



Incidence of Patients Diagnosed With Acute Cystitis in Nuuk, Greenland Management in the Primary Health Care Setting

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Abstract

Objective: To estimate the incidence of adult patients diagnosed with acute cystitis and evaluate the assessment and treatment of acute cystitis in Nuuk, Greenland.

Study design: Retrospective follow-up study including all adult patients diagnosed with acute cystitis at Queen Ingrid Primary Health Care Center within a fourteen-day long observation period.

Methods: Patients diagnosed with acute cystitis were identified using the electronic medical record (EMR). From EMR information about age, gender, diagnosis, examinations, treatment and medical history was obtained.

Results: A total of 66 patients (7 males and 59 females) diagnosed with acute cystitis were identified. Out of the 66 patients, 34 patients were classified with uncomplicated acute cystitis, while the other 32 patients were classified with complicated acute cystitis. The overall incidence rate among female patients was 189/1,000 person-years (95 % CI 181-198) and 20/1,000 person-years (95% CI 17-23) among male patients. A urine dipstick was performed in 53.0 % of the cases while a urine culture was performed in 39.4 % of the cases. *Escherichia coli* was the most common uropathogen found in the urine cultures (42.3% of the cases). In 34.6 % of the cases, no bacteria were found in the urine cultures. The majority of patients (98.5%) were treated with antibiotics, almost exclusively Sulfamethizole or Pivmecillinam (92.3 % of patients treated with antibiotics).

Conclusion: Acute cystitis is a common diagnosis among adult women in Nuuk, Greenland, with *E. coli* as the most common uropathogen. The majority of patients are treated with the recommended antibiotics.

Keywords: Cystitis, Inuit; Greenland; Primary health care

Introduction

Lower urinary tract infections (acute cystitis) are a common infection in women and account for a substantial financial burden on society [1-3]. In Denmark, patients with symptoms of urinary tract infections account for 2-5% of all contacts in general practice [1]. Antibiotic resistance among common uropathogens is increasing in many countries and this causes concern [4-7]. In Denmark, the official recommendations regarding assessment and treatment of urinary tract infections are provided by the Institute of Rational Pharmacotherapy, a partly independent institute under the Danish Health and Medicines Authority [8]. According to their latest recommendations from 2007, general practitioners should distinguish between an uncomplicated acute cystitis and a complicated acute cystitis when making decisions on assessment and treatment. Empirical treatment with either Sulfamethizole or Pivmecillinam is recommended for treatment of uncomplicated acute cystitis, while decisions regarding choice of antibiotics for complicated acute cystitis should be based on urine culture. These recommendations are in line with the European Association of Urology 2010 guidelines on urological infections [9]. Greenland is part of the Danish Realm and the health care system in Greenland is widely inspired by the Danish health care system, although major logistic differences exist. Similarly, Danish treatment guidelines are widely used in Greenland. Thus, treatment with Sulfamethizol or Pivmecillinam is recommended as first choice at Queen Ingrid Health Care Center in Nuuk. However, both incidence and management of patients diagnosed with acute cystitis in the population of Greenland remain unknown. The aim of this study was to determine the incidence of patients diagnosed with acute cystitis and to evaluate the assessment and treatment of acute cystitis in Nuuk, Greenland.

Material and Methods

This study was carried out as a Retrospective follow-up study including all patients diagnosed with acute cystitis at Queen Ingrid Primary Health Care Center from 27th January to 9th February 2014,

both days included.

Setting

The whole population of Greenland by January 1st 2014 was 56,282 people [10]. They live in the 18 towns and 60 settlements spread along the coastline of Greenland. The health care system in Greenland provides free health care service to all people with a permanent address in Greenland. In Nuuk, Queen Ingrid Primary Health Care Center exclusively provides primary care service for all people living in the Nuuk district, including the two minor settlements Kapisillit and Qerqersuatsiaat. All contact with patients is registered in the electronic medical record system (EMR). In addition, all prescriptions are handled electronically in EMR. The population of Nuuk district was by January 1st 2014 17,085 people [11] which constitutes around one third of the overall population of Greenland.

Study population

All adult patients (minimum 18 years of age) with a permanent address in the Nuuk district treated for acute cystitis at Queen Ingrid Primary Health Care Center within the study period were included. First, all patients treated with a relevant antibiotics were identified in EMR (Sulfamethizole (J01EB02), Pivmecillinam (J01CA08), Nitrofurantoin (J01XE01), Pondocilline (J01CA02), Ciprofloxacin

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(J01MA02) and Trimethoprim (J01EA01)). Second, the medical records of these patients were reviewed to identify the patients treated for acute cystitis. Furthermore, all patient contact headlines in the timetable of EMR were reviewed to identify any additional patients diagnosed with acute cystitis who had not been treated with antibiotics. Patients diagnosed with acute cystitis who were not associated with Queen Ingrid Primary Health Care Center were not included in the study. In the fourteen-day period after the initial diagnosis of acute cystitis, patients were observed in order to monitor any further contact they might have had with Queen Ingrid Primary Health Care Center. From EMR information about age, gender, diagnose, examinations, treatment and medical history was obtained. Urine dipsticks were performed at Queen Ingrid Primary Health Care Center while urine cultures were performed at the Central laboratory of Queen Ingrid Hospital.

Variables

In this study, an uncomplicated acute cystitis was defined as an acute cystitis in otherwise healthy, non-pregnant women up to 65 years old who have not received antibiotics for an acute cystitis within the last three months and who have not received any kind of antibiotics within the last 2 weeks. All other cases of acute cystitis including acute cystitis in men and women older than 65 years were defined as complicated acute cystitis [8-9,12].

Statistics

Age and gender specific incidence rates were calculated using the Nuuk population per January 1st 2014 as background population. Estimates are calculated with 95% confidence intervals. Chi-square test was used to compare frequencies. P-value at 0.05 was used as level of significance. The ethics committee for medical research in Greenland approved the study.

Results

One hundred and three patients who had received a prescription for at least one of the included antibiotics from Queen Ingrid Primary Health Care Center in the period from 27th January to 9th February 2014 were identified. Of these, 71 patients were diagnosed with acute cystitis. Thirty-two patients were excluded due to other diagnoses. By reviewing the electronic timetable in EMR, four additional patients diagnosed with acute cystitis were identified. Of those, two had a permanent address in Nuuk and were included in the study population. Seven patients were excluded due to age below 18 years. Thus, in total 66 patients diagnosed with acute cystitis were included in the study. Of these, 34 patients were classified with uncomplicated acute cystitis, whereas 32 patients were classified with complicated acute cystitis. The reasons for the classification of complicated acute cystitis were male gender (n=7), chronic diseases (n=6), use of immuno suppressive drugs (n=1), urological disease (n=14), use of prophylactic antibiotics for chronic cystitis (n=4), antibiotic treatment for acute cystitis within 3 months (n=22), any antibiotic treatment within 2 weeks (n=3) or a combination of the above-mentioned reasons.

Incidence rates and annual incidence proportions

Incidence rates for uncomplicated and complicated acute cystitis are shown in Table 1. The overall incidence rate of patients diagnosed with acute cystitis at Queen Ingrid Primary Health Care Center in the period from 27th January to 9th February 2014 was 101/1,000 person-years (95% CI 96-105). Age and gender specific incidence rates and gender specific annual incidence proportions are shown in Table 2. The highest incidence rate observed was 542/1,000 person-years in the 60-

	Uncomplicated		Complicated		Total	
	n	%	n	%	n	%
Study Population	34	51.5	32	48.5	66	100.0
Gender						
-Female	34	100.0	25	78.1	59	89.4
-Male	-	-	7	21.9	7	10.6
Assesment						
Diagnosis based solely on patienthistory	21	31.8	5	7.6	26	39.4
Urine dipstick	13	38.2	22	68.8	35	53.0
-leucocyte positive	11	84.6	11	50.0	22	62.9
-Nitrite positive	0	0.0	3	13.6	3	8.6
-Leucocyte and nitrite positive	1	7.7	3	13.6	4	11.4
-Negative	1	7.7	5	22.7	6	17.1
Urine culture	4	11.8	22	68.8	26	39.4
Escherichia coli	1	25.0	10	45.5	11	42.3
Enterococcus	0	0.0	3	13.6	3	11.5
klebsiella	0	0.0	2	9.1	2	7.7
Aerococcus	0	0.0	1	4.5	1	3.8
-Mixed florae	0	0.0	0	0.0	0	0.0
-Negative	3	75.0	6	27.3	9	34.6
Antibiotic treatment	34	100.0	31	96.9	65	98.5
Pivmecillinam	10	29.4	13	41.9	23	35.4
Sulfametizole	24	70.6	13	41.9	37	56.9
Ciprofloxacin	0	0.0	1	3.2	1	1.5
Nitrofurantoin	0	0.0	0	0.0	0	0.0
Nitrolurantoin	0	0.0	2	6.5	2	3.1
Trimethoprim	0	0.0	2	6.5	2	3.1
Patients with no further contact*	30/34	88.2	27/32	84.4	57/66	86.4
		95 %CI		95 %CI		95 % CI
Incidence rate (n/1,000 person-years)	52	(49-55)	49	(46-52)	101	(96-105)

*Patients with no further contact with Queen Ingrid primary health care center within the 14 day observation period.

Table 1: Characteristics of Greenlandic acute cystitis from Queen Ingrid primary health care center from (27th of January to 9th of February 2014).

Age	Women Incidence/1,000 person years (95 %CI)	n/N	Men Incidence/1,000 person-years (95 % CI)	n/N
20-29	212 (191-233)	12/1477	19 (12-26)	1/1392
30-39	214 (191-237)	10/1218	0(0-0)	0/1351
40-49	293 (269-318)	15/1333	0 (0-0)	0/1544
50-59	146(127-166)	7/1246	17 (11-24)	1/1508
60-69	542(497-587)	10/481	117 (92-141)	3/671
70+	343(281-405)	3/228	223 (170-276)	2/234
Overall	189(181-198)	59/8124	20 (17-23)	7/8958
Annual incidence proportion (%)	17.25		2.02	

Table 2: age and gender specific incidence rates, gender specific annual incidence proportions and relative risk of acute cystitis among patients from Queen Ingrid primary health care center from (27th of January to 9th of February 2014).

69 years age group of female patients (95 % CI 497-587). The overall incidence rate among female patients was 189/1,000 person-years (95% CI 181-198) and 20/1,000 person-years (95% CI 17-23) among male patients. These incidence rates correspond to an annual incidence proportion of 17.25% and 2.02% respectively.

Population characteristics and management

Characteristics and examination results are summarized in Table 1. The diagnosis was based solely on the history of symptoms in 39.4 % cases while a urine dipstick was performed in 53.0% of cases and a urine culture was performed in 39.4 % of cases. *Escherichia coli* were the most common uropathogen found in the urine cultures and was found in 42.3 % of the cases (Table 1). In 34.6 % of the cases, no bacteria were found in the urine cultures. Almost all patients (98.5 %) were treated with antibiotics. The majority (56.9%) of patients were treated with Sulfamethizole. Pivmecillinam was the second most common drug used in 35.4% of the cases. Overall, 92.3% (60/65) of patients diagnosed with acute cystitis and treated with antibiotics were treated with either Sulfamethizole or Pivmecillinam in accordance with the recommendation of first choice. No additional contact to Queen Ingrid Health Care Center within the fourteen-day observation period after initial treatment was observed for 86.4 % of the patients.

Discussion

In this study, we found an overall incidence rate of 189/1,000 person-years among women and 20/1,000 person-years among men in Nuuk, Greenland. Furthermore, the majority of patients were treated with antibiotics in line with official recommendations. Among women, we found an equitable distribution of uncomplicated and complicated acute cystitis. The majority of acute cystitis cases was classified as complicated due to prior treatment of acute cystitis within 3 months. Among patients diagnosed with complicated acute cystitis, the majority was examined with a urine dipstick and/or a urine culture before initiation of treatment.

Other studies

The data from our study are in line with data from other studies. First of all, the incidence rate of patients diagnosed with acute cystitis was found to be high among women and low among men. In 2014, Foxman B. reports of similar results regarding the incidence of acute cystitis among US/canadian men and women.[3]. Secondly, because of the anatomical differences between men and women, acute cystitis is known to primarily affect women. Many studies, consistent with our study, confirm this [2,3,13-15]. Thirdly, *E. coli* was found to be the most common uropathogen that is also consistent with other studies [6].

In the vast majority of cases, the treatment guidelines were followed. In addition, no further contact within the fourteen-day observation period was observed in 86.4 % of the cases. This may indicate a generally effective assessment and treatment procedure. However, in nearly 35 % of urine cultures no bacteria were found. A certain proportion of negative urine cultures is expected. Even though, this does suggest some over diagnosis. Furthermore, a relatively large proportion of female patients were diagnosed and classified with complicated acute cystitis due to prior antibiotic treatment of acute cystitis within the last 3 months. This also points towards some over diagnosis. In Nuuk, Greenland, the incidence rates of sexually transmitted diseases (Chlamydia and Gonorrhoea) are known to be very high [16]. Therefore, the possibility that some of these patients did not in fact have an acute cystitis but instead had a sexually transmitted disease must be considered. So far, patients presenting symptoms of acute cystitis at Queen Ingrid Primary Health Care Center are not routinely checked for sexually transmitted diseases. In light of the known high incidence rates of sexually transmitted diseases, and in order to limit the use of antibiotics, routine checks for sexually transmitted diseases should be considered for future patients presenting symptoms of complicated acute cystitis before

initiating antibiotics. Especially those patients recently treated with antibiotics. In addition, focus on awareness of preventive initiatives among patients with acute cystitis could be considered in order to reduce incidence and need for antibiotic treatment.

Strengths and limitations

This study is the first to estimate the incidence of patients diagnosed with acute cystitis in Nuuk, Greenland. The major strength of this study is that all patients in Nuuk district are included, that is 17,085 people, constituting approximately 30.4% of the overall population of Greenland. In Nuuk district, Queen Ingrid Primary Health Care Center exclusively provides primary health care service. Therefore, this study is expected to include all patients diagnosed with acute cystitis where there has been a need of medical advice or treatment. However, there are several limitations. The study period was relatively short and there are reservations with regard to the relatively small figures. Season variability with a peak during summer, cannot be excluded and this consequently leads to underestimation of the true annual incidence. On the other hand, since diagnosis was made on the history of symptoms in 39.4% of the cases without urine tests, some kind of overdiagnosis must have occurred leading to an overestimation of the true incidence of acute cystitis. Furthermore, it must be expected that some patients with an acute cystitis during the registration period did not seek medical aid. Thus, the percentage of a self-limiting number of acute cystitis remains unknown. This would underestimate the true incidence. However, primary health care is free to everyone and quite accessible [17]. Therefore, the vast majority of patients with acute cystitis are expected to have been in contact with Queen Ingrid's Health Care Center. Detailed information about urinary irritative symptoms, absence of vaginal/urethral discharge or vaginal irritation would have strengthened the diagnostic classification. A urinary dipstick or microscopy to indicate inflammation in all cases of suspected acute cystitis would also have strengthened the diagnostic classification. However, this information was only accessible in some cases. Thus, this study describes the group of patients actually given the diagnosis of acute cystitis rather than an ideal population of known cases of acute cystitis. Finally, the short observation period after initial treatment limits the possibility to evaluate whether or not the initial treatment was a success.

Conclusion

In conclusion, acute cystitis is a common diagnosis in Nuuk, Greenland and it primarily affects women with *E. coli* as the most common uropathogen as seen in other populations. The majority of patients are treated with the recommended antibiotics. Performing a urine sample for sexually transmitted diseases in addition to a conventional urine culture in complicated cases should be considered. Preventive procedures among patients with acute cystitis should be explored.

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