ORIGINAL RESEARCH

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

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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]

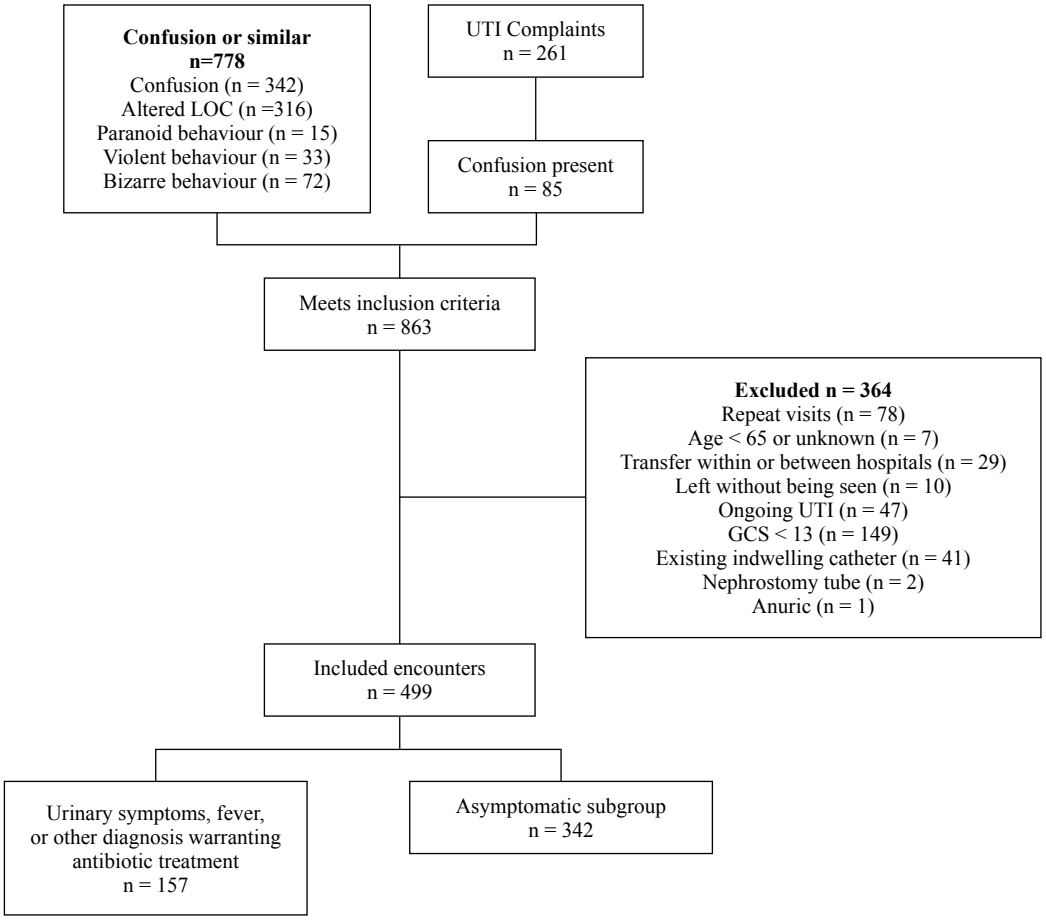
## RESULTS

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 (κ=1), UTI diagnosis (κ=0.90), antibiotic prescription (κ=0.95), and inclusion in the asymptomatic subgroup (κ=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%) |
| *C. difficile* within 30 days | 2 (0.4%) | 0 |

[a]Asymptomatic 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%) |

[a]Asymptomatic subgroup = patients with no urinary symptoms, fever, or other infectious diagnosis.
UTI = urinary tract infection; ED = emergency department.

<.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 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%) | |

[a]Asymptomatic subgroup = patients with no urinary symptoms, fever, or other infectious diagnosis.
UTI = urinary tract infection.

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

| *Symptom* | *Number of Symptomatic Patients* | *Relative Risk of Urinalysis [95% CI]* | *P Value* |
|---|---|---|---|
| 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

| | *All Patients (N=499) OR [95% CI]* | *Asymptomatic Subgroup[a] (N=342) OR [95% CI]* |
|---|---|---|
| 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] |

[a]Asymptomatic subgroup = patients with no urinary symptoms, fever or other infectious diagnosis.
[b]Among 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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## 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.

| *Infectious Diagnoses or Those Which May Potentially Require Antibiotics* |
|---|
| Acute diarrhea |
| Acute or chronic diarrhea |
| Bronchitis |
| *C. difficile* recurrence |
| Cellulitis |
| COPD exacerbation |
| Delirium, confusion, infectious source vs serotonin syndrome vs. NMS vs. viral |
| Dermatitis |
| Diabetic foot ulcer |
| Erysipelas |
| Febrile neutropenia |
| Fever NYD |
| Functional decline secondary to sacral ulcer |
| Gangrene |
| Hepatic encephalopathy |
| Infected hepatohydrothorax |
| Influenza |
| Lower respiratory tract infection |
| Pneumonia |
| Pneumosepsis |
| Post op infection |
| Pyelonephritis |
| R/O *C. difficile* |
| Sepsis |
| Severe COPD |
| Soft tissue/leg ulcer infection |
| Systemic inflammatory response syndrome |
| Urosepsis |
| Viral Illness |

| *Non-Infectious Diagnoses* |
|---|
| 3rd degree heart block |
| Accidental ingestion |
| Acute confusional state |
| Acute coronary syndrome |
| Acute kidney injury |
| Afib |
| Aggressive behaviour resolved |
| Agitation |
| Alcohol intoxication |
| Alprazolam withdrawal |
| Altered mental status NYD |
| Amnesia resolved |
| Amnesic event NYD |
| Anemia |
| Anxiety |
| Assault |
| Asymptomatic bacteriuria |
| Atrial tachycardia |
| Auditory hallucinations |
| Back to baseline |
| Behaviour changes of dementia |
| Behaviour support secondary to dementia |
| Behavioural change |
| Benign paroxysmal positional vertigo |
| Bifascicular block |
| Bilateral pleural effusion |
| Bizarre behaviour |
| Blurred vision NYD |
| Bowel obstruction |
| BPSD |
| Bradycardia |
| Brain lesion |
| Brain metastasis |
| Brain tumor |
| Brainstem stroke |
| Cannabis overdose/CBD oil |
| Cardiac arrest |
| Caregiver burnout |
| Colon cancer |
| Complete heart block |
| Concussion |

| *Non-Infectious Diagnoses (continued)* |
|---|
| Confusion (resolved) |
| Confusion NYD |
| Congestive heart failure |
| Constipation |
| Cranial nerve palsy |
| Critical limb ischemia |
| CVA |
| CVS bleed |
| Death |
| Decreased level of awareness |
| Decreased LOC |
| Dehydration |
| Delirium |
| Delirium secondary to medications |
| Delusional disorder |
| Dementia |
| Depression |
| Diabetic ketoacidosis |
| DVT/PE |
| Elder neglect |
| Elevated troponins |
| Encephalopathy |
| ETOH abuse |
| Exhaustion |
| Failure to cope |
| Failure to thrive |
| Fall |
| Gait difficulties |
| Gate palsy |
| Generalized weakness |
| Geri-psych |
| Global amnesia |
| Hallucinations |
| Hallucinations NYD |
| Heart failure |
| Heat exhaustion |
| Hematuria |
| Hip contusion |
| Hip fracture |
| Hyperglycemia |
| Hyperglycemic hyperosmotic state |
| Hypernatremia |
| Hypertension |
| Hyperthyroid |
| Hypocalcemia |
| Hypoglycemia |
| Hypomania |
| Hypothyroid |
| Intoxication/alcohol |
| Intra-abdominal process |
| Intracerebral hemorrhage |
| Intracranial hemorrhage |
| Intracranial mass |
| Left against medical advice |
| Lethargy NYD |
| Likely lung cancer |
| Lithium toxicity |
| Liver cirrhosis |
| Loss of consciousness |
| Low O2 |
| Lung mass |
| Major depression |
| Mania |
| Medication non-compliance |
| Medication side effect |
| Memory change |
| Memory problems |
| Meningioma |
| Metastatic breast cancer |
| Micturition syncope |
| Migraine |
| Migraine |
| Minor head injury |
| MSK leg pain |
| MSK pain |
| MVC no injuries |
| Myocardial infarction |
| Neck pain |
| Neurocognitive with psychosis |
| NMS |
| Non-organic delusional disorder decompensation |

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