

ORIGINAL ARTICLE

Awareness of antibiotic resistance and antibiotic prescribing in UTI treatment: A qualitative study among primary care physicians in Sweden

INGEBORG BJÖRKMAN¹, JOHANNA BERG², NINA VIBERG² & CECILIA STÅLSBY LUNDBORG²

¹Department of Public Health and Caring Sciences, Health Service Research, Uppsala University, Uppsala, Sweden, and

²Department of Public Health Sciences, Division of Global Health (IHCAR), Karolinska Institutet, Stockholm, Sweden

Abstract

Objectives. To improve education and information for general practitioners in relation to rational antibiotic prescribing for urinary tract infection (UTI), it is important to be aware of GPs' views of resistance and how it influences their choice of UTI treatment. The aim of this study was to explore variations in views of resistance and UTI treatment decisions among general practitioners (GPs) in a county in Sweden. **Design.** Qualitative, semi-structured interviews were analysed with a phenomenographic approach and content analysis. **Setting.** Primary care in Kronoberg, a county in southern Sweden. **Subjects.** A purposeful sample of 20 GPs from 15 of 25 health centres in the county. **Main outcome measures.** The variation of perceptions of antibiotic resistance in UTI treatment. How UTIs were treated according to the GPs. **Results.** Three different ways of viewing resistance in UTI treatment were identified. These were: (A) No problem, I have never seen resistance, (B) The problem is bigger somewhere else, and (C) The development of antibiotic resistance is serious and we must be careful. Moreover, GPs' perceptions of antibiotic resistance were mirrored in how they reported their treatment of UTIs in practice. **Conclusion.** There was a hierarchal scale of how GPs viewed resistance as an issue in UTI treatment. Only GPs who expressed concerns about resistance followed prescribing guidelines completely. This offers valuable insights into the planning and most likely the outcome of awareness or educational activities aimed at changed antibiotic prescribing behaviour.

Key Words: Antibiotics, bacterial resistance, general practice, general practitioners, interviews, urinary tract infection, Sweden, views

Introduction

Antibiotic resistance is increasingly challenging health care [1]. Irrational use of antibiotics is considered to contribute unnecessarily to increasing the rate of resistance [2]. Studies show that it is possible to decrease antibiotic prescribing [3,4]. However, more efforts are needed to implement changes [5–7]. In Swedish primary care uncomplicated urinary tract infection (UTI) is one of the most common diagnoses for which antibiotics are prescribed [8,9]. UTI treatment is usually empirical. In Sweden continual alternative use of first-line drugs is recommended for a duration of 3–5 days, and flouroquinolones are not recommended as first-line drugs, as they are needed in more complicated infections [9]. Today the

recommended first-line drugs are pivmecillinam and nitrofurantoin [9]. When this study was conducted in 2004 trimethoprim and cephadroxil were also recommended as first-line drugs [10]. Extended durations and unnecessary prescribing of flouroquinolones were reported for UTI treatment [11].

The most common pathogen involved in UTI is *Escherichia coli*. From 1983 to 2001 the level of *E. coli* resistance to trimethoprim among outpatients in Sweden increased from zero to 12% [12,13], and the level has continued to increase; it was 20.3% in 2009 [14]. In 2004 most studies performed on UTI treatment were focusing on quantifiable aspects [8,10,11], and less was known of how resistance and its influence in the choice of UTI treatment were

- The level of antibiotic use correlates to the level of antibiotic resistance; therefore infection treatment guidelines promote rational antibiotic prescribing.
- A perception that antibiotic resistance must be considered was related to adherence to all aspects of UTI treatment guidelines.
- A perception that enough was already done to contain resistance was related to non-adherence to all aspects of UTI treatment guidelines.

viewed by the prescribers. An opportunity to explore this issue was at hand along with the decision to reduce trimethoprim prescribing in a county in Sweden in 2004 [15]. The aim of this study was thus to explore variation in views of resistance and UTI treatment decisions among GPs in the county.

Material and methods

Based on the aim of this study two qualitative research methods were chosen [16]. These were the phenomenography approach to identify and describe different ways of understanding antibiotic resistance [17], and content analysis to capture views of UTI treatment decisions [18].

Sampling procedure

The study included 20 GPs in Kronoberg, a county in southern Sweden with a population of 178 000 inhabitants and about 80 GPs. Purposive sampling was used to achieve variations in age, sex, and geography. The GPs were contacted by one of the authors (JB) and asked to participate. Seven of the selected GPs initially declined and a sufficient number of subjects was reached after further contact with GPs fulfilling the inclusion criteria. The GPs (Table I) were

Table I. Gender, age, and geographical distribution of the GPs interviewed.

Gender	Characteristics		Total
	Women	Men	
Age			
31–40	2	1	3
41–50	4	5	9
51–60	2	5	7
61–70	–	1	1
Geographical location			
Rural area	4	5	9
Urban area	4	7	11
Total	8	12	20

working at 15 of 25 health centres, in six of eight municipalities in the county.

Data collection

Data were collected by face-to-face interviews following a pre-tested, semi-structured interview guide (Table II), containing open-ended initial questions. Probing questions enabled the interviewer to follow up on the answers. The interviews were performed by one of the authors (JB) during October and November 2004, at the GP’s workplace, at the Research and Development Centre in Växjö, or in the GPs’ homes. The interviews lasted 15–40 minutes, were tape-recorded, and were transcribed verbatim.

Data analysis

The phenomenographic analysis was first performed by two of the authors separately (JB and IB). The analysis followed a sequence of steps described by Alexandersson [19]:

- (1) becoming familiar with the data and gaining an overall impression;
- (2) noting similarities and differences in the statements;
- (3) determining descriptive categories of conceptions; and
- (4) examining the underlying structure of the system of categorization.

The findings of the two analysts were compared and the final categories of description were established in a discussion between the analysts and the two last authors (NV and CSL), who were also familiar with the material.

During the additional content analysis [18], performed by JB and IB, statements concerning treatment of UTI were gathered and coded. Then the codes were summarized to make up a description of each GP’s practice of UTI treatment. The relationships between described practices and identified perceptions were examined. This part of the analysis was discussed among the researchers and the final result was approved by all authors.

The study was approved by the Ethics Committee in Linköping (Dnr 03-04). Informed consent was obtained from all participants.

Results

Perceptions of resistance in UTI treatment

Three different, mutually exclusive ways of viewing resistance in UTI treatment were identified in the

Table II. Interview guide.

Area	Introductory questions	Probing questions
Introduction	Could you please think of a patient with uncomplicated urinary tract infection and describe this patient?	Typical patient? Do you often meet patients like that? What happens when patients like that comes to you? Symptoms? Diagnosis?
Treatment	How did you decide on the treatment for this patient?	Symptoms/urine tests? Direct/delayed treatment? Patient attitudes? Choice of drug? How frequently do you use that drug? Continual alternative use of first-line drugs? Treatment duration?
Effect of treatment	How do you usually experience the effect of the treatment?	Recurrent symptoms? What happens if the symptoms return? Similar diagnosis? Have you seen treatment failure associated with resistance?
Resistance	What are your thoughts on resistance in general?	Influence on daily work? The microbiological laboratory? Update? Influence of antibiotic use? How can you curb the trend?
Is there anything else you would like to say?		

phenomenographic analysis. They were: (A) No problem, I have never seen resistance; (B) The problem is bigger somewhere else; and (C) The development of antibiotic resistance is serious and we must be careful. In Table III the three categories are described and complemented with illustrative quotations, chosen so as to reflect the view of resistance in each category. In general the physicians said that UTI was easy to diagnose and to manage.

UTI treatment in practice and correlation to perception

In the content analysis, two elements of UTI treatment were examined. They included: (1) the choice of antibiotic and (2) the treatment duration. This part analysed the GPs' thoughts about UTI treatment in practice and how their practice (according to themselves) correlated to the identified perceptions A–C.

1. Choice of antibiotic

The GPs mainly discussed issues concerning the recommendation to alternate among first-line drugs. Many of them thought that this should be applied in the treatment of a single patient to avoid recurrent infections due to resistance. Some GPs were critical and stated that every infection should be seen as a new infection and that a previously effective prescribed drug could be used again. Instead of

alternating, a specific drug was commonly perceived as safe in most situations and hence used in a habitual manner. Lack of records, fear of side effects, patient demand, and costs were mentioned as reasons for the repeated use of a specific drug.

All GPs who expressed perception C reported that they practised continual alternative use of first-line drugs both in individual patients and in the population. These GPs said furthermore that they were careful in the use of flouoroquinolones, whereas some of the GPs expressing perceptions A and B reported sporadic use of flouoroquinolones as first-line drugs.

2. Treatment duration

Many of the GPs expressed reluctance to follow recommendations for shorter treatment durations. A very few questioned the effectiveness, whereas others found it difficult to change their previous ways of thinking. All GPs who expressed perception C reported that they followed the guidelines and used shorter courses of antibiotics of 3–5 days.

Discussion

Principal findings

Three separate views of resistance in relation to UTI treatment were identified. The views varied from (A)

Table III. The three identified perceptions.

Category of description	Quotation
<p>A. No problem, have never seen: Resistance was not seen as a problem in the everyday treatment of UTI. The GPs thought that practical problems seldom appear or that they had not experienced treatment failures due to resistance. In this perception, an antibiotic resistance problem at the global level was not considered nor were future consequences.</p>	<p>As for me, I prescribed for example trimethoprim to almost 90% of my patients, a trimethoprim preparation of short duration, five days. It is enough because it is effective.... No, I have never experienced that [patients cannot be treated by an antibiotic due to resistance]. This is not how it used to be. (Dr 9)</p>
<p>B. The problem is bigger somewhere else: In this perception there was an awareness of the existence of the antibiotic resistance problem. However, this had no or minor impact on the GP's own practice. Some GPs said they must sometimes change antibiotics due to resistance but this was not really a problem. The notion was that the development in Sweden was less urgent than in other countries, or there was a feeling that great efforts are already being made to curb the trend. It was also expressed that maybe the resistance problem was worse in large cities in Sweden but not here in the countryside, or in hospital care but not here in primary care.</p>	<p>The cases where they don't get well, that is resistance. But, then you have to switch drugs and you can usually do that. There are other drugs to choose. You seldom feel totally helpless.... As I see it in Sweden about the urinary tract infections, it doesn't feel like a big problem for me right now.... If the trimethoprim susceptibility or the resistance rises a bit, it still doesn't feel like a big problem. (Dr 14)</p>
<p>C. The development of AR is serious and we must be careful: Also in this perception was the notion that the problem of antibiotic resistance was worse in other countries and in hospital care and management of UTI was generally not seen as a problem. However, the GPs in this category reflected in broader terms on future consequences and expressed concerns about the increasing resistance. It was said that doctors must take the resistance problem seriously and be careful in the prescribing of antibiotics in order to contain the development of antibiotic resistance.</p>	<p>Even if you see resistance in vitro, in the test tube, it may still have been effective in vivo, in real life.... But it's worrying that resistance to certain drugs is increasing more and more.... It's also rather worrying that no new antibiotics are being developed ... and so, so we have to be careful with the ones we have. (Dr 8)</p>

not seeing resistance as a problem at all in the treatment of UTI, to (B) explaining that the problem does not exist here but somewhere else, in other countries, big cities, or in hospitals, to (C) the notion that there is no real problem today but we must take this issue seriously and be careful.

Only GPs who expressed perception C said they practised UTI treatment according to the stated guidelines in all aspects (continual alternative use of first-line drugs, and short treatment duration).

GPs who expressed perceptions A or B also reported that they followed guidelines for UTI treatment but did not do so in all aspects. For instance, they said they practised the alternative use of drugs but only at the individual level and often for seven days. Or short treatment was used but without alternating, or alternating was used but with flouoroquinolones as one of the drugs. Many of these GPs explained that they were aware of all recommendations and knew they must change their practice. However, there was also a common belief that the precautions taken were good enough.

Strengths and weaknesses of the study

The analysis of perceptions followed experience indicating that 20 participants are enough in an interview study aiming at exploring different ways of viewing

a phenomenon [20–22]. To increase trustworthiness the analysis was first done separately by two of the authors, one with long experience of phenomenographic analysis (IB), and in a second step categories were established in a discussion between all of the authors.

A weakness of the results of the study is that the interviews were held in 2004 and the awareness of antibiotic resistance may have developed since then. However, the problem of antibiotic resistance is not less today; instead it is more timely than ever. New strategies in the promotion against antibiotic resistance are still needed. We believe our conclusions are relevant and valuable.

The second part of the analysis examined the GPs' perception of resistance with the GPs' reported decisions in the treatment of UTI. A weakness is that we have not studied how the GPs practise in real life. We only know this from what the GPs explained during the interviews. However, the questions were constructed to help the GP to think about a real patient situation and make the collected interview material as true as possible.

Comparison with other studies

Deviations from recommended treatment have been reported, such as the use of second-line drugs and

extended treatment durations [23,24]. Prescribing has been described as done in a habitual manner [3,23–25], based on the trust of broad-spectrum antibiotics as being more effective [26], and being influenced by the structure of the healthcare system [25]. In primary care the patient–physician relationship seems to influence how antibiotics are prescribed [27,28]. However, in hospital care other factors aside from the relation to the patient were important when physicians decided how to manage infections [29].

Some studies explore whether physicians consider antibiotic resistance or not when infections are managed. GPs have reported concerns about antibiotic resistance but state that they must consider many factors in deciding whether or not to prescribe an antibiotic, and often patient issues are regarded as being more important than the issue of antibiotic resistance [30,31]. Physicians who stressed patient issues were less likely to use many resources (urine culture, microscopic urinalysis, follow-up visits and tests, and prolonged antibiotic treatment) and more likely to recommend treatment over the telephone [31]. However, it has been demonstrated that symptoms of UTI are not conclusive for the diagnosis of uncomplicated UTI [32]. In our study GPs were aware of antibiotic resistance but only a few said that this factor must be specifically considered in the treatment of UTI. The issue of antibiotic resistance may also be thought of as a national problem that does not concern the physician’s own practice [33], a concept that was also seen among participants in our study. When the physicians considered antibiotic resistance as an important factor, they did follow recommended regimens more often, according to their own reports [28,29].

Meaning of the study

Our findings suggest a relationship between compliance with treatment guidelines for UTI and the perception that antibiotic resistance is a major problem. It seems that when the GP has not adopted this perception he or she is satisfied to follow parts of the recommendations and believe this is good enough. To successfully promote cautious antibiotic prescribing it is probably of importance that the GPs become fully aware of possible threats from developing resistance, with regard to both their own practice and long-term circumstances.

Unanswered questions and future research

The findings in this study contribute to the understanding of physicians’ ways of thinking about antibiotic resistance and antibiotic prescribing. However, qualitative studies are used to develop hypotheses

and our findings can preferably be verified in further studies with a quantitative design. Other factors likely to influence the GPs’ prescribing behaviour, such as patient demand or the GPs’ personalities, were not evaluated. Further research in this area is desirable in order to provide insights into the importance of views on resistance and the changes in prescribing behaviour.

Acknowledgements

The authors especially thank the GPs who shared their experiences in the interviews. Thanks are offered to Strama (the Swedish strategic programme against antibiotic resistance) and the county council of Kronoberg who supported the study.

Statement of financial support for the reported project

The study was financially supported by Strama and the county council of Kronoberg.

Ethics approval

The Ethics Committee in Linköping approved the study (Dnr 03-04). Informed consent was obtained from all participants.

Declaration of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

References

- [1] WHO. World Health Day – 7 April 2011. Antimicrobial resistance: No action today, no cure tomorrow Available at: <http://www.who.int/world-health-day/2011/en/index.html> (accessed 27 May 2011).
- [2] Cars O, Hogberg LD, Murray M, Nordberg O, Sivaraman S, Lundborg CS, et al. Meeting the challenge of antibiotic resistance. *BMJ* 2008;337:a1438.
- [3] Kuehlein T, Goetz K, Laux G, Gutscher A, Szecsenyi J, Joos S. Antibiotics in urinary-tract infections. Sustained change in prescribing habits by practice test and self-reflection: A mixed methods before–after study. *BMJ Quality & Safety* 2011; 20:522–6.
- [4] Neumark T, Molstad S, Rosen C, Persson LG, Torngren A, Brudin L, et al. Evaluation of phenoxymethylpenicillin treatment of acute otitis media in children aged 2–16. *Scand J Prim Health Care* 2007;25:166–71.
- [5] Arason VA, Sigurdsson JA. The problems of antibiotic overuse. *Scand J Prim Health Care* 2010;28:65–6.
- [6] Gjelstad S, Dalen I, Lindbaek M. GPs’ antibiotic prescription patterns for respiratory tract infections: Still room for improvement. *Scand J Prim Health Care* 2009;27:208–15.

- [7] Neumark T, Brudin L, Engstrom S, Molstad S. Trends in number of consultations and antibiotic prescriptions for respiratory tract infections between 1999 and 2005 in primary healthcare in Kalmar County, Southern Sweden. *Scand J Prim Health Care* 2009;27:18–24.
- [8] Lundborg CS, Olsson E, Molstad S, Swedish Study Group on Antibiotic U. Antibiotic prescribing in outpatients: A 1-week diagnosis-prescribing study in 5 counties in Sweden. *Scand J Infect Dis* 2002;34:442–8.
- [9] Swedish Medical Product Agency. Nedre urinvägsinfektion (UVI) hos kvinnor – behandlingsrekommendationer [UTI in women – treatment guidelines]. Information från Läkemedelsverket 2:2007. Available at: http://www.lakemedelsverket.se/upload/halso-och-sjukvard/behandling-srekommendationer/UVI_rek.pdf (accessed 27 May 2011).
- [10] Sandberg T, Jodal U, Nyman J. Urinvägsinfektioner [Urinary tract infections]. *Läkemedelsboken [Drug therapy handbook]*. Stockholm: Stockholm Apoteket AB; 2003. p 389–99.
- [11] Andre M, Molstad S, Lundborg CS, Odenholt I, Swedish Study Group on Antibiotic U. Management of urinary tract infections in primary care: A repeated 1-week diagnosis-prescribing study in five counties in Sweden in 2000 and 2002. *Scand J Infect Dis* 2004;36:134–8.
- [12] Melander E, Petersson A. Resistensläge hos urinvägspatogener isolerade från patienter i öppen vård 1995–2001 [Resistance among urinary tract pathogens isolated from patients in primary care 1995–2001]. *Mikrobiolognytt; 2001 [News in Microbiology; Dec 2001]*. Available at: <http://www.skane.se/upload/Webbplatser/Smittskydd/Dokument/2001> (accessed 27 March 2011).
- [13] Referensmetodik för laboratoriediagnostik vid kliniskt bakteriologiska laboratorier. 1. Infektionsdiagnostik. 15. Urinvägsinfektioner/bakteriuri. 2:a upplagan 2000 [Methodology for laboratory diagnostics at clinical bacteriologic laboratories]. Available at: http://www.referensmetodik.smi.se/w/Referensmetodik:_Urin%C3%A4gsinfektioner/bakteriuri,_2:a_upplagan_2000 (accessed 27 March 2011).
- [14] Strama.se. Antibiotikaresistens [Antibiotic resistance]. Available at: <http://www.strama.se/dyn//,37,80,70.html?dcid=36> (accessed 28 March 2011).
- [15] Sundqvist M, Geli P, Andersson DI, Sjolund-Karlsson M, Runehagen A, Cars H, et al. Little evidence for reversibility of trimethoprim resistance after a drastic reduction in trimethoprim use. *J Antimicrob Chemother* 2010;65:350–60.
- [16] Sandbaek A. Qualitative methods used for effect studies and evaluations of healthcare strategies? *Scand J Prim Health Care* 2006;24:131–2.
- [17] Marton F, Booth S. Om lärande (also available in English: (1997) *Learning and awareness*. Mahwah, NJ: Erlbaum). Lund: Studentlitteratur; 2000.
- [18] Graneheim UH, Lundman B. Qualitative content analysis in nursing research: Concepts, procedures and measures to achieve trustworthiness. *Nurse Educ Today* 2004;24:105–12.
- [19] Alexandersson M. Metod och medvetande [Method and awareness]. Dissertation, Acta Universitatis Gothoburgensis; 1994.
- [20] Stålsby Lundborg C, Wahlström R, Dall’Alba G. Ways of experiencing asthma management: Variations among general practitioners in Sweden. *Scand J Prim Health Care* 1999;17:226–31.
- [21] Larsson J, Holmström I, Rosenqvist U. Professional artist, good Samaritan, servant and co-ordinator: Four ways of understanding the anaesthetist’s work. *Acta Anaesthesiol Scand* 2003;47:787–93.
- [22] Björkman IK, Bernsten CB, Schmidt IK, Holmström I. The role of drug and therapeutics committees. *Int J Health Care Qual Assur Inc Leadersh Health Serv* 2005;18:235–48.
- [23] Hummers-Pradier E, Denig P, Oke T, Lagerlov P, Wahlstrom R, Haaijer-Ruskamp FM. GPs’ treatment of uncomplicated urinary tract infections: A clinical judgement analysis in four European countries. DEP group. Drug Education Project. *Fam Pract* 1999;16:605–7.
- [24] Denig P, Wittman CL, Schouten HW. Scope and nature of prescribing decisions made by general practitioners. *Qual Saf Health Care* 2002;11:137–43.
- [25] Christiaens T, De Backer D, Burgers J, Baerheim A. Guidelines, evidence, and cultural factors. *Scand J Prim Health Care* 2004;22:141–5.
- [26] Enriquez-Puga A, Baker R, Paul S, Villoro-Valdes R. Effect of educational outreach on general practice prescribing of antibiotics and antidepressants: A two-year randomised controlled trial. *Scand J Prim Health Care* 2009;27:195–201.
- [27] Petursson P. GPs’ reasons for “non-pharmacological” prescribing of antibiotics: A phenomenological study. *Scand J Prim Health Care* 2005;23:120–5.
- [28] Björkman I, Erntell M, Roing M, Lundborg CS. Infectious disease management in primary care: Perceptions of GPs. *BMC Fam Pract* 2011;12:1.
- [29] Björkman I, Berg J, Roing M, Erntell M, Lundborg CS. Perceptions among Swedish hospital physicians on prescribing of antibiotics and antibiotic resistance. *Qual Saf Health Care* 2010;19:1–5.
- [30] Simpson SA, Wood F, Butler CC. General practitioners’ perceptions of antimicrobial resistance: A qualitative study. *J Antimicrob Chemother* 2007;59:292–6.
- [31] Flach SD, Longenecker JC, Tape TG, Bryan TJ, Parenti C, Wigton RS. The relationship between treatment objectives and practice patterns in the management of urinary tract infections. *Medical decision making: An international journal of the Society for Medical Decision Making* 2003;23:131–9.
- [32] Ferry SA, Holm SE, Stenlund H, Lundholm R, Monsen TJ. Clinical and bacteriological outcome of different doses and duration of pivmecillinam compared with placebo therapy of uncomplicated lower urinary tract infection in women: The LUTIW project. *Scand J Prim Health Care* 2007;25:49–57.
- [33] Giblin TB, Sinkowitz-Cochran RL, Harris PL, Jacobs S, Liberatore K, Palfreyman MA, et al. Clinicians’ perceptions of the problem of antimicrobial resistance in health care facilities. *Arch Intern Med* 2004;164:1662–8.