Published in final edited form as:

J Nurse Pract. 2015 October ; 11(9): 903–906. doi:10.1016/j.nurpra.2015.06.008.

The Role of the Nurse Practitioner and Asymptomatic Urinary Treatments

Leslie E. Morrison-Pandy, DNP, NP-C [assistant professor],

Department of Health and Community Systems at the University of Pittsburgh School of Nursing in Pittsburgh, PA.

Carl A. Ross, PhD, FNP-BC [professor of nursing],

Robert Morris University in Pittsburgh.

Dianxu Ren, PhD [associate professor],

Center for Research and Evaluation at the University of Pittsburgh School of Nursing.

Linda Garand, PhD, GCNS-BC [associate professor]

Duquesne University School of Nursing in Pittsburgh.

Abstract

Asymptomatic urinary tract infections (aUTIs) are common among older adults in long-term care facilities (LTCFs) and studies have shown that they are inappropriately treated with antibiotics. We retrospectively characterized treatment strategies among 89 cases of aUTIs before and after a long-term facility hired a full-time nurse practitioner (NP). We found that residents with aUTIs were prescribed significantly more supportive treatment strategies after hiring an NP. However, there was no significant drop in the rate of inappropriate antibiotic treatments for aUTIs after hiring an NP.

Keywords

asymptomatic urinary tract infections; evidence-based care; long-term care facility

INTRODUCTION

Urinary tract infections (UTIs) are a common acute infection among older adults in long-term care facilities (LTCFs),¹ and studies have shown that a large proportion of these UTIs are being inappropriately treated with antibiotics.^{2–6} There are 2 types of UTIs: symptomatic UTIs (sUTIs) and asymptomatic UTIs (aUTIs). A symptomatic UTI is diagnosed when bacteria in the urine (bacteria) is 10^5 colony-forming units (CFU) per milliliter of (clean catch) of urine or $> 10^2$ CFU/mL of urine and 3 of the following symptoms: fever ($> 100^\circ\text{F}$), chills, dysuria, altered urine characteristics (eg, specificity gravity, color, hematuria), altered voiding patterns (eg, urgency), altered mental status (delirium), or suprapubic/flank pain.^{5,7}

pandy1@pitt.edu.

In compliance with national ethical guidelines, the authors report no relationships with business or industry that would pose a conflict of interest.

An aUTI diagnosis is given when there is bacteriuria ($< 10^5$ CFU/mL) in 2 consecutive urine samples and no clinical symptoms.⁷⁻⁹

Evidence-based UTI treatment guidelines for older adults indicate that antibiotics are only indicated for the treatment of sUTIs.^{5,7,10} Antibiotics are not indicated when the resident presents with bacteriuria and no symptoms (aUTIs), as colony-forming bacteria are found in 90% of elderly LTCF residents.^{7,11} Evidence-based supportive (nonpharmacologic) treatment strategies for aUTIs are similar to preventive strategies and include the consumption of cranberry juice or supplements, increasing fluid intake, and increasing voiding frequency.^{10,12,13}

Projections suggest that the number of older adults will soon exceed the number of health care professionals with the necessary knowledge and skills needed to provide geriatric-specific (complex and specialized) collaborative care.¹⁴ Along with these demographic projections, the risk associated with inappropriate antibiotic use (eg, multidrug-resistant strains of bacteria)² mandates that prescribing practitioners (nurse practitioners, physicians, and physician assistants) differentiate between sUTIs and aUTIs, both of which are associated with bacteriuria in geriatric patients.⁷

The purpose of this study is to determine whether hiring a nurse practitioner (NP) within the LTCF improves rates of evidence-based treatments for aUTIs among older adults in an LTCF. After identifying elderly LTCF residents with aUTIs, we describe their antibiotic and supportive treatments before and after hiring an NP.

METHODS

After receiving approval from the institutional review board of Robert Morris University and the LTCF board, data were retrospectively collected from infection control logs, residents' medical records, and clinical progress notes of a 178-bed LTCF. We identified residents with a diagnosis aUTI and characterized their pharmacologic (antibiotic) and supportive treatment strategies (increasing fluid intake, increasing voiding frequency, and/or drinking cranberry juice). Data were collected from June 2012 to December 2013. This time frame allowed for data collection 9 months before and 9 months after an NP was hired by the LTCF. Residents were excluded from the study if they were new to the facility (< 6 months); < 65 years old; had an indwelling urinary catheter; or were receiving hemodialysis, long-term antibiotic therapy, and/or immunosuppressive treatments or medications.

Data Analysis

Microsoft Excel software was used for the statistical analysis. To test for statistically significant differences in sample characteristics and aUTI treatment strategies after hiring an NP, Mann-Whitney *U*-tests were used for continuous data (ie, age) and Pearson's χ^2 analyses were used for categorical data (ie, gender, race, and treatment strategies).

Study Sample

The sample consisted of 40 cases of aUTIs in the 9 months before and 49 cases of aUTIs in the 9 months after hiring an NP at the LTCF. Although the residents with cases of aUTIs

ranged in age from 66 to 90 years, the typical resident with aUTI was an 80-year-old Caucasian female. There were no significant age, gender, or racial differences among residents with aUTIs before and after employing the NP at the facility (see Table 1).

Study Results

The proportion of residents being appropriately treated with evidence-based supportive treatments for aUTIs improved significantly after hiring the NP. Yet, the proportion of residents with aUTIs being inappropriately treated with antibiotics did change after hiring the NP. Although the proportion of residents with aUTIs treated with antibiotics decreased from 86.2% to 78.1% after employing the NP, this drop in inappropriate antibiotic prescribing rates was not statistically significant. On the other hand, a significant proportion of residents with aUTIs were treated with increased fluid intake (46.8%), frequent toileting schedules (45.5%), and cranberry juice or supplements (24.3%) after hiring the NP (see Table 2).

DISCUSSION

In the LTCF we studied, evidence-based guidelines for the treatment of aUTIs in older adults^{5,7} were not systematically applied. The proportion of residents aUTIs treated with supportive strategies improved significantly after the NP was hired. Yet, the proportion of residents inappropriately treated with antibiotics was not significantly reduced after employment of the NP. These findings are contrary to the literature that suggests NPs work closely with physicians and other disciplines to deliver comprehensive and appropriate care in LTCFs.^{4,15}

Study Limitations

Several limitations to the present study must be considered. First, collecting data from paper medical records (ie, resident charts) resulted in some missing information (often due to illegible writing). Also, it is difficult to generalize the results of this study to the populations of LTCFs employing NPs because we only surveyed documents from 1 LTCF that hired a single NP. Finally, our study's pre-post, descriptive design limits conclusions that can be made regarding a causal relationship between hiring an NP and evidence-based treatment of aUTIs in LTCFs.

Implications for Practice

Given the risks associated with multidrug-resistant strains of bacteria,¹⁶ it is critical that NPs differentiate between sUTIs and aUTIs, both of which are associated with bacteraemia in geriatric patients.⁷ Our findings show that hiring an NP improved the treatment of geriatric aUTIs with supportive strategies but did not influence antibiotic treatment rates for aUTIs. Evidence-based UTI treatment guidelines for older adults indicate that antibiotics are only indicated for the treatment of sUTIs.^{7,10} Antibiotics are not indicated when a resident presents with bacteraemia and no symptoms (ie, aUTIs). This is important because aUTIs are more common than sUTIs in elderly LTCF residents,¹⁷ and 78% of the residents with aUTIs in our study were prescribed antibiotics. Results of our study suggest that NPs did not collaborate with physicians and other prescribing practitioners to discontinue inappropriate

antibiotic prescriptions. Discontinuing inappropriate antibiotic treatments has the potential to lower the number of infections within a facility¹⁸ and promote the health and well-being of elderly residents with aUTIs.^{2,15}

CONCLUSION

Our study demonstrates equivocal results regarding evidence-based treatment of aUTIs in an LTCF after an NP was hired. There was no change in the number of antibiotic prescriptions for aUTIs, but there was an increase in the number of supportive (nonpharmacologic) treatments for aUTIs. It is beyond the scope of our study to address whether it was the facility's NP or the resident's physician and/or physician assistant who prescribed the antibiotics or supportive therapies for the residents with aUTIs. It is possible that the resident's physician prescribed the antibiotics and the NP prescribed the supportive therapies. It is also possible that the resident's physician or NP prescribed both or neither of the treatment types. It will be important to design further studies to determine whether inappropriate antibiotic prescriptions are discipline-specific (physician, physician assistant, or NP) so educational and/or policy strategies can be developed to address this issue. As this literature builds, it will also be important to design studies to include more than 1 LTCF and 1 NP. Our study establishes a foundation for more work in this area.

Acknowledgments

This study was supported by the Jewish Health Care Foundation.

References

1. Nicolle LE. Symptomatic urinary tract infection in nursing home residents. *J Am Geriatr Soc.* 2009;57:1113–1114. [PubMed: 19490245]
2. Rowe TA, Juthani-Mehta M. Diagnosis and management of urinary tract infection in older adults. *Infect Dis Clin N Am.* 2014;28:75–89.
3. Das R, Towle V, van Ness PH, Juthani-Mehta M. Adverse outcomes in nursing home residents with increased bacteriuria. *Infect Contr Hosp Epidemiol.* 2011;32(1):84–86.
4. Juthani-Mehta M, Drickamer MA, Towle V, Zhang Y, Tinetti ME, Quagliarello VJ. Nursing home practitioner survey of diagnostic criteria for urinary tract infections. *J Am Geriatr Soc.* 2005;53:1986–1990. [PubMed: 16274383]
5. Nicolle LE, Bradley S, Colgan R, Rice JC, Schaeffer A, Hooton TM. Infectious disease society of America guidelines for the diagnosis and treatment of asymptomatic bacteriuria in adults. *Clin Infect Dis.* 2005;40:643–654. [PubMed: 15714408]
6. Phillips CD, Adepoju O, Stone N, et al. *BMC Geriatr.* 2012;12:73. [PubMed: 23176555]
7. McGeer A, Campbell B, Emori T, et al. Definitions of infection for surveillance in long-term care facilities. *Am J Infect Contr.* 1991;19(1):1–7.
8. Buhr GT, Genao L, White HK. Urinary tract infections in long-term care residents. *Clin Geriatr Med.* 2011;27:229–239. [PubMed: 21641508]
9. Polk C, Mayfield E. Definition of colonization. Urinary Incontinence in the Long Term Care Setting. Columbia, Md: American Medical Directors Association; 2012.
10. Gradwohl SE, Bettcher CM, Chenoweth CE, Harrison RV, Zoschnick LB. Urinary tract infection. University of Michigan Health System Urinary Tract Infection Guidelines; 2013 <http://www.med.umich.edu/1info/fhp/practiceguides/uti/uti.pdf/>. Accessed December 13, 2014.
11. Nicolle LE. Urinary tract infections in the elderly. *Clin Geriatr Med.* 2009;2:423–436.

12. Jepson RG, Craig JC. Cranberries for preventing urinary tract infections. *Cochrane Database Syst Rev*. 2012;10:CD001321.
13. Diagnosing Vance J. and managing urinary tract infections. *Am Med Direct Assoc*. 2002;3:62–168.
14. Institute of Medicine. Retooling for an aging America: building the health care workforce. 2008 <http://www.iom.edu/Reports/2008/Retooling-for-an-Aging-America-Building-the-Health-Care-Workforce.aspx/>. Accessed June 17, 2012.
15. Bourbonniere M, Mezey M, Burger S, et al. Expanding the knowledge base of resident and facility outcomes of care delivered by advanced practice nurses in long term-term care: expert panel recommendations. *Policy Politics Nurs Pract*. 2009;10:64–70.
16. Nicolle LE. Antimicrobial stewardship in long term care facilities: what is effective? *Antimicrob Resist Infect Contr*. 2014;3(6):2–7.
17. Genao L, Buhr T. Urinary tract infections in older adults residing in long-term care facilities. *Ann Long-Term Care*. 2012;20(4):33–38.
18. Rummukainen ML, Jakobsson A, Matsinen M, et al. Reduction in inappropriate prevention of urinary tract infections in long term care facilities. *Am J Infect Contr*. 2012;40:711–714.

Table 1.Demographic Characteristics of the Study Sample ($N = 89$)

Characteristics	Total Sample	Pre-NP ($n = 40$)	Post-NP ($n = 49$)	Statistic	<i>P</i> -value
Age in years [mean (SD)]	79.6 (8.07)	79.6 (8.07)	78.1 (7.76)	Mann-Whitney <i>U</i> -test	.35
Gender [% (<i>n</i>)]				$\chi^2 = 0.642$	
Female	57.3% (51)	60.0% (24)	55.1% (27)		.6722
Male	42.7% (38)	40.0% (16)	44.9% (22)		
Race [% (<i>n</i>)]				$\chi^2 = 0.114$	.123
Caucasian	58.4% (52)	62.5% (25)	55.1% (27)		
African-American	36% (32)	37.5% (15)	34.6% (17)		
Other	5.6% (5)	0% (0)	10.2% (5)		

NP = nurse practitioner.

Table 2.
Correlation Between Hiring an NP and Treatment of Asymptomatic Urinary Tract Infections

Variables	Before Employment of NP	After Employment of NP	χ^2	P-value
Cranberry juice	6.90% (2)	31.25% (10)	0.0169	.0237
Frequent toileting	13.8% (4)	59.3% (19)	0.0002	.00004
Increase fluids	25.0% (7)	71.8% (23)	0.0003	.00006
Antibiotics	86.2% (25)	78.1% (25)	0.0412	.5138

NP = nurse practitioner.