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RESEARCH ARTICLE (ORIGINAL)

Prevalence of urinary tract infections in people institutionalized in private institutions of social solidarity

Prevalência de infeções urinárias em pessoas institucionalizadas em instituições particulares de solidariedade social

Prevalencia de infecciones urinarias en personas institucionalizadas en instituciones privadas de solidaridad social

Ana Rosa Jesus Ribeiro [1]
https://orcid.org/0000-0003-4780-0286

Cláudia Margarida Correia Balula Chaves [1]
https://orcid.org/0000-0002-8103-7221

Alcinda Maria Sarmento do Sacramento Costa Reis [2]
https://orcid.org/0000-0002-1003-5990

[1] Health School of Viseu, Nursing Sciences, Viseu, Portugal

[2] Health School of Santarém, Santarém, Portugal

Corresponding author
Ana Rosa Jesus Ribeiro
E-mail: ribeiroanarosa1@hotmail.com

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Abstract
Background: In institutionalized elderly people, urinary tract infections are the most common, involving 12% to 30% of this population, with at least one episode per year, where several risk factors influence their occurrence.
Objective: To determine the prevalence of urinary tract infections in older people institutionalized in a private institution of social solidarity and to identify the risk factors.
Methodology: This is a cross-sectional, observational, and epidemiological study conducted on a convenience sample of people who are institutionalized in a private institution of social solidarity and belong to three different services. Data was collected over 8 months, and the number of patients in the different services was recorded (n = 171).
Results: The institution had a urinary tract infection prevalence of 18.1%. Although more cases occurred in women (p = 0.641) and people older than 75 years (p = 0.269), there were no significant differences. Location of hospitalization was identified as a risk factor for developing a urinary tract infection (p = 0.024).
Conclusion: Out of the 171 people who were institutionalized, 31 developed a urinary tract infection. It is important to adopt educational and preventive measures.

Keywords: urinary tract infections; cross-sectional studies; prevalence; risk factors; homes for the aged

Resumo
Enquadramento: Nas pessoas idosas institucionalizadas, a infeção urinária é a mais comum, envolvendo 12% a 30% desta população, com pelo menos um episódio por ano, onde diversos fatores de risco influenciam a sua ocorrência.
Objetivo: Determinar a prevalência das infeções urinárias em pessoas institucionalizadas numa instituição particular de solidariedade social e identificar os fatores de risco.
Metodologia: Estudo epidemiológico observacional transversal. Os participantes são pessoas institucionalizadas numa instituição particular de solidariedade social e que pertencem a três valências diferentes. Amostra por conveniência. A colheita de dados realizou-se durante 8 meses, com registo do número total de utentes das várias valências (n = 171).
Resultados: A prevalência de infeção urinária na instituição foi de 18,1%. Ocorreram mais casos em mulheres (p = 0,641) e em pessoas com idade superior a 75 anos (p = 0,269), mas sem diferenças significativas. O local de internamento demonstrou ter influência no risco de desenvolvimento de infeção urinária (p = 0,024).
Conclusão: Das 171 pessoas internadas, 31 desenvolveram infeção urinária. São necessárias atitudes educativas e preventivas.

Palavras-chave: infeções urinárias; estudos transversais; prevalência; fatores de risco; instituição de longa permanência para idosos

Resumen
Marco contextual: En los ancianos institucionalizados, las infecciones del tracto urinario son las más comunes, afectando del 12% al 30% de esta población, con al menos un episodio por año, donde varios factores de riesgo influyen en su aparición.
Objetivo: Determinar la prevalencia de infecciones urinarias en personas institucionalizadas en una institución privada de solidaridad social e identificar los factores de riesgo.
Metodología: Estudio epidemiológico observacional transversal. Los participantes fueron personas institucionalizadas en una institución privada de solidaridad social y pertenecientes a tres servicios diferentes. Muestra de conveniencia. Los datos se recogieron durante un período de 8 meses y se registró el número total de usuarios de los distintos centros (n = 171).
Resultados: La prevalencia de infección urinaria en la institución fue del 18,1%. Hubo más casos en mujeres (p = 0,641) y en mayores de 75 años (p = 0,269), pero sin diferencias significativas. Se demostró que el lugar de hospitalización influía en el riesgo de desarrollar infección urinaria (p = 0,024).
Conclusión: De las 171 personas hospitalizadas, 31 desarrollaron infección urinaria. Se necesitan actitudes educativas y preventivas.

Palabras clave: infecciones urinarias; estudios transversales; prevalencia; factores de riesgo; institución de larga estancia para ancianos

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Introduction

Urinary tract infections (UTIs) are highly prevalent among institutionalized older people, and it is important to study them in the context of their care. UTIs occur when pathogenic microorganisms invade the urinary system, leading to local inflammation (Araújo et al., 2021; Machado et al., 2022).
Bizo et al. (2021) reported that UTIs are prevalent among institutionalized older adults, affecting 12% to 30% of this population with at least one episode per year, with several risk factors contributing to their recurrence. This infection leads to high morbidity and mortality rates, resulting in significant individual, social, and healthcare costs (Marques-Vieira et al., 2021).
The literature emphasizes the significance of nurses in preventing UTIs. This can be achieved through training interventions and professional involvement of nurses in this area, as well as good practices in the insertion, maintenance, and removal of urinary catheters, and proper hand hygiene (Junior et al., 2022; Machado et al., 2023).
The main objective of this research is to determine the prevalence of urinary tract infections in individuals institutionalized in Private Institutions of Social Solidarity (IPSS) to understand the true scale of this problem. This study also aims to identify the risk factors and characteristics of institutionalized individuals associated with the occurrence of UTIs in IPSS.

Background

UTIs are an inflammation of the urinary tract characterized by the presence of pathogens in the urine and other symptoms. UTIs can affect either the lower urinary tract (cystitis and urethritis) or the upper urinary tract (pyelonephritis) (Bizo et al., 2021). Different names are used depending on the affected site (Marques-Vieira et al., 2021).
UTIs can be classified based on the presence or absence of associated symptoms (Araújo et al., 2021). In cases of cystitis, common symptoms include polyuria, dysuria, urinary urgency, hematuria, foul-smelling urine, and bladder pain. Pyelonephritis is characterized by localized flank pain, nausea, vomiting, fever, bacteriuria, and pyuria (Bizo et al., 2021; Marques-Vieira et al., 2021). UTIs can also cause changes in urine color (cloudy urine), urinary incontinence, and oliguria (Araújo et al., 2021; Calegari, 2020). Diagnosing a UTI at an early stage is more difficult in older people, especially as there may be no typical symptoms of infection and an abrupt decline or change in their mental and cognitive functions (Calegari, 2020). Infections of this type start with inflammation of the urethra. If not treated properly, this inflammation can spread to the rest of the urinary system and lead to sepsis and/or death (Araújo et al., 2021).
UTIs occur when a person comes into contact with a pathogen and are influenced by the host's risk factors. They can be associated with urinary catheterization in individuals who have had a urinary catheter for at least 28 hours (Marques-Vieira et al., 2021). This is due to both the placement technique and the chronic use of the catheter (Araújo et al., 2021).
According to the literature, the etiology of UTIs is multifactorial, especially in women. Anatomical characteristics, such as the proximity of the urinary tract to the perianal region and the length of the urethra, are contributing factors. Additionally, hygiene habits during bowel movements can also influence the occurrence of UTIs. According to the literature, women have a higher UTI prevalence compared to men, so it is important to implement preventive and educational measures (Araújo et al., 2021; Calegari, 2020).
The literature indicates that, in older adults, UTI prevalence is the same for both men and women. Risk factors may include diabetes mellitus, neurological diseases or dementia, prostatic alterations, urinary or fecal incontinence resulting in diaper use (Marques-Vieira et al., 2021), obesity, suppressed immunity, tumors (Araújo et al., 2021), benign prostatic hyperplasia (BPH), and greater dependency of the person (Calegari, 2021). Older adults are at a higher risk of developing infections, particularly if they have pre-existing conditions. Early diagnosis of UTI is crucial to prevent adverse health outcomes and even death (Calegari, 2020).
The high UTI prevalence in older adults is partly due to the decline in kidney function and decreased urinary defenses, such as incomplete bladder emptying. Urinary and fecal incontinence often result in diaper use or frequent urinary catheterization, which can lead to contamination and subsequent UTIs (Calegari, A UTI diagnosis can be confirmed through a urine culture test (Bizo et al., 2021). This test is usually associated with antimicrobial sensitivity and resistance testing, which allows the clinician to decide on the appropriate therapy. The microorganisms most frequently identified in UTIs are *Escherichia coli*, *Klebsiella pneumoniae*, *Enterococcus faecalis*, *Staphylococcus*, and *Proteus mirabilis* (Bizo et al., 2021; Calegari, 2020; Machado et al., 2022).
Nurses who provide close nursing care to older people should have knowledge about the changes of primary aging. They should be able to differentiate the natural effects of this stage of the life cycle from the changes produced by different diseases that affect older people, such as UTIs. It is important for them to adopt educational and preventive postures (Calegari, 2020). According to the Directorate-General for Health, nurses should aim to reduce the number of unnecessary urinary catheterizations. They should also follow guidelines for the correct placement, maintenance, and removal of catheters, including the use of aseptic techniques. Additionally, it is important to maintain a closed drainage system and perform daily urinary hygiene, as infections can largely be prevented (Direção-Geral da Saúde, 2022).

Research question

What is the UTI prevalence in individuals institutionalized in IPSS? What are the identified risk factors for UTIs in this population?

Methodology

A cross-sectional, observational, and epidemiological study was conducted on people institutionalized in an IPSS in the central region of mainland Portugal. The study included individuals aged 18 or over who reside in an integrated long-term care unit (UCCI), a residential facility for older people (ERPI), and a private senior residence, all of which are part of the same institution.
Inclusion criteria were the presence of typical symptoms of UTIs and agreeing to participate. Confirmation of infection was obtained through a urine culture test, which was performed by a nurse from the institution in compliance with good practice for biological sample collection. The exclusion criteria were individuals residing in the IPSS who did not have a confirmed UTI or who had a confirmed UTI but did not provide informed consent to participate. The sampling method used was convenience sampling.
For the purpose of this research, a questionnaire was created to evaluate sociodemographic data, including age, gender, and location of hospitalization (UCCI, ERPI, and senior residence). The questionnaire also assessed the presence of invasive devices such as a urinary catheter, the reason for catheterization, and the degree of dependency in activities of daily living (ADLs). The text describes various factors that need to be considered, including the form of ambulation (walking, wheelchair-bound, bedridden), presence of chronic illnesses, use of diuretics, history of UTI, sphincter control (continent, occasional accident, incontinent) or catheterization, and level of dependence and place in hygiene care. Additionally, the Barthel Index was used to determine dependency in ADLs. The Portuguese version of the scale consists of 10 items and has been validated for the Portuguese population by Ricardo Loução, José Pereira, and Carlos Colaço. It assesses dependency in grooming, bladder control, bowel control, toileting, feeding, transferring, ambulation, dressing, stair climbing, and bathing. The scale ranges from 0 to 100, with five-point intervals. A score of zero corresponds to total dependency for all the assessed ADLs, while a score of 100 indicates total independence for the same activities. This questionnaire contains information regarding the infection and treatment, including the origin of the infection (whether it was acquired in a hospital or another health unit, at home, or in the institution itself), presence of symptoms, pathogen identified in the urine culture test, antibiotic administered, duration and route of treatment, and resolution or recurrence of UTI in the patients.
This study included only UTI cases in which the person or their legal guardian had signed a written informed consent document allowing access to clinical data. The document was drawn up in accordance with the Declaration of Helsinki and the Oviedo Convention. After explaining the study, a week was given for reflection. The informed consent document was collected only after this period, thus guaranteeing time for a free decision. It was emphasized that participants could withdraw from the study at any time without consequences and without the need for justification. In case the person is unable to sign or does not know how to, the informed consent document includes a field for another person to sign on their behalf and affix their fingerprint, as provided for in Article 373 of the Civil Code and Article 51 of the Notaries Code (Diário da República, 2022, 2023).
After completing the informed consent form, the researcher, a nurse at the institution under study, completed the data collection instrument designed for this purpose. The researcher consulted the individual's physical file in the three services of the institution studied.
The questionnaires were assigned a code to ensure the anonymity of the participants' information. No names or personal information that could identify them were included in the data collection documents. The code used in this study was only accessible to the principal investigator.
Data collection occurred between October 1, 2022 and May 6, 2023, spanning a total of eight months or 31 weeks. The data was analyzed and processed using the SPSS statistical program, version 28.0.0.0 (190), and the Chi-square statistical test.
The study received ethical approval from the Ethics Committee of the Polytechnic Institute of Viseu on September 9, 2022 (Opinion No. 24/SUB/2022), as well as authorization from the head of the IPSS studied.

Results

UTI prevalence

The sample comprises 171 individuals, corresponding to the number of patients hospitalized in one of the IPSS services during the eight-month study period. The majority of the patients were women (60.8% vs. 39.2%). Out of the 171 hospitalized patients, 31 developed at least one UTI during this period, resulting in a total UTI prevalence of 18.1% (Table 1).

Table 1

UTI prevalence in the IPSS

UTI cases	Gender		Total
	Female	Male	
Yes	20	11	31
	(11.7 %)*	(6.4 %)*	(18.1 %)*
No	84	56	140
	(49.1 %)*	(32.7 %)*	(81.9 %)*
Total	104 (60.8%)	67 (39.2%)	171 (100%)

Note. * = % of the total; UTI = Urinary tract infection; IPSS = Private Institution of Social Solidarity.

Risk factors for UTIs

UTI cases are more prevalent in women than men (11.7% vs. 6.4%, p = .641) and occur more frequently in people aged ≥ 75 years (13.5%) compared to those aged 65-75 years (4.1%) and those aged < 65 years (0.6%; p = .269). UTI cases occurred more frequently in nursing homes and senior residences (12.9%) than in the UCCI (5.3%) regarding the location of hospitalization (p = 0.024; Table 2).

Table 2

Values of the relation between the dependente variable (UTI cases) and independent variables (gender, age, and location of hospitalization)

Variables		UTI cases		Total	Statistical test	*p*
		Yes	No			
Gender	Female	20	84	104	Chi-Square $X^2(1) = 0.217$	0.641
		(11.7 %)*	(49.1 %)*	(60.8 %)*		
	Male	11	56	67		
		(6.4 %)*	(32.7 %)*	(39.2 %)*		
Age	< 65 years	1	15	16	Chi-Square $X^2(2) = 2.629$	0.269
		(0.6 %)*	(8.8 %)*	(9.4 %)*		
	65-75 years	7	20	27		
		(4.1 %)*	(11.7 %)*	(15.8 %)*		
	≥ 75 years	23	105	128		
		(13.5 %)*	(61.4 %)*	(74.9 %)*		
Location of hospitalization	UCCI	9	72	81	Chi-Square $X^2(1) = 5.106$	0.024
		(5.3 %)*	(42.1 %)*	(47.4 %)*		
	Nursing home/ Senior residence	22	68	90		
		(12.9 %)*	(39.8 %)*	(52.6 %)*		

Note. * = % of the total; UTI = Urinary tract infection; UCCI = Long-term care unit.

Most UTI cases were not treated (87.1%). The majority of UTI patients were totally dependent (48.4%), according to the Barthel Index. The most common chronic diseases in UTI cases were arterial hypertension (64.5%), diabetes mellitus (38.7%), and dyslipidemia (25.8%). 61.3% of UTI patients did not use diuretics as usual therapy. Most UTI cases (74.2%) occur without any known history of UTI. Additionally, 87.1% of UTI cases are dependente for hygiene care (Table 3).

Table 3

Frequency of specific characteristics in patients with UTI

Variables		*n*	%
Urinary catheterization	With urinary catheter	4	12.9
	Without urinary catheter	27	87.1
Dependency (Barthel Index)	Independence (90-100points)	-	0
	Slight dependency (60-90points)	3	9.7
	Moderate dependency (40-55points)	5	16.1
	Severe dependency (20-35points)	8	25.8
	Total dependency (<20points)	15	48.4
Chronic diseases	Arterial hypertension	20	64.5
	Diabetes mellitus	12	38.7
	Dyslipidemia	8	25.8
	Dementia	7	22.6
	Atrial fibrillation	7	22.6
	Benign prostatic hyperplasia	5	16.1
	Stroke	5	16.1
	Kidney failure	3	9.7
Use of diuretics	With use of diuretics	12	38.7
	Without use of diuretics	19	61.3
History of UTI	With history of UTI	8	25.8
	Without history of UTI	23	74.2
Sphincter control	Continent	9	29.0
	Occasional accident	9	29.0
	Incontinent	9	29.0
Hygiene care	Independent	4	12.9
	Dependent	27	87.1
Total UTI cases		31	

Note. UTI = Urinary tract infection.

Discussion

Residents of nursing homes/ERPI, senior residences, and UCCI are typically older and more fragile, putting them at a higher risk for comorbidities. The study's relevance stems from the fact that UTIs are a common infectious condition among institutionalized older people. Therefore, it is crucial for nurses to conduct research to understand the extent of the problem in their institutions, identify risk factors and associated characteristics, and reflect on preventive measures for UTIs. Nurses must be vigilant in these situations.

A prevalence study conducted over eight months in an IPSS with several services in central Portugal found a total UTI prevalence of 18.1%. Similarly, a study conducted in a geriatrics unit of a hospital in 2017 reported a UTI prevalence of 22%, which is comparable to the UTI prevalence in the IPSS studied but higher (Bizo et al., 2021). A study conducted in nursing homes in Portugal aimed to identify and characterize the risk factors for occurring a UTI. The study obtained a UTI prevalence of 20.69%, which is higher than the prevalence obtained in this study (Araújo, 2011).

This study analyzed risk factors for UTI and found that the majority of cases occurred in women (11.7% vs. 6.4%). However, these differences were not statistically significant (p = .641). Published literature indicates that women have a higher UTI prevalence and are at a higher risk for this infection (Silva et al., 2021). The observational and retrospective study conducted in four family health-care units in Almada revealed that most UTIs occurred in women, which is consistent with the findings of this

study (Machado et al., 2022).
In terms of age, the majority of participants with UTI were aged ≥ 75 years (13.5%). However, these differences were not statistically significant (p = .269). UTIs are more likely to occur between the ages of 68 and 77, according to Machado et al. (2022). Other authors, such as Fernandes (2019) and Ribeiro et al. (2019), also report that age is a risk factor for UTI. UTIs in older people require significant attention from nurses. They often affect older individuals (Fernandes, 2019), leading to longer hospital stays, prolonged antibiotic therapy, and increased healthcare costs (Cristina et al., 2021). In some cases, these infections can even result in death.
There were more UTI cases in nursing homes and senior residences compared to the UCCI (12.9% vs. 5.3%). The statistical analysis showed that the differences were significant (p = .024). This may be due to various environmental factors, such as the cleanliness of the institution, patient hygiene measures, and education/training of nurses and healthcare assistants. Future studies could investigate potential relationships between UTI occurrence and health institutions in different areas.
In UTI cases, the majority of participants were not catheterized (87.1%), were totally dependent (48.4%), did not use diuretics as their usual therapy (61.3%), had no known history of UTI (74.2%), and were dependent on others for hygiene care (87.1%).
The literature agrees that there is a connection between UTIs and urinary catheterization (Hutton et al., 2018), so it is necessary to take preventive measures to reduce UTIs associated with these devices. However, most of the UTI cases in this investigation were not related to catheterization. This may indicate good compliance with proper urinary catheterization procedures.
Other authors also link the higher risk of UTI occurrence to the increased dependency of older people, incontinence associated with diaper use, use of diuretics, and dehydration (Silva et al., 2021). These factors should be taken into account when providing direct care to patients.
This study identified several chronic diseases in UTI cases. The most prevalent diseases were arterial hypertension, diabetes mellitus, dyslipidemia, dementia, auricular fibrillation, and BPH. Fernandes (2019) conducted a study that supports these findings. The study mentions that previous illnesses, such as diabetes and BPH, are risk factors for developing UTIs (Fernandes, 2019; Silva et al., 2021).
Knowing the prevalence and risk factors for UTIs in institutionalized older people, it is important to understand nursing interventions for prevention. These interventions include reinforcing adequate hydration of patients (Wu et al., 2020) and educating/training professionals in these institutions (Ham & Montgomery, 2021; Viner, 2020; Wu et al., 2020), promoting hand hygiene, using personal protective equipment, and implementing good practices in the insertion, maintenance, and removal of catheters, as well as reinforcing personal hygiene in patients (Ham & Montgomery, 2021; Wu et al., 2020).
This study has limitations regarding the data collection time, which was only 8 months. This may have influenced the results and the sample obtained. Future research on this topic is suggested, with a longer data collection period and a larger sample size, including other similar institutions. This may lead to more significant results regarding the risk factors for UTIs.

Conclusion

This study found a UTI prevalence of 18%, which is comparable to, but lower than, other studies on UTIs. The study examined several risk factors and the frequency of specific characteristics associated with UTI in individuals residing in IPSS. These factors include female gender, advanced age, belonging to ERPI and senior residence, dependency on ADL, chronic illnesses, and fecal incontinence. Nurses should be aware of these factors to prevent UTIs and implemente measures for preventing UTIs in patients under their care.

Authors contribution

Conceptualization: Ribeiro, A., Chaves, C., Reis, A.
Data curation: Ribeiro, A., Chaves, C., Reis, A.
Formal analysis: Ribeiro, A., Chaves, C., Reis, A.
Funding Acquisition: Chaves, C., Reis, A.
Investigation: Ribeiro, A., Chaves, C., Reis, A.
Methodology: Ribeiro, A., Chaves, C., Reis, A.
Project administration: Ribeiro, A., Chaves, C., Reis, A.
Resources: Ribeiro, A., Chaves, C., Reis, A.
Software: Ribeiro, A., Chaves, C., Reis, A.
Supervision: Ribeiro, A., Chaves, C., Reis, A.
Validation: Ribeiro, A., Chaves, C., Reis, A.
Visualization: Ribeiro, A., Chaves, C., Reis, A.
Writing – Original draft: Ribeiro, A., Chaves, C., Reis, A.
Writing – Review and editing: Ribeiro, A., Chaves, C., Reis, A.

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