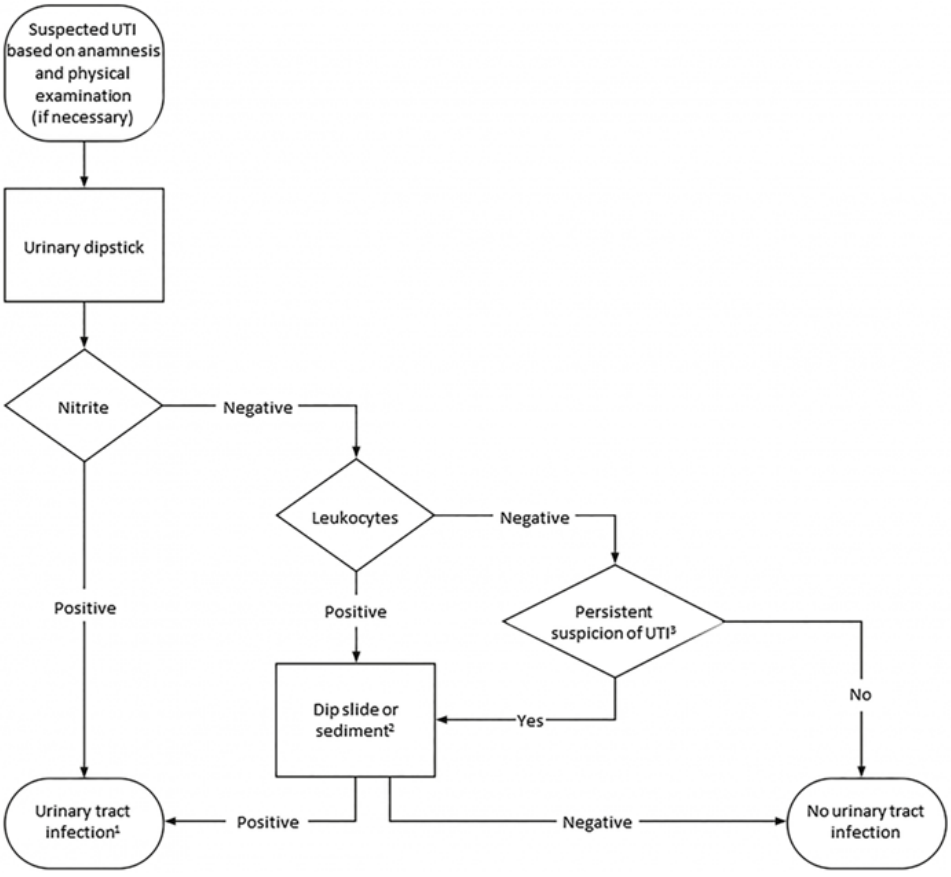

Figure 1 Diagnostic algorithm for urinary tract infection (UTI) in family practice in the Netherlands. [1]Perform a urinary culture with antibiotic susceptibility testing in case of a two-time treatment failure for cystitis in healthy non-pregnant women, treatment failure for cystitis in vulnerable elderly patients, cystitis in patients taking antibiotic prophylaxis because of recurring UTI, cystitis in risk patients, cystitis in children younger than 12 years of age or UTI with signs of tissue invasion. [2]Only perform a sediment in patients older than 12 years of age. [3]Perform a urinary culture with antibiotic susceptibility testing in case of a persisting suspicion of UTI, despite a negative dipstick and dip slide or sediment result. Image adapted from the UTI guidelines of the Dutch College of General Practitioners.[4]

of a urinary culture need to be interpreted with patient symptoms in mind, lest the physician prescribes antibiotics for the relatively benign condition of bacteriuria.[8] Furthermore, while the sensitivity of the urinary culture is definitely one of its strengths, it also means that it is susceptible to contamination.

Because of the drawbacks of urinary culture, most UTI treatment decisions in general practice are based on patient symptoms, urinary dipstick results and empirical antibiotics.[9–12] Because of this, GPs' knowledge of urinary symptoms related to UTIs and the DAs' ability to take the relevant patient history are of the utmost importance to avoid overtreatment. Overtreatment with antibiotics is a burden to both the patient and society as a whole. The patient is exposed to the side effects of antibiotics without reaping the benefits, while society is faced with increasing healthcare costs due to rising of antibiotic resistance.[13 14] Overtreatment is a problem in the OOH setting especially, where physicians generally do not have access to patients' previous urine culture results or prior UTI symptoms, which causes them to opt for the prescription of antibiotics sooner.[5]

GPs divert from UTI guidelines in half of the patients and most UTIs are treated with empirical antibiotic prescriptions, even though the disease is known to be self-limiting in 50% of otherwise healthy women.[15 16] To improve the appropriateness of prescribed antibiotics, more insight is needed into the factors that may influence GPs' decisions around the diagnosis and management of UTIs.

Research towards the knowledge and experiences of GPs managing UTIs is limited.[17] Having an understanding of GPs' experiences is crucial when designing and implementing effective interventions and potential new diagnostic tests. This study, therefore, aims to investigate the knowledge, attitudes and practices of Dutch GPs towards UTIs during regular and OOH care.

METHODS

We conducted a cross-sectional internet-based survey among Dutch GPs between December 2021 and February 2022. We used Qualtrics software (Qualtrics, May 2020, Provo, Utah, USA) to obtain responses. We sent emails

to all GPs with publicly available email addresses in the Dutch province of Limburg (n=126). To enhance the response rate, we created a website that underlined the affiliation with Maastricht University and linked to the survey proper. Here the respondents were informed about the study, after which they could consent to participation. Additionally, we distributed invitations on multiple social media platforms, including LinkedIn (Microsoft), Twitter, Facebook (Meta) and WhatsApp (Meta), as well as via newsletters of multiple GPs' networks in Limburg (HOZL, Cohesie, ZIO and Meditta).

Setting and subjects

Fully trained GPs registered at the Dutch registry of healthcare professionals were eligible for participation. To have a selective overview of current practice, participants were excluded if they were not actively working as GPs. Participants did not receive any incentive to participate in the study. While the focus of our recruitment was in the province of Limburg, we did not exclude responses from the rest of the Netherlands.

Sample size

Based on an estimated population of 12 766 active GPs in the Netherlands during the conduction of this survey, a confidence interval of 95% and a margin of error between 5% and 10%, we considered a sample size of 96–373 sufficient to ensure generalisability.[18]

Survey contents

The survey included 15 questions, of which three questions had three to nine subquestions (online supplemental figure 1). These questions covered knowledge, attitudes, practices and sociodemographic information. Answer possibilities within the survey were Likert scale statements, right-wrong-don't know questions, listing priorities, regular multiple-choice questions, an open-ended question to explore the needs of GPs, and an open-ended question to allow respondents to explain their answers or to notify the research group of survey difficulties, if any.

Data collection

The content of the questionnaire was derived from previous qualitative and quantitative research and expert opinion.[4 19–21] Face validity (the degree to which the survey appears effective in terms of its stated aims) and readability was tested after a consensus was reached within the research group about the quantity and quality of the compiled questions. A pilot sample of seven individuals verified the face validity and readability of the questionnaire. Among these individuals were 1 active GP, 1 retired GP, 1 project manager, 3 medical students and 1 non-medically educated individual. All multiple-choice questions required a human interaction to the answer possibilities or required a data entry before the survey would continue to the next question. Subitems within questions were shuffled randomly among respondents. To prevent ballot box stuffing, the survey software placed a local browser-based cookie if not disagreed to by the user. The respondent's IP address was also logged during completion of the survey, allowing the research group to identify possible fraudulent enrolment to the survey.

Table 1 Population characteristics

Characteristics	General practitioners (n=190)
Age, mean years (SD)	44.3 (9.4)
Female, n (%)	129 (67.9)
Work experience, mean years (SD)	13.4 (9.5)
Work during regular hours, mean days/month (SD)	14.6 (6.0)
Work during OOH, mean days/month (SD)	2.6 (2.2)
Practice holder, n (%)	108 (56.8)
Resident educator, n (%)	19 (10.0)
Practice holder and resident educator, n (%)	15 (7.9)

OOH, out of hours.

Data analysis

Respondents' answers were automatically entered into a data file and analysed using SPSS V.27.0 (IBM). We used descriptive statistics to analyse the demographic data. Analysis was based on frequencies and cross tables of preselected variables. The open-ended questions were categorised yielding frequencies and cross tables.

Patient and public involvement

Patients or other public were not involved in the design, conduct, reporting or dissemination of the research.

RESULTS

Population characteristics

We received 233 responses over the course of 3 months. After exclusion of partial responses (n=32), responses from physicians in training (n=10) and a response which was submitted by a doctor's assistant (n=1), 190 responses remained eligible for analysis.

Table 1 summarises the characteristics of the included GPs. GPs had a mean age of 44.3 (SD=9.4), ranging from 29 years to 69 years. Among the participating GPs, 129 (68%) were female. On average, GPs had been practising their profession for 13.4 years (SD=9.5), worked 14.6 days/month (SD=6.0) during regular hours and worked 2.6 days/month (SD=2.2) in OOH care centres.

GPs' knowledge

UTI symptoms

We asked GPs to choose two symptoms out of a possible nine that they considered most likely to indicate a UTI in women (table 2). We chose these nine symptoms because they were listed in the guidelines of the Dutch College of General Practitioners as possible symptoms

Table 2 Symptoms believed by general practitioners to indicate a UTI in healthy women

Symptom(s)	Respondents (%)
Dysuria	172 (90.5)
Urinary frequency	140 (73.7)
Malodorous or turbid urine	27 (14.2)
Urge to urinate on empty bladder	15 (7.9)
Absence of vaginal complaints	8 (4.2)
Haematuria	8 (4.2)
Fever	6 (3.2)
Lower abdominal pain	4 (2.1)
Shivers	0 (0.0)

UTI, urinary tract infection.

of UTI. According to the guidelines, the symptoms most indicative of a UTI in healthy, non-pregnant women are dysuria and the absence of vaginal complaints.[4] Almost all GPs (n=172, 90.5%) correctly chose *dysuria* as most indicative of a UTI, and eight GPs (4.2%) chose *absence of vaginal complaints*. *Urinary frequency* was the second most frequently picked answer possibility with 140 (73.7%) responses.[20 22]

To further evaluate GPs' knowledge, multiple statements involving the diagnosis and management of UTIs were presented within the survey (online supplemental figure 2). More than four out of five respondents answered the questions regarding the use of urinary culture in risk patients correctly (box 1). Fewer respondents were able to correctly answer the question with regard to patients with signs of tissue invasion (fever, shivers, signs of sepsis, etc): 151 in regular hours (79.5%) and 131 in OOH (68.9%).

UTI in elderly patients

When asked about whether a urinary culture is required in an elderly patient with a positive nitrite test without micturition complaints (a likely case of asymptomatic bacteriuria), 109 respondents (57.4%) answered correctly that this was not the case. In a similar vein, 144 respondents (75.8%) answered correctly that a urinary culture was not indicated in the case of a catheterised patient with odorous or turbid urine.

Box 1 High-risk patients with UTI

Patients with urinary tract infection (UTI) at a higher risk for a complicated course of disease according to Dutch guidelines

⇒ Women who:
- ⇒ Are pregnant.
- ⇒ Are diagnosed with diabetes mellitus.
- ⇒ Are immunocompromised.
- ⇒ Have abnormalities to the kidneys or urinary tract.
- ⇒ Have a neurogenic bladder.

⇒ Men

Uncomplicated UTI

Respondents' knowledge on the diagnosis of uncomplicated UTI was tested with the statement: 'In the case of non-specific complaints with a negative nitrite test, a UTI can be diagnosed with a positive leukocyte and erythrocyte test'. Of all respondents, 135 (71.1%) correctly disagreed with the statement. Almost all respondents (n=184, 96.8%) correctly agreed with the statement that a cystitis can resolve by drinking sufficiently and with the possible addition of painkillers.

GPs' attitudes

Online supplemental figure 3 shows the answer distributions to the Likert scale questions regarding GPs' attitudes around UTI care. Almost two-thirds of GPs participating in the survey (65.3%) would not disregard the result of a urinalysis when a urine sample is submitted from a patient with symptoms that do not suggest a UTI. Most GPs agree that better point-of-care tests are needed for the diagnosis of UTI (54.2%), that these new tests will aid them in prescribing antibiotics more accurately (72.6%) and that better point-of-care tests will likely save them time during their activities as a GP (60.0%).

We asked respondents what they thought were the most important features to consider of any potential newly developed test, what they thought were the most important considerations before prescribing an antibiotic and what they thought were the most important reasons for patients to consult a GP (table 3). Among the respondents, 75.8% considered *diagnostic accuracy* the most important feature of a diagnostic test. Furthermore, when asked to rank considerations for prescribing an antibiotic from least to most important, most GPs (86.8%) ranked patient expectation least important (the other options being a positive urine culture, symptom recognition by the patient and symptom recognition by the GP). According to our respondents, most patients with urinary symptoms visit the family practice with the expectation of *obtaining antibiotics* (37.5%), followed by *symptom relief* (31.1%).

GPs' practices

Most GPs (46.3%) indicated that they *sometimes* prescribe a delayed antibiotic prescription when diagnosing a UTI in a healthy woman. Moreover, 43.7% indicated that they *never* or *rarely* employed delayed prescriptions.

DISCUSSION

Summary

GPs seem to overvalue urinary frequency as a symptom most indicative of a UTI. Furthermore, fewer than 6 out of 10 GPs chose the correct course of action for an elderly patient with asymptomatic bacteriuria. When deciding on whether to prescribe antibiotics for a UTI, GPs deemed symptom recognition or the urinary culture result more important than patient expectation. Almost half of responding GPs indicated to never or rarely prescribe

Table 3 Most and least important features of new diagnostic tests, considerations before prescribing an antibiotic and patient reasons for consultation according to general practitioners

Most important (%)		Least important (%)
Test feature		
75.8	Diagnostic accuracy	1.1
10.0	Time to result	7.4
9.5	Ease of use	14.2
2.6	Patient discomfort	24.2
2.1	Cost	53.2
Consideration before prescribing an antibiotic		
57.4	Positive urine culture	2.1
26.8	Symptom recognition by patient	2.6
12.1	Symptom recognition by GP	8.4
3.7	Patient expectation	86.8
Patient reasons for consultation		
37.5	Obtaining antibiotics	4.7
31.1	Symptom relief	5.3
22.1	Diagnosis	5.3
7.4	Additional examination	58.4
2.6	Reassurance	26.3

GP, general practitioner.

delayed antibiotics for a UTI. When asked about their highest need in UTI care, GPs indicated that diagnostic improvements have the highest urgency.

A limitation of this study is the presence of possible selection bias, since respondents are likely more interested in the subject and therefore more up to date with the latest guidelines. Additionally, GPs who think that UTI care should be improved are more likely to participate. Another limitation of this study is the presence of possible response bias, since respondents could have answered in a socially desired manner. Due to our recruitment strategy, we were unable to calculate a response rate, since it was unknown to us how many potential respondents the survey invitation reached.

Some questions in the survey might be prone to misinterpretation leading to inaccurate results. In addition, multiple-choice questions might not offer all answer possibilities, leading to response bias as well. Furthermore, due to our inclusion strategy, almost half of our respondents resided in Limburg, the southernmost province of the Netherlands with 6–7% of the nation's inhabitants. However, our study population has a similar average age, average amount of working days a month and share of practice holders compared with the total population of GPs in the Netherlands.[18] Still, the relatively small sample size combined with the limited spread of respondents throughout the Netherlands might limit the generalisability of our findings. Nonetheless, this study highlights points of improvement for UTI care in the Netherlands in general, since we hypothesise that most if not all points raised are applicable to GPs throughout the country.

The main strength of this study is that this is the first quantitative survey among GPs in the Netherlands investigating their knowledge, attitudes and practices towards UTI care. Therefore, this study gives a unique insight into where UTI care can be improved in Dutch family medicine.

Comparison with current literature

The results of our study show that most GPs would treat a patient based on a urinary dipstick result, even when the patient does not have specific symptoms. However, UTI guidelines indicate that a cystitis is the correct diagnosis when a positive urinalysis is accompanied by patient symptoms.[4 18] This indicates that GPs might rely on diagnostics too much, while not paying enough attention to patient symptoms.[23]

Curiously, almost half of the GPs indicated that they felt the dipstick test is inadequate for the diagnosis of a UTI. This is probably a reflection of the poor accuracy of the urinary dipstick.[3 6 7] In view of its poor accuracy, the use of urinary dipsticks is not always recommended for the diagnosis of cystitis in otherwise healthy, premenopausal, non-pregnant women in other countries. International guidelines from Belgium, Germany, Sweden, Norway and the UK suggest to diagnose these patients with a UTI if the symptoms point to this diagnosis, while ensuring the absence of symptoms that could point to other diagnoses (such as vaginal complaints).[24–28] In Northwestern Europe, only the French, Danish and Dutch guidelines recommend the routine use of urinary dipsticks for the diagnosis of UTI in otherwise healthy women in addition to asking for symptoms.[4 29 30] Previous versions of the Dutch guidelines included the recommendation to diagnose based only on patient symptoms. However, previous research has shown that 15–20% of patients presenting with symptoms suggestive of a UTI did not have a microbiological cause for their symptoms.[31] Additionally, an increase in the amount of GP visits and antibiotic prescriptions due to UTIs in the Netherlands was seen, which was believed to be caused by GPs diagnosing solely based on symptoms.[10] These findings combined led to the inclusion of the urinary dipstick in the diagnostic algorithm. In order to account for the dipstick's relatively poor accuracy when performed in isolation, the revised guidelines recommend to perform the urinary dipstick test only under the condition that the patient's symptoms already suggest a UTI. In this manner, both the dipstick and the patient's symptoms act as a control for each other. However, as our results show, Dutch GPs often forgo this condition and perform a urinary dipstick test whether patient symptoms suggest a UTI or not. Therefore, it is imperative that GPs are made aware of the conditions

under which they should perform a urinary dipstick by offering continuing education on UTI guidelines.

An inclusion in such continuing education could be the recognition of the symptoms most indicative of a UTI. The guidelines of the Dutch College of General Practitioners indicate that dysuria and the absence of vaginal complaints are the most indicative symptoms for UTI in otherwise healthy women. While dysuria was almost unanimously recognised, GPs failed to include the absence of vaginal complaints when asked about the strongest predictors for the presence of UTI.[32] Furthermore, urinary frequency was often chosen as a symptom indicative of UTI. While urinary frequency is indeed a symptom associated with UTI, previous studies have shown that it is a symptom with limited specificity for UTI.[20 22] However, as is the case in most international guidelines, the Dutch guidelines still recommend GPs to ask patients about frequency of urination. Therefore, we do not mean to suggest that looking out for urinary frequency is wrong, only that the combination of dysuria and an absence of vaginal symptoms is the most predictive. This is also recognised internationally, since most international guidelines we consulted suggests to forgo the diagnosis of UTI when vaginal symptoms are present.[24 25 28] It is therefore critical that GPs pay close attention to their presence and adjust their diagnosis accordingly.

Moreover, almost half of GPs think that the most pressing need in UTI care is the need for better diagnostics. We believe that until better diagnostics become available, the decision to test a urine sample should be much more conscious in order to improve current UTI management in general practice, something which was also proven to be effective in previous studies where healthcare professionals were trained in recognising UTIs.[33]

Implications for practice

This study shows that while GPs think that they have sufficient knowledge around the diagnosis and treatment of UTI, this is not always the case. GPs rely heavily on urinalysis for the diagnosis of a UTI and seem to have trouble identifying the symptoms indicative of UTI and even indicate they disregard symptoms as a whole when a dipstick test turns out positive for nitrite. This may lead to overdiagnosis and overtreatment of patients with asymptomatic bacteriuria. Moreover, this could lead to GPs overlooking alternative diagnoses, leading to increased morbidity. This over-reliance on the urinary dipstick could be an unintended side effect of the revision of the Dutch guidelines mentioned above, since it created a central role for the urinary dipstick in diagnosing UTI in otherwise healthy women. Creating awareness among GPs of the urinary dipstick's limited accuracy and teaching them to only employ the urinary dipstick when the patient's symptoms call for it is critical in reducing the current over-reliance on the urinary dipstick.

Moreover, GPs in our study indicated that they value a positive urine culture and symptom recognition by either the patient or the GP over patients' wishes when deciding to prescribe antibiotics. We think this is partly due to GPs interpreting the question with each option in isolation. We can imagine that GPs would not want to describe antibiotics to a patient when anamnesis and diagnostics ruled out a UTI, no matter the patient's desire to obtain antibiotics. In this context, it is understandable that GPs might not take the patient's wishes into account when deciding on treatment. This is supported by previous research that has shown that GPs think that patients with urinary symptoms primarily visit a GP to obtain antibiotics.[34] However, patients primarily want to be free of symptoms and want to have the feeling that they are taken seriously during consultation.[23 35] Therefore, we think that UTI care can be improved by incorporating the patient's wishes into the treatment decision. However, this warrants supplying the patient with the necessary information, since the patient's knowledge on UTIs might be lacking.

It is imperative that GPs not only change their own behaviour, but that they change the culture around testing and antibiotic prescriptions throughout their whole practice. In the Dutch healthcare system, patients with urinary symptoms are not always seen by GPs. Instead, the patient contact is performed entirely by a DA. Therefore, it is imperative that DAs are also sufficiently informed by GPs about which symptoms to look out for in case of a suspected UTI. Little research has been done towards DA's knowledge, attitudes and practices around UTIs, and we therefore recommend to repeat this study in that population.

CONCLUSION

In this cross-sectional survey study, we show that GPs have trouble identifying specific symptoms of UTI. They often act in discordance with established guidelines, especially when determining in which cases urinalysis needs to be performed. Furthermore, GPs overvalue urinary frequency as an indication of UTI. Additionally, GPs value a positive urine culture and the recognition of UTI symptoms by either the patient or the GP over patient preference when deciding on whether antibiotics should be prescribed. GPs seldom make use of delayed antibiotic prescriptions when treating UTIs.

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Contributors SMLC, WG and EGPMdB made the concept of and designed the work. SMLC and WG acquired and analysed the data. SMLC, WG, TNP, JWLC and EGPMdB interpreted the data. SMLC is responsible for the overall content as guarantor.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by the Medical Ethics Committee of the Maastricht University Medical Centre+ (2019-1294). Participants gave informed consent to participate in the study before taking part.

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