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Research

Guidelines adherence to lower urinary tract infection treatment in out-of-hours primary care in European countries

Hilde Philips
Department of Primary and Multidisciplinary Care, General Practice, University of Antwerp, Belgium

Linda Huibers
Radboud University Medical Centre, Nijmegen, Scientific Institute for Quality of Healthcare, Netherlands

Elisabeth Holm Hansen
National Centre for Emergency Primary Health Care, Uni Research, Uni Health, Norway; Associate Professor, Haraldsplass Deaconess University College

Morten Bondo Christensen
Research Unit and Department for General Practice, Aarhus University, Denmark

Rüdiger Leutgeb
Department of General Practice and Health Services Research, University of Heidelberg, Germany

Zalika Klemenc-Ketis
Department of Family Medicine, Medical School, University of Maribor, and Department of Family Medicine, Medical School, University of Ljubljana, Slovenia

Corinne Chmiel
Institute of General Practice and Health Services Research University of Zurich, Switzerland

Miguel-Angel Muñoz
Primary Healthcare University Research Institute IDIAP-Jordi Gol and Catalan Institute of Health, Barcelona, Spain

Katarzyna Kosiek
Department of Family and Community Medicine, Medical University of Lodz, Poland

Roy Remmen
Department of Primary and Multidisciplinary Care, General Practice, University of Antwerp, Belgium

ABSTRACT

Background The substantial prevalence of bacterial lower urinary tract infections (LUTIs) in out-of-hours (OOH) primary care is a reason for frequent prescription of antibiotics. Insight in guideline adherence in OOH primary care concerning treatment of LUTIs is lacking.

Aims To check feasibility of the use of OOH routine data to assess guideline adherence for the treatment of LUTI in OOH primary care, in different regions of Europe.

Methods We compared guidelines for diagnosis and treatment of uncomplicated LUTIs in nine European countries, followed by an observational study on available data of guideline adherence. In each region a convenience sample of registration data of at least 100 contacts per OOH primary care setting was collected. Data on adherence (% of contacts) was identified for type of antibiotic and for full treatment adherence (i.e. recommended type *and* dose *and* duration).

Results Six countries were able to provide data on treatment of LUTIs. Four of them succeeded to collect data on type, dosage and duration of treatment. Mostly, trimethoprim was the treatment of first

choice, sometimes combined with sulfamethoxazol or sulfamethizol. Adherence with the type of antibiotics varied from 25% to 100%. Denmark achieved a full treatment adherence of 40.0%, the Netherlands 72.7%, Norway 38.3%, and Slovenia 22.2%.

Conclusion Guidelines content is similar to a large extent in the participating countries. The use of OOH routine data for analysis of guideline adherence in OOH primary care seems feasible, although some challenges remain. Adherence regarding treatment varies and suggests room for improvement in most countries.

Keywords: after hours care, anti-infective agents, guideline adherence, primary healthcare, urinary tract infection

How this fits in with quality in primary care

What do we know?
National health systems support guidelines on many clinical issues. LUTIs are the most common infections in primary care and out-of-hours (OOH) services, and a substantial reason for prescribing antibiotics. Many countries have adopted large-scale general practitioner-led services, responsible for the provision of OOH care.

What does this paper add?
OOH services are a convenient setting to study guideline adherence and offers a basis for comparison between countries. Even though European guidelines on the treatment of LUTIs are very similar, adherence differs substantially between European countries.

Introduction

Lower urinary tract infections (LUTIs) account for about 2% of the workload during regular daytime practice.[1,2] In out-of-hours (OOH) primary care 5.8% of diagnoses are urological (International Classification of Primary Care (ICPC) 2 chapter 'U') and 2% of all diagnoses concern LUTIs (ICPC code U71).[3] The prevalence of urological complaints in OOH care does not seem to depend on the type of setting, as an equal prevalence of urological complaints was found in an emergency department (5.1%) and a general practitioners' cooperative (GPC) (5.3%).[4] Being the second most common bacterial infections in general practice, LUTI is a frequent reason for prescribing antibiotics.[5]

Practice guidelines are common tools for improving the quality of healthcare in numerous (European) countries. In general, primary care associations have established evidence-based guidelines for diagnosis and treatment of uncomplicated LUTIs. Theoretically, only variation in type and resistance of bacteria and availability of medication should alter treatment strategies. There is some evidence that differences in guideline adherence exist, in particular concerning the prescribing behaviour of antibiotics.[6]

Guideline adherence has been studied in relation to prescription and use of antibiotics regarding treatment of uncomplicated LUTIs, because of the risk of bacterial resistance and patient safety.[7,8] Adherence to LUTI guidelines has been assessed for daytime care where suboptimal guideline adherence has shown to be less cost-effective in the treatment of uncomplicated LUTIs.[9–14] In OOH care, first research results on guideline adherence in Belgium were published in 2012.[15] This study found that a simple, multifaceted intervention improved quality of antibiotic prescribing for LUTI.

International comparison of LUTI guideline adherence will increase insight into performance and provide knowledge for potential improvement. Observing differences in guideline adherence in regions of different countries might help us learn more about reasons or causes for differences in prescribing behaviour and guideline adherence itself. Comparison between different settings also provides information about feasible and realistic goals in guideline adherence. Many countries have been starting large-scale OOH primary care services.[16,17] These services offer a convenient platform to study behaviour of GPs as they tend to collect routine data in large databases.[3] Furthermore, OOH care entails specific challenges due to the acute character of healthcare problems. In most countries the same clinical guidelines are used during daytime practice as during OOH care. Therefore, we studied the feasibility of assessing guideline adherence using routine data from OOH services.

Methods

Study design

We performed a cross-sectional observational multicentre study. For the preparation of this study, we collected national LUTI guidelines from the nine participating European countries and compared contents. Secondly, we measured guideline adherence to LUTI treatment in the participating OOH primary care services, by comparing the actual performance with the country specific guideline, using routine data.

Settings and study population

EurOOHnet is a European research network for OOH primary healthcare, which aims to study OOH primary care. (www.eurooohnet.eu).[18,19] As we did a convenience sample, all nine EurOOHnet members were invited to participate and all representatives were prepared to do so. The participating countries were Belgium, Denmark, Germany, the Netherlands, Norway, Poland, Slovenia, Spain and Switzerland. For the first study part, these national representatives completed a structured form reporting the content of their national guidelines for diagnosis and treatment of uncomplicated LUTI in primary healthcare, if possible specifically for OOH care. We invited each of these countries to participate in the observational part of the study.

In the second part, we aimed to collect data on at least 100 consecutive LUTI contacts from one or more regional OOH primary care services per participating country. Data originated from regular electronic, registration systems of the OOH primary care services, recording patient age, type of contact (i.e. telephone consultations, clinic/practice consultation, home visit), reported symptoms during medical history-taking, clinical examination, technical examination (e.g. nitrite test), test results, and treatment provided (i.e. type of antibiotic, dose, and duration). Participation to this part of the study is voluntary. Details of the services are provided in Table 1. We included contacts of women aged 20 to 80 years, who were diagnosed with a first episode of LUTI (ICPC2 code U71).[20] These inclusion criteria (gender, age) were based on the target patient group mentioned in the guidelines for uncomplicated LUTI. Consequently, men, pregnant women, children, patients with recurrent episodes of LUTI (based on the patient's story), and patients with a suspected complicated LUTI were excluded.

Data analysis

We performed a descriptive analysis of defined elements of the national LUTI guidelines (diagnosis and treatment). Consequently, we assessed guideline adherence with national recommendations for diagnosis and treatment of uncomplicated LUTI. To assess guideline adherence on diagnosis, we used registration on 'medical history-taking', 'clinical examination', and 'technical examination' (dipstick, laboratory testing). Due to differences in registration of diagnostic criteria (Table 2), these data were only used descriptively. Most registration systems only contained data on symptoms, clinical and technical examinations, in case they were positive. For this reason, we could not distinguish between symptoms or results which were not registered (but present) and symptoms which were absent (but examined). To estimate guideline adherence for treatment, we used two measures: 'recommended type of medication' and 'recommended dose and duration'. 'Full guideline adherence on treatment' was present if type of medication *and* dose *and* duration were in accordance with the guidelines recommendations. For Belgium and Germany we were not able to estimate the 'full guideline adherence on treatment', because the dose and duration were not registered in these regions.

This study was approved as an international multicentre study by the ethical committee of the University of Antwerp (reference number A10–60). If required, participating countries applied for and became approval of local ethical committees as well.

Results

Guidelines in participating countries

Most countries had national guidelines which are commonly used in primary care. We included guidelines from Belgium,[21] Denmark,[22] Germany,[23] the Netherlands,[24] Norway,[25] Slovenia,[26] Spain and Switzerland (Table 2).[27,28] In Poland, no national guidelines exist, but they used the Scottish Intercollegiate Guidelines Network (SIGN) guideline approach.[29] In Spain, GPs use different Spanish guidelines. For the purpose of this paper, we considered the guidelines from Fisterra and from the Catalan Association of Family and Community Medicine (in the region of Catalonia), which are most commonly used in the region included in our study. Overall, the nine countries used nine different guidelines, which were published between 2000 (Belgium) and 2010 (Switzerland). Only Denmark had a specific guideline for OOH primary care.

Table 1 Information on OOH primary care services of the participating countries

	Belgium	Denmark	Germany	The Netherlands	Norway	Poland	Slovenia	Spain	Switzerland
Setting	GP OOH centre	OOH service covering a region (600 000 to 1.2 mill inhab.) staffed almost entirely by GPs	OOH care centre (with GP on duty or deputising doctors from hospitals)	GPC	Emergency primary health care clinics with GPs on duty and employed nurses	Independent OOH service covering a region	Primary care walk-in centre	Emergency primary health care clinics with GPs and employed nurses	Rota-system walk-in emergency centres Large primary care group practices
Opening hours	Friday 7 pm until Monday 7 am	Monday to Friday from 4 pm until 8 am; all weekends and public holidays	Friday 6 pm until Monday 7 am and public holidays	Weekdays from 5 pm until 8 am the next day; all weekends from Friday 5 pm until Monday 8 am, and public holidays	Some clinics are open from 4 pm until 8 am next day, and all day on weekends; other clinics are open 24/7	Monday to Friday from 6 pm until 8 am; all weekends and public holidays	24/7	24/7	24/7
Telephone triage	Not applicable	Only GPs	Nurses	Community nurses and hospital nurses	Registered nurses and nurses	Nurse and doctor	Nurses and GPs	Nurses and GP	Dispatcher

Table 2 Diagnostic criteria for LUTI

Country	Year	Diagnostic criteria mentioned in the guideline for diagnosis of LUTI	
		History (one or more signs)	Clinical examination
Belgium	2000	Dysuria, stranguria, frequency, urgency	Painful suprapubic palpation
Denmark	2006	Dysuria, frequency	Not necessary
Germany	2009	Dysuria, frequency, vaginal discharge, pain back-(fever)–(nitrite+leucocytes+ is not strict)	Not necessary only in case of risk patients, fever, pregnancy, pyelonefritis, restricted communication
The Netherlands	2005	Typical history for cystitis (not all complaints are necessary to diagnose cystitis; it is a clinical diagnosis): stranguria (painful miction), pollakisurie (frequency), dysurie (pain urgency), pain abdomen/back, hematuria, urgency, previous episodes with similar symptoms, no new or changed vaginal fluor	Not necessary (only in case of symptoms of pyelonefritis, risk patients, frequent cystitis)
Norway	2008	Dysuria, frequency, urgency; absence of pregnancy, fever, abdominal pain, vaginal discharge, diabetes; symptoms less than 7 days	Not necessary
Poland	2006	Dysuria, frequency	Not necessary
Slovenia	2003	Dysuria, stranguria, frequency, urgency; absent of: vaginal discharge, itching, fever, flank pain, symptoms more than 7 days, pregnancy, diabetes, age over 65, functional or anatomic abnormalities of urinary tract, recent hospitalisation of urinary tract surgery, recent antibiotic treatment, permanent urinary catheter, immunosuppression	Painful suprapubic palpation
Spain		Dysuria (painful urination), urinary urgency and frequency, painful in pelvis	Not necessary (only in case of symptoms of pyelonefritis, risk patients, frequent cystitis)
Switzerland	2010 (treatment) 2006 (diagnostic)	Dysuria (discomfort during urination) and urinary frequency (frequent urination), lower abdominal pain	Not necessary (only in case of symptoms of pyelonefritis, risk patients, frequent cystitis)

Comparison of guidelines: diagnosis and treatment of LUTI

For all guidelines the diagnosis of LUTI is based on the history-taking, needing one or two of the typical symptoms (e.g. dysuria, pollakisuria (= frequent and small amounts)) (Table 2). Only two national guidelines (Belgium, Slovenia) recommended clinical examination with finding of painful suprapubic palpation contributing to diagnose LUTI. In general, additional technical examination was not recommended in case of a typical history of LUTI. A dipstick with nitrite test was often mentioned in case of unclear history (i.e. Belgium, Germany, The Netherlands, Slovenia, and Switzerland).

In six guidelines, trimethoprim was the 'drug of choice', sometimes in combination with sulfamethoxazol or sulfamethizol. Nitrofurantoin or sulfamethizol in mono-therapy were first choice in the others (Table 3). Treatment with trimethoprim was always recommended for three days, mostly 300 mg a day. For nitrofurantoin the duration of treatment varied from three to seven days, with daily doses between 150 mg and 300 mg.

Guideline adherence

Due to organisational problems, three representatives (Poland, Spain, and Switzerland) were not able to deliver electronic data within the deadline. The other representatives provided data of at least 100 OOH patient contacts, except Slovenia due to insufficient data at deadline (n = 54). Two representatives delivered more data than requested (the Netherlands (n = 494, registration in three regional OOH services), and Norway (n = 196, registration in two regional OOH services) (Table 4).

Guideline adherence for diagnosis

Although most guidelines did not recommend additional clinical or technical examination, these were frequently performed. Technical examinations were performed in 16% (Denmark) to 99% (Norway) of the contacts (Belgium 42%, the Netherlands 91%, Slovenia 72%, no data in Germany, Poland, Spain, Switzerland).

Guideline adherence for treatment

Adherence to national guidelines for type of antibiotics shows a variation between the national OOH services (Table 4). In Denmark and Norway guideline adherence with type of antibiotics was respectively 100% and 99.5%. In The Netherlands and Slovenia the adherence was above 70%, whereas in Belgium and Germany it was less than 40%. We were able to calculate the 'full guideline adherence on treatment' (i.e. recommended type, dose, and duration of treatment) for seven regions (in four countries). The Dutch regions had full adherence in 72.7% of the contacts, the Danish in 40.0%, the Norwegian regions in 38.3%, and the Slovenian in 22.2% of the contacts. Table 4 also shows us that in the Dutch regions, non-adherence mainly is caused by prescribing other types of antibiotics, whereas in the other regions, most non-adherence is found in dose and duration.

Discussion

Main findings

This study showed that it is possible to collect and use routine data from OOH services of different European regions. Our data showed that treatment adherence to the national guideline varied from 25% to 100% for type of antibiotics between regions of the participating countries and full guideline adherence on treatment also varied greatly, from 22% to 73%. Use of routine data opens opportunities for studying differences in prescribing behaviour and guideline adherence and may assist to improve prescribing behaviour of GPs.

Interpretation of findings on guideline adherence

Although data collection was feasible, coding and registration of variables differed between regions, which limited access to full valid data for some. However, our results on treatment match the conclusions of recent national studies on primary care. In The Netherlands, prescribing antibiotics at GPCs during OOH is in accordance with guidelines in 69% to 71% of contacts.[30] A recent study in Belgium found only 34.5% guideline adherence for antibiotic treatment of patients with rhino-sinusitis in daytime care.[31] A Norwegian study showed that GPs followed national guidelines for UTI well (94% correct type of treatment), only the duration of treatment was often too short (in 32%).[32] In Spain, guideline adherence has shown to be low, with a low utilisation of first-choice antibiotics.[33] In Slovenia, guideline adherence was 72% in primary care settings, for the correct type of drug therapy.[34] These results of earlier research largely correspond to our results, which supports generalisability.

In our study, Denmark, The Netherlands, Norway, and Slovenia show greater adherence with treatment recommendations (for type of antibiotics), especially compared to Belgium and Germany. In the Dutch

Table 3 Treatment of uncomplicated LUTI: recommendations in the national guidelines

Country	Year	Treatment (recommended steps)	Dose and duration
Belgium	2000	Trimethoprim	1 × 300mg/day, 3 days
		Nitrofurantoin	3 × 100mg/day, 3 days
Denmark	2006	Sulfamethizol	2 × 1g/day, 3 days
		Mecillinam/ pivmecillinam	3 × 200–400mg/day, 3 days
Germany	2009	Trimethoprim	2 × 100–200mg/day, 3 days
		Nitrofurantoin; or fosfomycine	2 × 100mg/day, 5 days; 1 × 3g
The Netherlands	2005	Nitrofurantoin	2 × 100mg/day, 5 days
		Trimethoprim (in case of intolerance)	1 × 300mg/day, 3 days
		Fosfomycin	1 × 3g
Norway	2008	Trimethoprim	1 × 300mg/day, 3 days
		Nitrofurantoin	3 × 50mg/day, 3 days
		Pivmecillinam	3 × 200mg/day, 3 days
Poland	2006	Trimethoprim	3 days
		Nitrofurantoin	3 days
Slovenia	2003	Trimethoprim-sulfamethoxazole	2 × 160mg/800mg/day, 3 days
		Norfloxacin	2 × 400mg/day, 3 days
		Ciprofloxacin°	2 × 250mg/day, 3 days
Spain		Nitrofuratoin	3 × 50–100mg/day, 7 days
		Fosfomicine	1 × 3g
		Beta-lactamics	
Switzerland	2010	Trimethoprim-sulfamethoxazole forte	2 × (160mg+800mg)/ day, 3 days
		Nitrofurantoin	2 × 100 mg/day, 5 days

regions we found that once that type of antibiotic drug is correct, most GPs also prescribe it with respect to the guideline concerning dose and duration. This is less observed in the regions of other countries. In most other countries, the treatment duration is the item with the largest non-adherence (Table 4).

Uncomplicated LUTI can be diagnosed using history-taking alone, in women without symptoms suspicious for complications. Guidelines do not recommend clinical or technical examinations (e.g. dipstick tests) in case of a typical history. Nevertheless, additional examinations were performed in 16% (Denmark) to 99% (Norway) of OOH contacts. Physicians probably perform a clinical examination during a face-to-face contact to rule out complicated LUTI or to comply with patients' expectations. This might be unnecessarily time-consuming or even superfluous, when we notice that in Denmark and The Netherlands uncomplicated LUTIs are often treated in telephone consultations. When the patient is seen on a face-to-face contact, chances are great that she will be examined. Whether or not a patient will have a

Table 4 Guideline adherence: treatment of LUTI

Country	National guideline available	Cases (*n*)	Mean age (years)	Type of contact (*n*)			Guideline adherence for type of medication (%)	Guideline adherence for dose (%)	Guideline adherence for duration (%)	Full guideline adherence on treatment (%)
				Tel	Cons	HV				
Belgium	Yes	100	43	0	89	11	37	Not applicable	Not applicable	Not applicable
Denmark	Yes	100	41	88	11	1	100	93	41	40
Germany	Yes	100	48	No registration			25	Not applicable	Not applicable	Not applicable
The Netherlands	Yes	494	43	167	324	2	89.5	66.2	73.9	72.7
Norway	Yes	196	40.1	2	194	0	99.5	65.8	40.3	38.3
Poland	No		No registration yet because of recent change in OOH primary care organisation							
Slovenia	Yes	54	39	3	0	1	70	57.4	29.6	22.2
Spain	No		No registration							
Switzerland	Yes		No registration							

doctor's contact depends on different explanations: possibility of telephone consult, practice nurses who treat the patients for LUTI, and telephone triage.

Differences in registration have influenced our results concerning history-taking, clinical and technical examination. As most registration systems 'in our study' only contained data on symptoms which were positively confirmed by the patient, we could not distinguish between symptoms which were not registered (but present) and symptoms which were absent (but asked). For clinical and technical examinations the same problem was encountered. In our database, however, we also found that GPs tend to record negative signs, when they are important to rule out complications (i.e. back pain). Consequently, as symptoms and examinations probably are under-registered, we can presume that our results are a minimal estimate of the tests performed. Therefore, we suspect that routine OOH data appear to be not suitable for valid decisions concerning guideline adherence for diagnostic testing in case of LUTI, unless obligatory registration fields are implemented in the software systems.

Limitations

This European study, on guideline adherence in OOH primary care, including different regions of nine countries in the EurOOHnet network. Although participation was voluntary, selection bias is a concern as interested regions might perform better on registration of data. Three OOH services were not able to deliver valid data for the study and only three from nine countries who expressed interest, were able to produce the required amount of data. This illustrates that differences in OOH services between regions and countries limits the external validity of the results. For this reason, comparisons between countries have to be interpreted with caution.

Moreover, concluding upon guideline adherence on a national level is not possible as we only had selected regional data. On the other hand, our results seem to match data from other research, suggesting that our findings are valid and not that different from daytime care settings.

Differences in registration systems in the participating regions is an issue of special attention. Some electronic registration systems include fields that are obligatory to fill out. For instance in The Netherlands several signs and symptoms are listed and the caregiver has to check each box. Most other patient records record history-taking and clinical or technical examination results in free text, leading to large differences in registration.

Recommendations

A prospective study design, although they tend to overestimate adherence, including a uniform registration of clinical data, will be necessary to decide upon guideline adherence for diagnosis of LUTI during OOH. Routine registrations are often feasible for data gathering on treatment, but to assess diagnostic adherence to guidelines (using data on history-taking) other study designs are necessary.

Differences in healthcare systems should be considered, because these also seem to influence treatment routines (e.g. possibility of a telephone consult, free access, gatekeepers' role of GP, the role of emergency departments, tradition of guideline-based working). Therefore, when analysing availability and implementation of guidelines, a comparison of healthcare systems is crucial. In the regions of some countries, quasi full adherence already exists, and identification of contributing factors might be helpful to implement system changes in countries with lower adherence. In this respect, benchmarking of countries might be a strong incentive for quality improvement.[35]

Conclusions

Using OOH routine data to assess guideline adherence for LUTI treatment is feasible. Moreover it seems to provide an opportunity to perform national, comparative, observational research. Provided some points of attention in registration methodology, even international comparative studies will be feasible. The setting of OOH care is less suitable for interpreting guideline adherence on history-taking and diagnostic testing, due to variability in registration. Well motivated key persons who encourage correct registration by GPs and uniform software packages might improve quality of data during OOH.

We found relevant differences in applying the recommendations, although the content of the guidelines was to a large extent comparable. This highlights the room for improvement for guideline adherence in some countries.[15]

List of abbreviations

LUTI: lower urinary tract infection
EurOOHnet: European research network for out-of-hours primary care
OOH: out-of-hours
GP: general practitioner
GPC: general practitioner cooperative
U71: acute cystitis (ICPC2 diagnostic code)
ICPC: International Classification of Primary Care

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AUTHORS' CONTRIBUTIONS

HP contributed to the conception and design of the study, coordinated the data collection, analysed and interpreted the data, and drafted the manuscript. LH participated in the planning of the study, collected national data, interpreted the data, and drafted the manuscript. EHH and MBC participated in the planning of the study, collected national data, and revised the article. CC, RL and ZKK collected national data and revised the article. All authors contributed to collecting the content of the guidelines and national data. All authors have read and approved the final version of the manuscript. RR contributed to the conception and design of the study and drafted the manuscript.

PEER REVIEW

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CONFLICTS OF INTEREST

None.

ADDRESS FOR CORRESPONDENCE

Hilde Philips, Department of Primary and Multidisciplinary Care, General Practice, University of Antwerp, Universiteitsplein 1, gebouw R, 3de Verd., B-2610 Wilrijk, Belgium. Email: Hilde.philips@uantwerpen.be

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