Investigation and treatment of asymptomatic bacteriuria in older patients with delirium: a cross-sectional survey of Canadian physicians

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Abstract

Objectives Current guidelines suggest assessing non-infectious causes and careful observation before giving antibiotics to delirious patients with asymptomatic bacteriuria. Our study aims to describe the current practice of Canadian physicians regarding the investigation and treatment of asymptomatic bacteriuria in delirious older patients (aged ≥ 65 years).

Methods Our team of medical experts designed and reviewed a cross-sectional online survey. Study participants were physicians who conduct their clinical practice in Canada and care for older patients with delirium in their current practice. Potential study participants were reached through Canadian associations: Canadian Geriatrics Society, the Canadian Association of Emergency Physicians, the Association des Médecins d'Urgence du Québec and members of Choosing Wisely Canada.

Results 297 physicians were included. The main results show 79.4% of our participants request a urine dipstick or urinalysis in delirious patients and 52.4% immediately order a urine culture with the urinalysis. If bacteriuria is found in delirious but afebrile patients without urinary symptoms, 38% of physicians immediately treat with antibiotics, 33.8% wait for culture before initiating treatment, 14.4% treat if no other cause is found for delirium and only 13.7% would refrain from giving antibiotics. Results from respondents were similar for delirious patients with known cognitive impairment. Participants were almost unanimous (92.5%) in saying they need clear guidelines regarding the treatment of bacteriuria in older delirious patients.

Conclusions This survey highlights the heterogeneous clinical management of asymptomatic bacteriuria in delirious patients and the need for clear guidelines for patients.

Keywords Delirium · Asymptomatic bacteriuria · Geriatric

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Résumé

Objectifs Les directives actuelles suggèrent d'évaluer les causes non infectieuses et de procéder à une observation attentive avant d'administrer des antibiotiques aux patients délirants présentant une bactériurie asymptomatique. Notre étude vise à décrire la pratique actuelle des médecins canadiens concernant l'investigation et le traitement de la bactériurie asymptomatique chez les patients âgés délirants (âgés ≥ 65 ans).

Méthodes Notre équipe d'experts médicaux a conçu et examiné une enquête transversale en ligne. Les participants à l'étude étaient des médecins qui exercent leur pratique clinique au Canada et qui soignent des patients âgés atteints de délire dans leur pratique actuelle. Les participants potentiels à l'étude ont été contactés par le biais d'associations canadiennes: Société Canadienne de Gériatrie, l'Association Canadienne des Médecins d'Urgence, l'Association des Médecins d'Urgence du Québec et les membres de Choisir avec soin (Choosing Wisely Canada).

Résultats 297 médecins ont été inclus. Les principaux résultats montrent que 79,4% de nos participants demandent une bandelette urinaire ou une analyse d'urine chez les patients délirants et 52,4% demandent immédiatement une culture d'urine avec l'analyse d'urine. En cas de découverte d'une bactériurie chez des patients délirants mais afébrile sans symptômes urinaires, 38% des médecins traitent immédiatement avec des antibiotiques, 33,8% attendent la culture avant de commencer le traitement, 14,4% traitent si aucune autre cause n'est trouvée pour le délire et seulement 13,7% s'abstiendraient de donner des antibiotiques. Les résultats des répondants étaient semblables chez les patients délirants ayant une déficience cognitive connue. Les participants étaient presque unanimes (92,5%) à dire qu'ils avaient besoin de lignes directrices claires concernant le traitement de la bactériurie chez les patients délirants plus âgés.

Conclusions Cette étude met en évidence la prise en charge clinique hétérogène de la bactériurie asymptomatique chez les patients délirants et la nécessité de lignes directrices claires pour les patients.

Clinician's capsule

What is known about the topic?

Although a possible link has been established between urinary tract infection and delirium, there is no evidence associating asymptomatic bacteriuria and delirium.

What did this study ask?

We asked what the current practice of Canadian physicians is when investigating and treating asymptomatic bacteriuria in delirious older patients.

What did this study find?

We found that clinical management of asymptomatic bacteriuria in the delirious patient was highly heterogeneous and a majority of our respondents did not follow the recommendations.

Why does this study matter to clinicians?

This study highlights the need for clear guidelines for delirious patients.

medication, dehydration, and constipation, to name a few [2–4]. Assessing symptoms for older patients with delirium may be difficult and physicians often conduct extensive investigations to determine the cause [3, 4]. However, these multiple investigations sometimes lead to unexpected results [5].

Bacteriuria is considered asymptomatic in patients who show no symptoms suggesting a urinary tract infection, whether pyuria is present or not [6]. A 3.5% prevalence of asymptomatic bacteriuria was found in the general population. However, this number increases to 11–16% in women over 70 years of age and ranges between 4 and 19% in men from the same age group [6]. The misconception that any bacteriuria is harmful may lead to potentially inappropriate treatment [7–9]. A 2015 systematic review found that treating asymptomatic bacteriuria led to no clinical benefit [7]. Treatment should be reserved for urinary tract infection defined as bacteriuria with symptoms such as increased urinary frequency, urgency, dysuria, and suprapubic pain [10, 11]. However, these symptoms are often non-specific [12, 13]. Variable presentation and broad diagnoses, such as acute cystitis and acute pyelonephritis, make urinary tract infection a difficult and potentially critical diagnosis in older patients [14].

Although a possible link has been established between urinary tract infections and delirium, there is currently no evidence to associate asymptomatic bacteriuria with delirium [12, 15]. No studies have justified the use of antibiotic treatment to decrease the duration or severity of delirium

Introduction

Delirium is defined as an acute onset of confusion with a fluctuating course and is a common geriatric syndrome in older adults (aged 65 years and over) [1]. The etiologies of delirium are multifactorial and include infections, pain,

[16, 17]. Antibiotic use should be carefully monitored to avoid antimicrobial resistance and adverse effects in older and potentially frail patients. Current guidelines suggest assessing other causes and careful observation before giving antibiotics to delirious patients [6].

This gray area leads to a knowledge gap for physicians. Our study aimed to describe the current practice of Canadian physicians regarding the investigation and treatment of asymptomatic bacteriuria in delirious older patients.

Methods

Study design and participants

We performed a cross-sectional survey of Canadian family physicians, geriatricians, emergency physicians, internists, infectious disease specialists, and residents, between January 20 and March 1, 2020. Included physicians had to (1) conduct their clinical practice in Canada, (2) be able to speak French or English and (3) care for older patients with delirium in their current practice.

Survey distribution

The survey was distributed via the following widely known Canadian organizations: the Canadian Geriatrics Society (CGS) (350 members), the Canadian Association of Emergency Physicians (CAEP) (1525 members), the Association des Médecins d'Urgence du Québec (AMUQ) (1200 members), Choosing Wisely Canada (250 members) and was also distributed to colleagues working in the network of Université Laval (50 members). The survey was distributed using the modified Dillman method [18]. Members of these associations received an introduction email, which explained the study objective and contained a link to the online REDCap survey. Three reminders (2-week interval) were sent by CAEP and AMUQ. CGS and Choosing Wisely were only able to send the invitation once.

We used a convenience sample for this study due to ethical and confidentiality reasons, as the targeted medical associations are not allowed to share their members' contact information. This study was approved by the CHU de Québec-Université Laval Research Ethic Board.

The survey

The online survey (see online supplemental material) was designed by the study authors (AL & ME). The pilot survey was distributed to a steering committee consisting of four physicians from different specialties (geriatric care, family physician, and emergency physicians). This committee

assessed the survey's construct validity, content validity, and face validity and lead to the final version [19]. Both versions (French and English) were reviewed by bilingual medical experts (MÉ, CM, PJ & KY).

The first question ensured that the participants met our inclusion criteria. The survey was then divided into four distinct sections. The first section aimed to describe the participants' initial assessment of the delirious patient. The second section contained case scenarios with afebrile patients without urinary symptoms to determine the participants' standard management of patients depending on their mental and cognitive status. The third section assessed first-choice antibiotics and antibiotic treatment objectives for delirious patients. An optional text box gave flexibility to physicians should they wish to provide other ideas. The fourth section allowed physicians to express their opinion regarding the possible association between bacteriuria and delirium. Clinical cases, based on a study by Juthani-Metha et al. were created to assess whether low-grade fever or confusion influenced clinical management [20]. Participants were then questioned on whether or not they thought recommendations for the treatment of the delirious patient with asymptomatic bacteriuria were needed. Socio-demographic information was also collected.

Data analysis

Descriptive statistics were computed for socio-demographic characteristics, investigations and decisions for treatment. Intra-rater reliability was assessed with cross tables. Means and proportions were calculated when appropriate. We used two-sided chi-square for categorical variables. Thematic content analysis was performed for qualitative information from text boxes. Statistical analyses were completed using IBM SPSS Statistics 25 software.

Results

The survey was sent to approximately 3375 physicians across Canada and 301 responded to the survey. Five of those respondents did not meet our inclusion criteria and were therefore removed from our analyses, leaving us with a sample of 296 participants. The majority of our participants were primary care physicians: 114 (38.6%) family physicians, 147 (49.8%) emergency physicians and 10 (3.4%) residents of these specialties. Most of our respondents were from Quebec (48.8%) and Ontario (26.1%). Over 50% of our participants had more than 10 years of clinical experience and 45.6% were working in an academic teaching hospital. 69.6% of physicians cared for delirious patients on a regular

Table 1 Description of the population (n=296)

Characteristics	%
<i>Province (n=296)</i>	
Quebec	48.8
Ontario	26.1
Alberta	9.2
British Columbia	7.1
Manitoba	3.1
Nova Scotia	3.1
Saskatchewan	0.7
P-E-I	0.7
Newfoundland and Labrador	0.7
Northern Territories	0.3
Yukon	0.3
New Brunswick	0
Nunavut	0
<i>Specialty (n=293)</i>	
Emergency medicine	49.8
Family physicians	40.3
Geriatrician	4.4
Resident	3.4
Internal medicine	1.4
Infectious disease specialist	0.7
<i>Years in practice (n=292)</i>	
< 10	47.6
10–19	22
≥ 20	29.1
<i>Settings of practice (n=294)</i>	
Academic teaching hospital	45.6
Community / District general hospital: teaching	38.1
Community / District general hospital: non-teaching	13.3
Long-term care facilities	3.1
<i>Frequency investigating delirium</i>	
A few times a year	6.1
A few times a month	24.3
Each week	69.6

basis (at least once a week). Table 1 shows our participants' full sociodemographic characteristics.

Testing patients with delirium for urinary tract infection was found to be a common practice: 79.4% of our participants revealed they at least frequently request a urine dipstick or urinalysis in delirious patients and 52.4% immediately order a urine culture with the urinalysis (Fig. 1). If bacteriuria is found in delirious but afebrile patients who show no urinary symptoms, 38% of physicians immediately treat with antibiotics, 33.8% wait for culture before initiating treatment and 14.4% treat if no other cause is found for delirium, whereas only 13.7% would refrain from giving antibiotics (Fig. 2a). Our results were similar for delirious afebrile patients with known cognitive impairment (Fig. 2b). Our thematic content analyses revealed that some of our participants felt uncomfortable leaving bacteriuria untreated in delirious patients as they cannot be sure patients are asymptomatic.

The clinical cases section of our survey revealed that 92.4% of our participants did not treat a positive urinalysis or urine culture if the patient has no fever and normal mental status. They were more inclined to treat if the patient has an altered mental status with no fever (59.8%) or has a low-grade fever with a normal mental status (62.8%). If there was fever and altered mental status, almost all physicians choose to treat the positive urinalysis/urinary culture (Table 2).

Cross tabs were performed to validate internal consistency comparing clinical cases responses with the initial questions regarding the treatment of bacteriuria. For patients with delirium, data was consistent for 89.8% of answers.

In terms of treatment, antibiotic choice by physicians is described in Table 3. As per the Quebec provincial guideline from *Institut national d'excellence en santé et services sociaux* (INESSS), 80.2% of our participants chose a first-line agent and 19.8% preferred a second-line treatment for patients with bacteriuria and delirium [21]. 84% of our respondents used the same approach regardless of the patient's sex. To understand the reasons for treating bacteriuria in patients with delirium, various treatment objectives

Fig. 1 Assessment with urine dipstick or urinalysis in delirious patients (N=296)

Fig. 2 Decision for treating bacteriuria in afebrile patients without urinary symptoms in (A) delirious patient and (B) patient in delirium but known for cognitive impairment

Table 2 Case scenarios about giving antibiotics to patients with a positive urinalysis/culture, no urinary symptoms and A, B, C, D

Clinical scenario	No %	Yes %
(A) No fever and normal mental status	94	6
(B) No fever and altered mental status	39	61
(C) Low fever and normal mental status	36	64
(D) Low fever and altered mental status	4	96

were proposed to physicians. They agreed with the following: to treat an infection (83.3%), reduce the duration of delirium (64.5%), resolve urinary symptoms for comfort (55.3%) and avoid progression to pyelonephritis (60.6%). The aim of reducing the intensity of delirium symptoms was more controversial with only 47.3% of physicians who

Table 3 Choice of first-line antibiotics for bacteriuria in delirious patient ($N=282$)

Antibiotics	%
<i>First-line</i>	
Nitrofurantoin (Macrobid)	35.8
Trimethoprim-sulfamethoxazole (Bactrim or Septra)	17.0
Cephalexin (Keflex)	10.6
Fosfomycin (Monurol)	8.5
Amoxicillin/clavulanic acid (Clavulin)	5.0
Cefixime	3.2
<i>Second-line</i>	
Ciprofloxacin (Cipro)	13.8
Ceftriaxone	5.3
Levofloxacin (Levaquin)	0.7

agreed. Thematic content analyses showed that 17 physicians also mentioned feeling pressure from family or colleagues to treat bacteriuria in delirious patients.

When asked if asymptomatic bacteriuria could cause delirium, 159 (55.6%) answered negatively, 47 (16.4%) were uncertain and 80 (28%) agreed with this statement. Bacteriuria in an afebrile patient with a new onset of confusion and no urinary or systemic symptoms were defined by 47% of physicians as a urinary tract infection and the other 53% as an asymptomatic bacteriuria. 92.5% of our participants mentioned they need clear guidelines regarding the treatment of bacteriuria in older delirious patients.

Discussion

Interpretation of findings

This is the first Canadian cross-sectional survey assessing the current practice of a multidisciplinary group of physicians with regards to the investigation and antibiotic treatment of older delirious patients with asymptomatic bacteriuria. Our results show that the majority of physicians screen for urinary tract infection, even though almost half of them do not immediately order a urinary culture. Two out of five physicians will treat patients using antibiotics, nearly half will wait for culture or other investigations but are more likely to treat rather than observe if no other cause is found. Almost all respondents agree that specific guidelines would be useful for the management of the delirious patient with bacteriuria.

Most physicians agreed on the proposed objectives for treating the delirious patient with bacteriuria except for reducing the intensity of symptoms of delirium. Furthermore, several participants mentioned feeling a lot of pressure from other health professionals and the patient's family about treating asymptomatic bacteriuria for different reasons. This outside pressure should be taken into account and could partially explain the observed difference between practice and recommendation.

Comparison to previous studies

Current available guidelines provide conflicting information regarding the screening of delirious patients for bacteriuria. The Canadian Coalition for Seniors' Mental Health suggests screening with urinalysis in contrast to the AMMI and Public Health Ontario, who suggest assessing other possible causes of confusion instead [4, 22, 23]. Several studies recommend against the treatment of asymptomatic bacteriuria in delirious patient because the harm treatment might cause may outweigh the benefits [8, 12, 24]. For patients with delirium, current guidelines from the IDSA suggest careful

observation rather than antibiotic treatment [6]. This strong recommendation is, however, mostly based on low-quality evidence which may negatively impact physician adherence and may explain the 10% discrepancy found in our participants' responses.

A 2014 meta-analysis concluded that the strength of the association between urinary tract infection and delirium is modest at best [16]. This lack of evidence may explain why physicians' responses are so mixed when asked if they believe asymptomatic bacteriuria can cause delirium. This uncertainty is also present for the definition of urinary tract infection or asymptomatic bacteriuria for bacteriuria in afebrile patient with a new onset of confusion and no urinary or systemic symptoms.

Strengths and limitations

Our study has limitations. First, our response rate is unknown because our survey was distributed through medical associations, from which some physicians may hold more than one membership. Indeed, associations were not allowed to share their members' contact information. We assumed that it was very unlikely that physicians took the time to answer this survey more than once. In addition, not all physicians hold memberships to our chosen associations, which may limit our results. Non-response bias needs to be considered in this type of study. Furthermore, our limited number of participants in different specialties did not allow us to perform stratified analyses.

However, our study has several non-negligible strengths. First, our survey was built and validated by a team of experienced clinician-scientists. Our anonymous nationwide survey let respondents express their thoughts without being influenced by others. Another strength is the large range of experience of our participants, half of whom were in their first years of practice and the other half were more experienced. Our validation of internal consistency using clinical cases reinforces the results of our study.

Clinical implications

Our study found that clinical management of older delirious patients with asymptomatic bacteriuria is highly heterogeneous in Canada. Physicians were clear, they need guidelines for treating asymptomatic bacteriuria. This lack of guidelines could imply unnecessary procedures and antibiotics for already fragile patients, as well as sub-optimal use of resources.

Research implications

The literature on the treatment of asymptomatic bacteriuria for delirious patients is scant. This survey highlights the

difference in management by Canadian physicians. Clinical trials should be performed to evaluate if antibiotics for asymptomatic bacteriuria have a real clinical impact, like decreasing the number and severity of delirium symptoms or faster delirium recovery.

Conclusion

Our results highlight the heterogeneous clinical management of asymptomatic bacteriuria in delirious patients. Screening for urinary tract infection with urinalysis in delirious patients is a common practice, and most of our respondents preferred antibiotic treatment despite current recommendations, which suggest observation. Pressure from other health professionals or family members who request treatment may influence the decision. Clear guidelines are needed for delirious older patients with asymptomatic bacteriuria [5].

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s43678-021-00148-1>.

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Availability of data and material Available upon reasonable request.

Declarations

Conflicts of interest None.

Ethics approval The CHU de Québec-Université Laval Research Ethics Board approved this study (#2020–4911).

Consent to participate Responding to the survey questions constituted a consent to participate, as stated in the information page preceding the survey itself.

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