

Urinary Tract Infection Investigation and Treatment in Older Adults Presenting to the Emergency Department with Confusion: a Health Record Review of Local Practice Patterns



Rhiannan A. M. Pinnell, BSc¹, Tim Ramsay, PhD², Han Wang, MD³, Pil Joo, MDCM^{2,3}

¹Faculty of Medicine, University of Ottawa, Ottawa, ON; ²Ottawa Hospital Research Institute, Ottawa, ON;

³Department of Family Medicine, University of Ottawa, Ottawa, ON, Canada

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ABSTRACT

Background

The rate of urinary tract infection (UTI) investigation and treatment in confused older emergency department (ED) patients has not been described in the literature. We aim to describe the pattern of practice in an academic tertiary care ED for this common presentation.

Methods

A health record review was conducted on 499 adults aged ≥ 65 presenting to academic EDs with confusion. Exclusion criteria: Glasgow Coma Scale < 13 , current treatment for UTI, indwelling catheters, nephrostomy tubes, transfer from another hospital. Outcomes were the prevalence of UTI investigation, diagnosis and antibiotic treatment.

Results

64.9% received urine tests, 11.4% were diagnosed with UTI, and 35.2% were prescribed antibiotics. In the subgroup with no urinary symptoms, fever, or other obvious indication for antibiotics, these numbers were 58.2%, 7.6%, and 18.1%, respectively. Patients who had urine tests or received antibiotics were older than those who did not (p values $< .01$). Patients receiving antibiotics had higher admission rates and 30-day and six-month mortality (OR of 2.9 [2.0–4.3], 4.0 [1.6–11], and 2.8 [1.4–5.8], respectively).

Conclusion

Older patients presenting to ED with confusion were frequently investigated and treated for UTI, even in the absence of urinary symptoms. Antibiotic treatment was associated with higher hospitalization and mortality.

Key words: urinary tract infection, asymptomatic bacteriuria, confusion

INTRODUCTION

Diagnosing urinary tract infections (UTI) in older adults in the emergency department (ED) is challenging. Although there are several consensus guidelines for UTI diagnosis and treatment, such as the McGeer (original and revised) and Loeb criteria, these were formulated for the long-term care setting.^(1–4) Currently there is no universal definition of UTI in older adults in the ED.⁽⁵⁾ Since it is difficult to assess urinary symptoms in confused patients, and the first formulation of the McGeer criteria included a change in mental status, cognitive changes often prompt physicians to consider UTI as a diagnosis and initiate urinary tests.^(2,3) This is an especially common dilemma since confusion is present in 10–30% of older adults presenting to the ED.⁽⁶⁾ Currently, however, the number and quality of studies showing associations between UTI and confusion are limited, and no randomized controlled trials have been conducted.^(7,8) Additionally, studies have shown that non-specific symptoms, such as a change in mental status, do not substantially increase the likelihood of a bacterial infection in the ED.⁽⁹⁾ A recent systematic review therefore concluded that the current body of evidence cannot determine whether confusion is correlated with UTI.⁽⁸⁾

Additionally, 10–20% of seniors living in the community, and 25–40% of those living in long-term care facilities have asymptomatic bacteriuria (ASB).^(5,10) Thus, bacteriuria in older patients presenting with confusion may only indicate the presence of pre-existing ASB, rather than true UTI.⁽¹¹⁾ The challenges in distinguishing UTI from ASB in older adults are relevant because previous studies have shown no morbidity or mortality benefit, as well as side effects and increased antibiotic resistance, when ASB is treated.^(12,13)

Given the lack of clear guidelines and potential misdiagnosis of ASB as UTI, the appropriate conditions under which to investigate for UTI in older adults remain unclear. Nevertheless, older patients appear to be frequently diagnosed with, and treated for, UTI without symptoms^(14,15) or positive urine

culture.⁽¹⁶⁾ In other studies, UTI has been found to be the most or second most common indication for antibiotic prescription in the population of older adults in nursing homes.^(17–19) Guidelines from the Association of Medical Microbiology and Infectious (AMMI) Disease and the Infectious Diseases Society of America (IDSA) therefore recommend that patients with a change in mental status but no other signs of infection be thoroughly investigated for other causes rather than concluding the confusion is due to bacteriuria.^(20,21)

There remains a paucity of data regarding ED practice patterns surrounding UTI in older adults who present with confusion. No such data were published from any Canadian EDs to our knowledge. To date, studies have reported on nursing home and inpatient UTI care patterns, the appropriateness of UTI investigation and treatment in older adults,^(14,15,22–25) ED patterns of UTI investigation in young patients,⁽²⁶⁾ and ED antibiotic prescription for UTI in all older women.⁽¹⁶⁾ The last of these found that only one-third of patients diagnosed with UTI had urinary symptoms, and that many presented with confusion instead, but the study did not specifically investigate this link.⁽¹⁶⁾ Our study aimed to quantify the rate at which older adults who present to ED with confusion receive urine tests, are diagnosed with UTI, and receive antibiotics. We hypothesized that older adults with confusion are regularly investigated for, diagnosed with, and treated for UTI even when urinary symptoms are absent.

METHODS

Study Design, Setting and Population

This was a cross-sectional retrospective health record review of adults aged 65 or older presenting to two EDs of an academic tertiary-care hospital in Ottawa, Ontario from January 15th to July 30th, 2018. These EDs have a combined 180,000 annual visits. The Ottawa Hospital's Data Warehouse identified charts for patients with an ED triage tracking chief complaint of "altered level of consciousness," "bizarre behaviour," "confusion," "paranoid behaviour," or "violent behaviour." In addition, patient encounters with an ED tracking chief complaints of "UTI complaints" were reviewed to identify additional patients presenting with confusion, delirium, or similar. In our clinical experience, older patients (or family) may report presumed UTI as the chief complaint rather than the actual confusional state that the patient is experiencing. Patients who presented repeatedly to the emergency department within the study period were only included once, on their first visit. Patients who had been transferred between or within hospitals were excluded because it was not possible to determine which investigations had already been performed. Patients with a Glasgow Coma Scale less than 13 were also excluded, as this could preclude assessment of urinary symptoms and may indicate other moderate-to-severe brain pathologies outside the scope of this study.⁽²⁷⁾ Additionally, patients with any of the following conditions were excluded: left without being seen, current treatment for UTI, indwelling catheters, nephrostomy tubes or anuria. The study

was approved by the Research Ethics Board of The Ottawa Hospital Research Institute.

Protocol

As this was an observational and descriptive study, no sample size calculation was performed. We arbitrarily chose to review all patients within the first seven months of 2018. An electronic standardized data abstraction form was created and further refined using encounters from January 1 to January 15, 2018. Study data were collected on 1,039 encounters from January 15, 2018 to July 30, 2018. A code book for the data abstraction form was used to ensure consistency. One trained researcher (RP) extracted age, sex, and documented presence of infectious signs and symptoms. The abstractor also captured whether a urine test was performed and whether antibiotics were ordered or prescribed. Patient outcomes including hospitalization, *Clostridium difficile* infection or return to hospital within 30 days, and 30-day and six-month mortality were recorded. When any data were unclear, the record was reviewed by a second researcher (PJ) and decisions made by consensus during periodic meetings. A random sample of 50 included charts (10%) was re-abstracted by a third independent reviewer (HW) to assess inter-rater agreement using Cohen's kappa statistics.

Definitions

Fever was defined as a temperature of 38.0°C or higher. Classic UTI symptoms were defined as frequency, urgency, dysuria, hematuria, suprapubic tenderness or CVA tenderness (adapted from the Loeb criteria).⁽¹⁾ Urinalysis included point of care, laboratory and microscopic urinalysis. We defined urinalysis to be positive if point of care or laboratory urinalysis showed trace or greater amounts of blood or leukocyte esterase, or positive nitrites, or if microscopic urinalysis was flagged for red blood cells, white blood cells, or bacteria. Urine culture was categorized as positive if the final culture report was positive or indicated contamination. "Urine test" refers to both urinalysis and urine culture. Hematuria in urinalysis and contamination in urine culture were categorized as positive in order to maximize the negative predictive values of these tests.

Outcomes

The primary outcome was the proportion of patients who received urine tests, UTI diagnosis, and antibiotic treatment. Secondary outcomes included correlations between presenting symptoms, demographic factors and the rate of urine testing, and the association between antibiotic prescription and negative outcomes (*C. difficile* infection, admission to hospital, return to hospital within 30 days, 30-day and six-month mortality).

These analyses were repeated for a subset of patients who had no classic UTI symptoms, no fever, and no other ED infectious disease diagnoses, which was identified as the "asymptomatic subgroup". In this subgroup, any urine investigation and antibiotic treatment was presumed to be for suspected UTI based on confusion alone. The list of

diagnoses which potentially require antibiotics is included in the Appendix, Table A1.

Data Analysis

Descriptive statistics were calculated using means and standard deviation for continuous variables and proportions for categorical variables. The statistical significance of differences between subgroups was tested with *t*-tests for continuous variables and Fisher's exact test between categorical variables. Odds ratios and relative risks were reported where appropriate. Logistic regression analysis was performed to assess associations between antibiotics and patient outcomes. Cohen's kappa statistics were calculated for inter-rater agreement. All statistical analyses were performed in R.⁽²⁸⁾

RESULTS

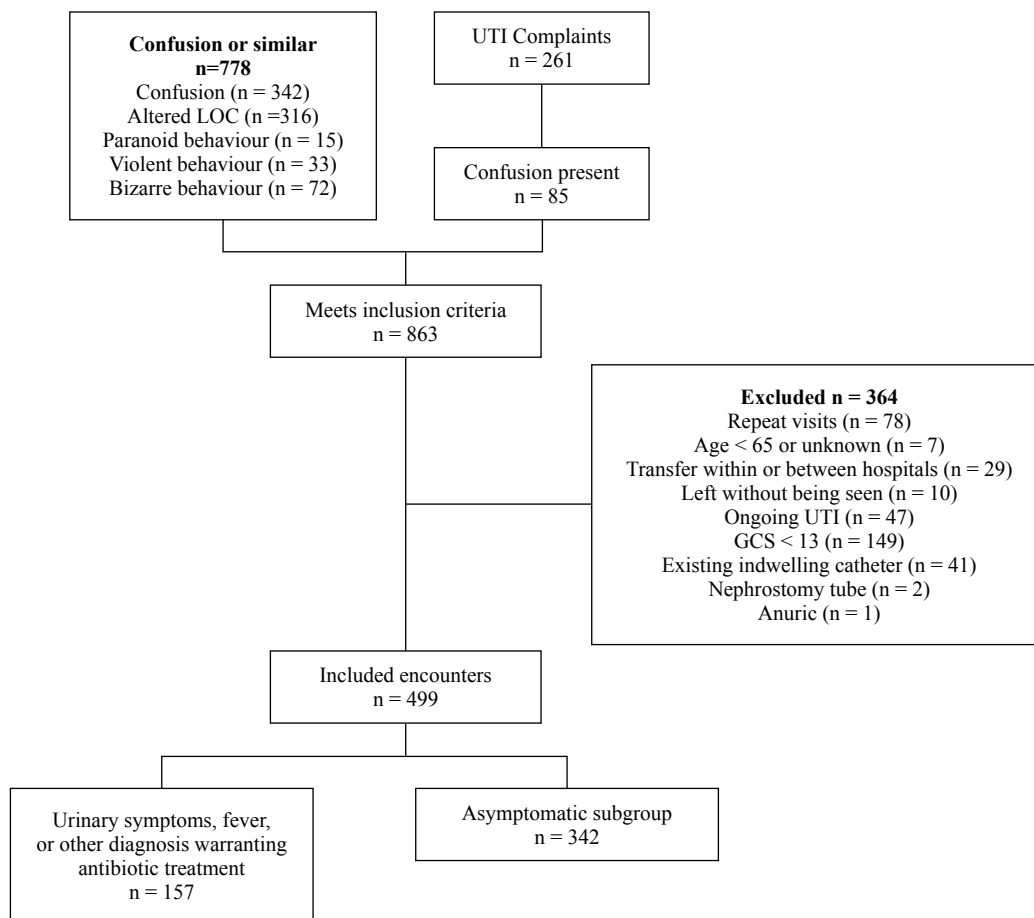
The study flow diagram is illustrated in Figure 1. Data warehouse identified 1,039 eligible encounters during the study period. From this, 540 encounters were excluded, leaving 499 in the final analysis. Of these patients, 157 had UTI symptoms, fever or a diagnosis other than UTI warranting antibiotics. The asymptomatic subgroup consisted of the remaining 342

patients (68.5% of total encounters) who had none of these three criteria. Other demographic and clinical features of these patients are presented in Table 1.

Among all included encounters, 64.9% (95% CI: 60.6–69.1%) had a urine test, 11.4% (8.8–14.5%) had an ED diagnosis of UTI, and 35.2% (31.1–39.6%) received antibiotics (Table 2). In the asymptomatic subgroup, these numbers were 58.2% (52.8–63.4%), 7.6% (5.0–10.9%), and 18.1% (14.1–22.6%). Kappa values for urine testing ($\kappa=1$), UTI diagnosis ($\kappa=0.90$), antibiotic prescription ($\kappa=0.95$), and inclusion in the asymptomatic subgroup ($\kappa=0.85$) were high, suggesting excellent agreement between data abstractors.

Among those who had any urine test performed, 21.3% had one or more UTI symptom (Table 3). Among those who received a UTI diagnosis and those who received antibiotics, 40.3% and 23.3% had UTI symptoms, respectively. Urinalyses and urine cultures were positive in 62.5% and 34.1% of patients receiving antibiotics, respectively. The presence of frequency, urgency, dysuria, suprapubic tenderness, change in urine quality, fever or chills was more likely to prompt urine tests than absence of such symptoms (Table 4).

Patients who had urine tests tended to be older than those who did not (82.4 yrs, SD=8.4 vs. 78.3 yrs, SD=8.8, *p* value



LOC = level of consciousness; UTI = urinary tract infection; GCS = Glasgow Coma Scale.

FIGURE 1. CONSORT study flow diagram

TABLE 1.
Demographic characteristics and clinical features of included charts

	All Patients (N=499)	Asymptomatic Subgroup ^a (N=342)
Age (mean, [standard deviation])	81.0 [8.8]	80.5 [8.8]
Female	277 (55.5%)	191 (55.8%)
Living arrangement		
Independent	261 (52.3%)	173 (50.6%)
Retirement home	78 (15.6%)	59 (17.3%)
Long-term care	86 (17.2%)	59 (17.3%)
Unknown/unclear	74 (14.8%)	51 (14.9%)
UTI symptoms	75 (15.0%)	
Fever	48 (9.6%)	
Other diagnosis warranting antibiotic treatment	105 (21.0%)	
Complications		
Admission	270 (54.1%)	166 (48.5%)
Return to ED within 30 days	43 (8.6%)	29 (8.5%)
30-day mortality	21 (4.2%)	13 (3.8%)
6-month mortality	37 (7.4%)	23 (6.7%)
<i>C. difficile</i> within 30 days	2 (0.4%)	0

^aAsymptomatic subgroup = patients with no urinary symptoms, fever, or other infectious diagnosis.

UTI = urinary tract infection; ED = emergency department; *C. difficile* = *Clostridium difficile*.

TABLE 2.
Prevalence of urine testing, UTI diagnosis, and antibiotic prescription in older adults presenting to the ED with confusion

	All Patients (N=499) N (%)	Asymptomatic Subgroup ^a (N=342) N (%)
Urine Test	324 (64.9%)	199 (58.2%)
UTI diagnosis	57 (11.4%)	26 (7.6%)
Antibiotics	176 (35.2%)	62 (18.1%)

^aAsymptomatic subgroup = patients with no urinary symptoms, fever, or other infectious diagnosis.

UTI = urinary tract infection; ED = emergency department.

TABLE 3.
Frequency of UTI symptoms and urinalysis or culture positivity among patients receiving UTI investigation, UTI diagnosis, and antibiotics

	Patients With Urine Test Performed (N=324)	Patients With UTI Diagnosis (N=57)	Patients Who Received Antibiotics (N=176)	Patients in the Asymptomatic Subgroup ^a Who Received Antibiotics (N=62)
UTI symptom present	69 (21.3%)	23 (40.3%)	41 (23.3%)	
Positive urinalysis	212 (65.4%)	56 (98.2%)	110 (62.5%)	42 (67.7%)
Positive urine culture	86 (26.5%)	39 (68.4%)	60 (34.1%)	30 (48.4%)
UTI symptom and positive urine culture	24 (7.4%)	12 (21.1%)	18 (10.2%)	
Meets Loeb criteria	32 (9.9%)	6 (10.5%)	22 (12.5%)	

^aAsymptomatic subgroup = patients with no urinary symptoms, fever, or other infectious diagnosis.

UTI = urinary tract infection.

<.001). By contrast, there was no significant difference in the rate of urine tests between sexes (*p* value = .13) or hospital campuses (*p* value = .85). Similarly, patients who received antibiotics tended to be older than those who did not (82.5 yrs, SD=8.6 vs. 80.1 yrs, SD=8.7, *p* value <.01), but there was no difference between sexes (*p* value = .19) or hospital campuses (*p* value = .35).

We observed higher rates of admission and mortality among those who received antibiotic treatment both in the entire cohort and in the asymptomatic subgroup (Table 5). In the asymptomatic subgroup where antibiotics are presumably given for suspected UTI based on confusion, odds ratios (95% CI) for admission, and 30-day and six-month mortality were 2.7 (1.5–4.9), 3.8 (1.1–12.2), and 2.7 (1.03–6.6), respectively, after adjusting for age and sex. There was no statistically significant association between antibiotic use and prevalence of return to ED within 30 days. There were only two cases of positive *Clostridium difficile* assays within 30 days of presentation among all cases (one in a patient who did and one who did not receive antibiotics), and no further statistical analysis was performed.

DISCUSSION

This is the first Canadian cross-sectional investigation describing the current prevalence of UTI investigation, diagnosis, and treatment in confused older patients in the ED. Our results suggest that such patients are often investigated for UTI and receive antibiotics, even in the absence of urinary symptoms. Almost two-thirds of patients in this study—including 58% of those with no urinary symptoms, fever or other infectious diagnosis—received a urine test. One-third of all patients received antibiotics, including 18% of patients in the asymptomatic subgroup.

The proportion of asymptomatic patients who received antibiotics in our study (18%) was slightly lower than the 27% of confused patients treated for ASB in a previous study involving in-patients.⁽²⁵⁾ This variation may be due to the shorter time course of ED treatment, as 35–40% of the

TABLE 4.
Relative risk of UTI investigation in patients with potential UTI symptoms or signs (vs. absence of the symptom)

<i>Symptom</i>	<i>Number of Symptomatic Patients</i>	<i>Relative Risk of Urinalysis [95% CI]</i>	<i>P Value</i>
Frequency	45	1.42 [1.25 – 1.61]	<.001
Urgency	12	1.56 [1.46 – 1.67]	.01
Dysuria	19	1.57 [1.47 – 1.68]	<.001
Suprapubic tenderness	22	1.43 [1.23 – 1.65]	.01
Change in urine quality	30	1.48 [1.31 – 1.66]	<.001
Subjective fever	36	1.36 [1.17 – 1.58]	.01
Measured fever	13	1.56 [1.46 – 1.67]	.01
Chills	16	1.36 [1.12 – 1.66]	.05
Incontinence	42	1.11 [0.91 – 1.36]	.36
Nausea	56	0.93 [0.74 – 1.16]	.48
Vomiting	38	0.93 [0.71 – 1.21]	.55
Hematuria	6	1.31 [0.91 – 1.88]	.32

UTI = urinary tract infection.

TABLE 5.
Association of antibiotic treatment and complications after adjusting for age and sex

	<i>All Patients (N=499) OR [95% CI]</i>	<i>Asymptomatic Subgroup^a (N=342) OR [95% CI]</i>
Admission	2.9 [2.0-4.3]	2.7 [1.5-4.9]
30-day return visit ^b	1.25 [0.6-2.7]	0.7 [0.1-2.3]
30-day mortality	4.0 [1.6-10.8]	3.8 [1.1-12.2]
6-month mortality	2.8 [1.4-5.8]	2.7 [1.03-6.6]

^aAsymptomatic subgroup = patients with no urinary symptoms, fever or other infectious diagnosis.

^bAmong those not admitted.

patients treated for ASB in the in-patient study received their treatment after the first week of admission.⁽²⁵⁾

Our results suggest that many patients are receiving urine tests and UTI diagnoses without any urinary symptoms, and many of them would not meet Loeb criteria.^(1,4) Urinary symptoms were present in only 21% of patients receiving urine tests and 40% of patients receiving UTI diagnosis. This was similar to previous studies reporting the prevalence of symptoms in patients diagnosed with UTI to be 43–53%.^(9,29) Only 10% of patients receiving UTI diagnosis met the Loeb criteria. This suggests that the majority of confused older adults receiving urine tests and subsequent antibiotic treatment are being treated for ASB (or presumed UTI) as a causative factor for confusion, a practice which is not supported by the literature and current guidelines.^(1,3,9,10,12,20,21) Additionally, although the majority of patients receiving antibiotics had positive urinalysis in the ED, only approximately half of them later had a positive urine culture. This is comparable to previous studies which suggest that positive urinalysis has a specificity of only 45–70%.^(30–32)

Finally, we found that antibiotic prescription in this population was associated with more admissions and deaths, regardless of whether the patient had UTI symptoms or other reasons for antibiotics. An association between antibiotics and poor outcomes was also reported in a previous cohort study, which showed worse functional recovery for older delirious in-patients treated for ASB.⁽²⁵⁾ There are several possible explanations for this finding. Antibiotic prescription may reflect worse baseline status and correlate with worse outcomes for this reason. Older age was a positive predictor for both urine testing and subsequent antibiotic prescription. However, even when adjusted for age and sex, antibiotic prescription had statistically significant correlation with hospital admission and mortality. This may point to a possible independent and causal risk of antibiotic prescription due to side effects or increased antibiotic resistance which are known to worsen patient outcomes.^(11,33,34) These results lend support to the AMMI and IDSA recommendations that indiscriminate urine testing be avoided to limit false positives and treatment associated harms.^(20,21) A randomized controlled trial in older adults in the ED is required to distinguish any causative link between antibiotic treatment for UTI and patient outcomes.

Limitations

This study has several limitations. First, we were not able to ascertain that patients included in the study had delirium as opposed to other causes, such as underlying cognitive impairment, because they were not screened for delirium with any validated instrument. However, our goal was to describe ED practice patterns for patients who present with a complaint of undifferentiated confusion or similar, not just those with delirium. The lack of screening for delirium, or any formal assessment of confusion, also precludes assessment of any association between antibiotic treatment and resolution of confusion in this study. Second, we are only able to report on

documented signs and symptoms. Some patients may have had urinary symptoms which were not elicited, not documented in the health record, or not ascertainable due to the patient's confusion. Additionally, it was sometimes unclear whether documented symptoms were acute or chronic. Documentation of patient temperatures was also inconsistent, which may have altered the number of patients in the asymptomatic subgroup. Third, it was at times unclear whether investigations were ordered by emergency physicians or by consulting services. For this reason, our results may reflect the broader practice within the hospital and may not necessarily be specific to the ED. Fourth, as this is a retrospective observational study, all associations between patient management and outcomes do not imply causality. Additionally, even if the final diagnosis is non-infectious, it is possible that patients may have received antibiotics for an indication other than presumed UTI. Finally, observations in this study were limited to two large Canadian academic EDs and may not be generalizable to other settings.

CONCLUSION

In this health record review of ED management of older adults presenting with confusion, we found that 64.9% of patients received urine tests, 11.4% were diagnosed with UTI, and 35.2% received antibiotics. Amongst those with no urinary symptoms, fever or other infectious diagnosis, these numbers were 58.2%, 7.6%, and 18.1%, respectively. These findings suggest that UTI investigation and treatment for presumed UTI is common in this population. Additionally, patients who received antibiotics had higher rates of hospitalization and death, even after adjusting for age and sex. Further study is required to establish the benefits and harms of UTI investigation and subsequent antibiotic treatment in older patients presenting with confusion.

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CONFLICT OF INTEREST DISCLOSURES

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Correspondence to: Dr. Pil Joo, MDCM, Department of Family Practice, The Ottawa Hospital, Civic Campus, 1053 Carling Ave., Ottawa, ON K1Y 4E9
E-mail: pjoo@toh.ca

APPENDICES

TABLE A1.

List of infectious diagnoses vs. non-infectious diagnoses, showing the list of the emergency department final diagnoses that we deemed of infectious origin or potentially requiring antibiotics, and those we deemed to be of non-infectious, and thus not requiring an antibiotic treatment, along with commonly used abbreviations. The diagnoses are reported verbatim as written on the medical records.

<i>Infectious Diagnoses or Those Which May Potentially Require Antibiotics</i>	
Acute diarrhea	Acute kidney injury
Acute or chronic diarrhea	Afib
Bronchitis	Aggressive behaviour resolved
<i>C. difficile</i> recurrence	Agitation
Cellulitis	Alcohol intoxication
COPD exacerbation	Alprazolam withdrawal
Delirium, confusion, infectious source vs serotonin syndrome vs. NMS vs. viral	Altered mental status NYD
Dermatitis	Amnesia resolved
Diabetic foot ulcer	Amnesic event NYD
Erysipelas	Anemia
Febrile neutropenia	Anxiety
Fever NYD	Assault
Functional decline secondary to sacral ulcer	Asymptomatic bacteriuria
Gangrene	Atrial tachycardia
Hepatic encephalopathy	Auditory hallucinations
Infected hepatohydrothorax	Back to baseline
Influenza	Behaviour changes of dementia
Lower respiratory tract infection	Behaviour support secondary to dementia
Pneumonia	Behavioural change
Pneumosepsis	Benign paroxysmal positional vertigo
Post op infection	Bifascicular block
Pyelonephritis	Bilateral pleural effusion
R/O <i>C. difficile</i>	Bizarre behaviour
Sepsis	Blurred vision NYD
Severe COPD	Bowel obstruction
Soft tissue/leg ulcer infection	BPSD
Systemic inflammatory response syndrome	Bradycardia
Urosepsis	Brain lesion
Viral illness	Brain metastasis
	Brain tumor
	Brainstem stroke
	Cannabis overdose/CBD oil
	Cardiac arrest
	Caregiver burnout
	Colon cancer
	Complete heart block
	Concussion
<i>Non-Infectious Diagnoses</i>	
3rd degree heart block	
Accidental ingestion	
Acute confusional state	
Acute coronary syndrome	

PINNELL: UTI INVESTIGATION IN OLDER ADULTS

<i>Non-Infectious Diagnoses (continued)</i>	
Confusion (resolved)	Hyperglycemic hyperosmotic state
Confusion NYD	Hypernatremia
Congestive heart failure	Hypertension
Constipation	Hyperthyroid
Cranial nerve palsy	Hypocalcemia
Critical limb ischemia	Hypoglycemia
CVA	Hypomania
CVS bleed	Hypothyroid
Death	Intoxication/alcohol
Decreased level of awareness	Intra-abdominal process
Decreased LOC	Intracerebral hemorrhage
Dehydration	Intracranial hemorrhage
Delirium	Intracranial mass
Delirium secondary to medications	Left against medical advice
Delusional disorder	Lethargy NYD
Dementia	Likely lung cancer
Depression	Lithium toxicity
Diabetic ketoacidosis	Liver cirrhosis
DVT/PE	Loss of consciousness
Elder neglect	Low O ₂
Elevated troponins	Lung mass
Encephalopathy	Major depression
ETOH abuse	Mania
Exhaustion	Medication non-compliance
Failure to cope	Medication side effect
Failure to thrive	Memory change
Fall	Memory problems
Gait difficulties	Meningioma
Gate palsy	Metastatic breast cancer
Generalized weakness	Micturition syncope
Geri-psych	Migraine
Global amnesia	Migraine
Hallucinations	Minor head injury
Hallucinations NYD	MSK leg pain
Heart failure	MSK pain
Heat exhaustion	MVC no injuries
Hematuria	Myocardial infarction
Hip contusion	Neck pain
Hip fracture	Neurocognitive with psychosis
Hyperglycemia	NMS
	Non-organic delusional disorder decompensation

<i>Non-Infectious Diagnoses (continued)</i>	
Non-STEMI	Severe dehydration
Normal pressure hydrocephalus	Shin pain
Old infarcts	Situational crisis
Opiate reaction	SOB
Opioid toxicity	SOB NYD
Orthostatic hypotension	Social issues
Oversedation with Benadryl	Soft tissue injury
Palliation	Spell
Panic attack	STEMI
Paranoia	Stroke
Paranoid behaviour	Subarachnoid hematoma
Paranoid delusions	Subdural hematoma
Parasomnia	Subdural hematoma
Parkinson's hallucinations	Syncope
Polydrug overdose	Tachypnea NYD
Polypharmacy	Tension headache
Postural hypotension – medication related	Terminal illness
Prednisone induced cognitive change	TGA
Presyncope	TIA
Progression of Parkinson's	Transient altered LOC
Progressive decline	Transient drowsiness likely secondary to napping
Psychosis	Transient global amnesia
Psychotic depression	Transient unresponsive NYD
Pulmonary edema, CHF exacerbation	Tumour lysis syndrome
Radiation pneumonitis	Uremia
Resolved mutism NYD	Uremic encephalopathy
Rhabdomyolysis	Urinary retention
Right forearm hematoma	Vasovagal
Right wrist fracture	Violent behaviour
Schizoaffective disorder	Vomit NYD
Schizophrenia	Vulvar cancer
Seizure	Weakness NYD

C. difficile = *Clostridium difficile*; COPD = chronic obstructive pulmonary disease; NMS = neuromuscular syndrome; R/O = rule out; NYD = not yet diagnosed; BPSD = behavioural and psychological symptoms of dementia; CBD = Cannabidiol; CVA = cerebrovascular accident; CVS = cerebrovascular system(?); LOC = loss of consciousness; DVT = deep vein thrombosis; PE = pulmonary embolism; ETOH = ethanol; MSK = musculoskeletal; MVC = motor vehicle collision; STEMI = ST elevation myocardial infarction; CHF = congestive heart failure; SOB = shortness of breath; TGA = transient global amnesia; TIA = transient ischemic attack.