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Survey of knowledge, beliefs and confidence towards infections and antimicrobial stewardship among Veterans Affairs providers who care for older adults.

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Abstract

We conducted an anonymous survey of providers who care for older adults from 10 Veterans Affairs long-term care facilities to assess their knowledge, beliefs and confidence towards treating infections and antimicrobial stewardship. The average score on 5 questions assessing knowledge was 3.6/5.0 (95% CI 3.3 - 3.9), which supports a need for education regarding the care of older adults with infections.

Keywords

antibiotic resistance; long-term care; nursing homes; infection; VA Community Living Center

Introduction

Despite guidelines for implementing antimicrobial stewardship practices in acute care hospitals, there is not yet sufficient evidence to support similar recommendations in long-term care facilities (LTCFs).¹ Antimicrobials are among the most frequently prescribed medications in LTCFs; between 25 – 75% of these prescriptions are inappropriate.² At a

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single Veterans Affairs (VA) LTCF, termed Community Living Center (CLC), expert review deemed 40% of antibiotic courses as unnecessary.³ Previous studies found that factors other than resident characteristics generate a significant amount of the variation in antimicrobial use in LTCFs.^{4,5} Differences in how LTCF providers perceive antibiotic stewardship as well as clinical experience and knowledge may account for this variation. We conducted a survey of providers from 10 VA facilities with CLCs to better understand their knowledge, beliefs and confidence in caring for older adults with potential infections and towards antimicrobial stewardship.

Methods

We developed an internet-accessible survey that assessed knowledge, beliefs and confidence about antibiotic stewardship and caring for older adults with potential infections (Qualtrics, Provo, UT). Knowledge questions were based on 5 clinical vignettes of infections common to older adults. Beliefs and confidence questions used a slider bar with a range of 1 to 100 to assess agreement with statements.

Between January and October 2013, we recruited staff from 10 VAs to participate in an educational intervention addressing the evaluation and treatment of older adults with infections. The target audience for the education was CLC providers, but any interested provider was included. Prior to the intervention, we invited but did not require participants to take the survey. Completed surveys from physicians, nurse practitioners or physician assistants were analyzed. Characteristics of those who achieved higher (4 or 5 correct answers out of 5 questions) versus lower (3 or less correct answers) knowledge scores were compared using Mann-Whitney test for continuous data or Pearson's Chi-square test for categorical data using R (version 3.0.1; Vienna, Austria).

Results

Out of 111 respondents, 89 (80%) completed the survey. Among these, 71 were providers (physicians, nurse practitioners and physician assistants), nearly half of whom (46%) primarily practiced in VA CLCs (**Table 1**). The average score on the 5-question knowledge section was 72% (3.6 out of 5 points, 95% confidence interval (CI) 3.34 - 3.89). The survey assessed providers' beliefs about multi-drug resistant organisms and antimicrobial stewardship as well as their confidence to care for older adults with common infectious syndromes (**Table 2**).

Providers were stratified into those with higher vs. lower knowledge scores; 47 (66%) scored 4 or 5 on the 5-question knowledge section and 24 (34%) scored 3 or less. Providers with higher knowledge scores indicated greater confidence to use diagnostic tests or microbiological results to narrow or stop antimicrobial therapy compared to providers with lower knowledge scores (81/100 (95%CI 75-87) vs. 71/100 (95%CI 62-80), respectively; $P<0.05$). We found no statistically significant differences between those with higher vs. lower knowledge scores based on demographic characteristics or beliefs.

Discussion

To our knowledge, this is the first survey that asks providers who care for older adults specifically about antimicrobial stewardship and care of people with potential infections. Even though each of the questions was based on current guidelines and accepted practice patterns, 32/71 (45%) providers answered 4 questions correctly and just 15/71 (21%) answered all 5 questions correctly. This finding indicates a clear need for improvement in the knowledge base for the proper use of antimicrobials in the care of older adults.

These findings validate similar outcomes from LTCFs in Nebraska that identified physician practice and compliance as the greatest perceived barrier to antimicrobial stewardship.⁶ Our results indicate that nurse practitioners and physician assistants should also be included when developing antimicrobial stewardship initiatives in the LTCF setting. An educational intervention that included physicians and nurses in Swedish LTCFs showed a decrease in total antimicrobial use over 2 years, suggesting that all clinical staff may contribute to antimicrobial stewardship initiatives.⁷ CLC providers, the intended target for the survey, comprised about one-half of the respondents. Comparison of those who do and do not practice at CLCs yielded no statistically significant differences for any measured outcomes. This suggests that survey results are applicable to providers who care for older adults across inpatient, outpatient and long-term care settings.

Providers with higher knowledge scores indicated significantly more confidence to use diagnostic tests to narrow or stop antimicrobial therapy. Modifying antimicrobial therapy based on both the patient's clinical course and results of diagnostic tests is a key component of the antibiotic "time-out" developed and endorsed by the CDC. Our results suggest that helping providers gain confidence in using and responding to diagnostic tests may improve overall use of antimicrobials and in turn, advance the practice of antimicrobial stewardship.

Our study has limitations. First, respondents came from a group of providers who agreed to participate in an educational intervention and thus represent a convenience sample. A non-response bias may influence our outcomes. Second, survey responses do not assess actual practice patterns as they relate to the care of older adults with infections or to antimicrobial stewardship. Higher scores on the knowledge portion of the survey may not correlate with antimicrobial prescribing patterns. Third, the professionals surveyed were all VA employees who practice within a healthcare system with substantial infrastructure that serves a patient population different than those seen in non-VA settings.⁸ For example, VA CLCs have mostly full-time providers and the support of a full-time infection control practitioner. This is considerably different than the model of care in most community settings where physicians spend an average of 12 hours each week at nursing homes and where paid time for infection control practitioners is 10 hours per month.^{9,10}

CONCLUSIONS

The average score of ~70% on the knowledge questions indicates a need for education regarding the care of older adults with infections; these efforts should include antimicrobial stewardship principles as a means to reduce unnecessary antimicrobial use. Specifically,

encouragement and reassurance for providers to tailor or stop therapy in response to diagnostic tests may help promote practice change.

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REFERENCES

1. Nicolle LE. Antimicrobial stewardship in long term care facilities: what is effective? *Antimicrob. Resist. Infect. Control.* 2014; 3:6. [PubMed: 24521205]
2. Nicolle LE, Bentley DW, Garibaldi R, Neuhaus EG, Smith PW. Antimicrobial Use in Long-Term-Care Facilities. *Infect. Control Hosp. Epidemiol.* 2000; 21:537–545. [PubMed: 10968724]
3. Peron EP, Hirsch AA, Jury LA, Jump RLP, Donskey CJ. Another setting for stewardship: high rate of unnecessary antimicrobial use in a veterans affairs long-term care facility. *J. Am. Geriatr. Soc.* 2013; 61:289–290. [PubMed: 23405923]
4. Mylotte JM. Antimicrobial prescribing in long-term care facilities: prospective evaluation of potential antimicrobial use and cost indicators. *Am. J. Infect. Control.* 1999; 27:10–19. [PubMed: 9949373]
5. Daneman N, et al. Antibiotic Use in Long-Term Care Facilities. *J. Antimicrob. Chemother.* 2011; 66:2856–2863. [PubMed: 21954456]
6. VanSchooneveld TV, Miller H, Sayles H, Watkins K, Smith PW. Survey of Antimicrobial Stewardship Practices in Nebraska Long-Term Care Facilities. *Infect. Control Hosp. Epidemiol.* 2011; 32:732–734. [PubMed: 21666410]
7. Pettersson E, Vernby A, Molstad S, Lundborg CS. Can a multifaceted educational intervention targeting both nurses and physicians change the prescribing of antibiotics to nursing home residents? A cluster randomized controlled trial. *J. Antimicrob. Chemother.* 2011; 66:2659–2666. [PubMed: 21893568]
8. Agha Z, Lofgren RP, VanRuiswyk JV, Layde PM. Are patients at Veterans Affairs medical centers sicker? A comparative analysis of health status and medical resource use. *Arch. Intern. Med.* 2000; 160:3252–3257. [PubMed: 11088086]
9. Caprio TV, Karuza J, Katz PR. Profile of physicians in the nursing home: time perception and barriers to optimal medical practice. *J. Am. Med. Dir. Assoc.* 2009; 10:93–97. [PubMed: 19187876]
10. O'Fallon E, Harper J, Shaw S, Lynfield R. Antibiotic and Infection Tracking in Minnesota Long-Term Care Facilities. *J. Am. Geriatr. Soc.* 2007; 55:1243–1247. [PubMed: 17661964]

Highlights

- We surveyed 71 providers from 10 VAs with long-term care facilities
- The questions asked about infections & antimicrobial stewardship for older adults
- Only 66% of providers answered 4/5 knowledge questions correctly
- These providers also indicated more confidence to narrow or stop antibiotics
- Education about infections in older adults should promote antimicrobial stewardship

Table 1**Providers' Demographic Characteristics and Knowledge Assessment**

Characteristics	No. (%) (n = 71)
Gender	
Male	18 (25%)
Practice Location	
VISN ^a -6 (North Carolina, and portions of Virginia, West Virginia and South Carolina)	29 (41%)
VISN-10 (Ohio and portions of Kentucky and Indiana)	14 (20%)
VISN-12 (portions of Wisconsin, Michigan, Illinois and Indiana)	28 (39%)
Role	
Nurse Practitioner or Physician Assistant	37 (52%)
Physician	34 (48%)
Experience in Healthcare	
< 10 years	31 (43%)
10 – 20 years	20 (28%)
>20 years	19 (26%)
Experience in Caring for Older Adults	
< 10 years	29 (41%)
10 – 20 years	18 (25%)
>20 years	24 (34%)
Clinical Service(s)	
Community Living Center	33 (46%)
General Medicine Ward	20 (28%)
Primary Care	17 (24%)
Geriatric Clinic	14 (20%)
Home Based Primary Care	6 (8%)
Other ^a	9 (13%)
Knowledge	
Mean Score	
Total Score (out of 5 questions)	3.62
Individual Questions (1 point each)	
Urinary tract infection and asymptomatic bacteriuria	0.78
Upper respiratory tract infection	0.61
Lower respiratory tract infection	0.63
Skin & soft tissue infection	0.89
<i>C. difficile</i> infection	0.70

^bspecialty clinic, administration, hospice & palliative care

^aVISN; Veterans Integrated Service Network

Table 2**Providers' Beliefs and Confidence Regarding Antimicrobial Stewardship**

Characteristic	All Respondents (n = 71)	Knowledge Score ^a		P-value ^b
		Lower (n = 24)	Higher (n = 47)	
Beliefs on scale of 1 - 100 (disagree completely to agree completely); 95% CI ^c				
Multi-drug resistant organisms are a growing concern in my practice	87 (82 - 91)	87 (82 – 93)	86 (81 - 92)	0.42
Antimicrobial stewardship is the norm on my unit	64 (58 - 70)	66 (57 - 75)	63 (55 - 70)	0.77
It can be hard to make antimicrobial stewardship a priority	51 (44 - 58)	43 (31 - 54)	55 (47 - 63)	0.08
Pharmaceutical companies will make new, effective antimicrobials	22 (17 - 27)	22 (11 - 32)	22 (16 - 28)	0.56
Infection control is more important than antimicrobial stewardship to prevent acquisition of multi-drug resistant pathogens	52 (44 – 60)	45 (30 - 59)	56 (46 - 65)	0.20
I have little control as to whether my patients acquire multi-drug resistant pathogens	27 (22 - 33)	22 (13 - 30)	30 (23 - 38)	0.17
Only very vulnerable patients acquire multi-drug resistant pathogens	19 (14 - 24)	17 (10 - 24)	20 (13 - 27)	0.97
Confidence on scale of 1 - 100 (rarely confident to always confident), 95% CI				
Start empiric therapy for suspected infections	73 (71 – 78)	74 (68 – 81)	75 (70 – 79)	0.79
Determine the length of therapy for suspected infections	76 (73 – 80)	77 (68 – 82)	74 (73 – 81)	0.59
Distinguish a urinary tract infection from asymptomatic bacteriuria	74 (69 - 77)	72 (63 - 80)	75 (69- 80)	0.78
Determine if pneumonia is caused by bacteria or a virus	58 (52 - 63)	56 (44 - 66)	58 (52 - 65)	0.85
Use diagnostic tests or microbiological results to narrow or stop antimicrobial therapy	77 (73 - 83)	71 (62 - 80)	81 (75 - 87)	0.03

^a Lower scores are 3/5; higher scores are 4/5.

^b Compares those with lower vs. higher knowledge scores.

^c CI, Confidence Interval