

## CONCISE COMMUNICATION

## Infections in Australian Aged-Care Facilities: Evaluating the Impact of Revised McGeer Criteria for Surveillance of Urinary Tract Infections

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Our survey of 112 Australian aged-care facilities demonstrated the prevalence of healthcare-associated infections to be 2.9%. Urinary tract infections (UTIs) defined by McGeer criteria comprised 35% of all clinically defined UTIs. To estimate the infection burden in these facilities where microbiologic testing is not routine, modified surveillance criteria for UTIs are necessary.

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Residential aged-care facility (RACF) residents are at risk of developing healthcare-associated infections (HAIs) for many reasons, including advanced age, comorbidities, functional disabilities, immunosuppression, and use of invasive devices.<sup>1–4</sup> In 1991, to standardize the identification of HAIs within RACFs, McGeer et al<sup>5</sup> published surveillance definitions specific to these facilities.<sup>5</sup> These were revised in 2012,<sup>6</sup> including new requirements for clinical and microbiologic criteria to fulfill the case definition for urinary tract infection (UTI).

To estimate the prevalence of HAIs and antibiotic use within long-term aged-care facilities, the European Center for Disease Prevention and Control conducted the first European point prevalence survey (PPS) in 2010.<sup>7</sup> In 2011, an equivalent survey was performed in rural Australian RACFs in the state of Victoria. This survey was repeated in 2012 and 2013, and revised McGeer definitions were applied in 2013.

In Australian RACFs, urinary tract, respiratory tract, skin, soft-tissue, and mucosal infections have been shown to comprise the majority of HAIs. Limited use of microbiology testing has also been demonstrated, possibly related to difficulty obtaining clinical specimens from confused or debilitated residents, the clinical significance of culture results being difficult to interpret, insufficient access to diagnostic laboratories, and/or costs.<sup>8</sup> The impact of using the revised McGeer definition for UTI upon HAI surveillance in Australia has not been evaluated.

The objectives of this 2014 PPS were (1) to estimate the prevalence of HAIs, (2) to review the utility of microbiology testing for HAIs, and (3) to evaluate the impact of a revised case-definition for UTI upon prevalence estimates in Victorian RACFs.

### METHODS

#### Study Population

The Rural Infection Control Practice Group (RICPRAC) represents Victorian infection control practitioners (ICP) employed in rural public health services, including 146 RACFs operated by state government. All members were invited to participate in the current study. Although not actively recruited, participation by ICPs working in the metropolitan 28 RACFs operated by state government was also permitted. Eligible residents were those who resided full-time in the RACF for  $\geq 48$  hours and were present on the survey day. In Victoria, RACFs provide continuous supported care ranging from assistance with personal care and daily tasks to 24-hour nursing care.

#### Survey Tool and Data Collection

Using resident medical records, data were collected by ICPs on a single day between July 1 and August 31, 2014. Prior to data collection, ICPs were educated regarding uniform methodology, and a study coordinator was available to assist (via telephone) on the survey day. A facility survey was completed for each participating RACF, including the total number, age, and sex of residents. A resident survey was completed for residents identified by ICPs or RACF clinical staff and confirmed by ICPs as having an HAI on the survey date.

#### Definitions

Presumed and confirmed UTIs were classified according to 3 case definitions: (1) revised McGeer clinical and microbiologic criteria met, (2) revised McGeer clinical (not microbiologic) criteria met, and (3) revised McGeer microbiologic (not clinical) criteria met.

Bloodstream infections, gastrointestinal tract infections, respiratory tract infections (RTIs), skin, soft-tissue, or mucosal infections, as well as unexplained fever were defined according to the revised McGeer definitions.<sup>6</sup> HAIs were reported if not already present at the time of admission to the RACF. The prevalence of HAIs was calculated by dividing the number of residents having  $\geq 1$  HAI by the total number of surveyed residents.

### RESULTS

#### Participating Facilities

Overall, 3,741 residents in 112 RACFs (99 rural, 13 metropolitan) participated in the PPS, corresponding to 64.4% of all state-government-operated RACFs in Victoria. The median number of eligible residents at participating RACFs was

28.5 (range, 7–110), the median proportion of residents aged >85 years was 52.3% (range, 0–89.3%), and the median proportion of male residents was 35.1% (range, 3.6–79.3%).

### Hospital-Associated Infections

Using the revised McGeer definition, 109 residents had at least 1 HAI, corresponding to a crude prevalence of 2.9% (95% confidence interval [CI] 2.4%–3.5%). In total, 111 HAIs were identified, with 2 residents having 2 infections. The most frequently reported HAIs were skin, soft-tissue, or mucosal infections (44.1%) and RTIs (38.7%) (Table 1). Of the 109 residents with an infection, 32 (29.4%) had a clinical specimen collected for microbiological testing.

### Urinary Tract Infections

In total, 14, 26, and 5 residents met case definitions A, B, and C, respectively. The majority of these residents (97.8%) were prescribed antibiotic therapy for a UTI (Table 2). Case definition A accounted for 31.1% of all UTIs. Of those that fulfilled the clinical criteria alone (case definition B), 53.9% (14 of 26) did not undergo microbiological testing, 19.2% (5 of 26) were tested but organism(s) cultured did not meet the microbiologic criteria threshold, 15.4% (4 of 26) were tested and cultured negative, and 11.5% (3 of 26) were tested but results were unavailable. As a composite clinical measure, combining case definitions A and B resulted in an estimated crude prevalence of 3.6% (135 of 3,741; 95% CI, 3.0%–4.3%).

TABLE 1. Healthcare-Associated Infections in Victorian RACF Residents (2014)

Healthcare-Associated Infection <sup>a</sup>	No.	%
Skin, soft tissue or mucosal infections	49	44.1
Cellulitis/soft tissue/wound infection	35	
Scabies	0	
Fungal infections (oral, perioral or skin)	4	
Herpes virus skin infection	0	
Conjunctivitis	7	
Not otherwise specified	3	
Respiratory tract infection	43	38.7
Common cold syndromes/pharyngitis	7	
Influenza-like illness	2	
Pneumonia	10	
Bronchitis/tracheobronchitis	20	
Not otherwise specified	4	
Urinary tract infection	14	12.6
Indwelling catheter	1	
Non-indwelling catheter	13	
Gastrointestinal tract infection	4	3.6
Unexplained fever	1	0.9
Bloodstream infection	0	0
Total	111 <sup>b</sup>	100

<sup>a</sup>All infections were defined according to revised McGeer criteria.<sup>6</sup>

<sup>b</sup>Two residents had two infections (109 residents with 111 HAIs).

### DISCUSSION

Our study is the largest in Australia to apply standardized methodology to estimate HAI prevalence in RACFs. This study supports the national agenda concerning monitoring of antimicrobial use and resistance to improve safety and clinical outcomes in the aged-care setting.<sup>9</sup> HAI prevalence was 2.9%, which is lower than but still comparable to estimates provided in 2013 by Victorian and international studies: 3.3% (unpublished data) and 3.4%,<sup>10</sup> respectively. Using revised McGeer definitions, skin, soft-tissue, and mucosal infections and RTIs were most frequently identified.

The estimated prevalence of UTIs is influenced significantly by the surveillance case definition employed. In particular, we observed that a large proportion of presumed UTIs (68.9%) did not meet the revised McGeer definition, mostly the microbiologic criteria (57.8%). If the objective of surveillance is to monitor the burden of illness, including impact upon resources and antimicrobial prescribing, a broader case definition would be more appropriate to capture cases of confirmed and presumed UTI.

We have demonstrated the feasibility of an annual PPS tool in Australian RACFs using internationally accepted methodology. Given the need for enhanced monitoring of HAIs in non-acute healthcare settings, we propose that this tool could provide quality indicators for Australian RACFs. Historically, HAIs have been regarded as important performance indicators within acute-care facilities,<sup>11</sup> and a similar framework could be adopted within RACFs. Standardized reporting of HAIs allows identification of potential processes for policy development and formulation of targeted clinical guidelines. Furthermore, standardized reporting would facilitate comparison of baseline and post-intervention outcomes for individual RACFs implementing prevention programs.

The strengths of our study include the application of internationally accepted HAI definitions to facilitate international comparisons and longitudinal evaluation by participating RACFs.

Some limitations of our study include the potential seasonality of some HAIs. The PPS was performed during winter months, which may have particularly influenced RTI prevalence. Although a large number of public RACFs participated, this study did not include non-government-operated RACFs and therefore may not be generalizable to other RACF types. Given that not all eligible facilities participated in the study, data may be influenced by selection bias. Data quality was dependent upon documentation in resident records. We acknowledge that incomplete and/or missing clinical details may contribute to the underestimation of HAIs.

Given the low uptake of microbiologic testing in Australian RACFs, it may be beneficial for future PPSs to measure the utility of microbiologic testing and to incorporate the assessment of clinically significant HAIs to ensure that UTI prevalence is not underestimated. Antibiotic prescribing practices for UTIs could also be used to apply a more sensitive case

TABLE 2. Comparison of Urinary Tract Infections (UTI) Identified by 3 Case Definitions

Category	UTI Case Definition	Cases (No.)	No. (%) Receiving Antibiotics for UTI
A (confirmed)	Revised McGeer clinical and microbiologic criteria	14	14 (100)
B (presumed)	Revised McGeer clinical criteria only	26	25 (96.2)
C (presumed)	Revised McGeer microbiologic criteria only	5	5 (100)
Total		45	44 (97.8)

definition, and therefore an estimated prevalence that is more closely aligned with clinical practice.

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