



THIS OPTIMAL USAGE GUIDE IS PROVIDED FOR INFORMATION PURPOSES ONLY AND SHOULD NOT REPLACE THE JUDGMENT OF A PROFESSIONAL. The scientific content of this guide was developed in collaboration with the Association des pharmaciens des établissements de santé du Québec (A.P.E.S.).

## GENERAL POINTS

In 2010, among the elderly living in long-term care facilities (LTCFs):

- 41% were over 85 years old (MSSS, 2010);
- 68% suffered from severe loss of autonomy (MSSS, 2010);
- 60% to 80% were affected by some form of cognitive impairment (MSSS, 2010).

► **Infection management in this population should always be adapted to the level of care determined by the physician after a consultation with the patient or the patient's representative. The availability of laboratory tests, variability of medical coverage and capacity to administer IV antibiotics should also be considered.**

## FACTORS ASSOCIATED WITH GREATER SUSCEPTIBILITY TO INFECTIONS AND COMPLICATIONS

- Decreased immune defences associated with age
- Protein-energy undernutrition
- Medications (antibiotics, immunosuppressants, steroids) and polymedication
- Decreased cognitive and physical abilities
- Recent hospital stay
- Comorbidities (cancer, diabetes, COPD, dysphagia)
- Peripheral vascular disease
- Increased risk of exposure to pathogens
- Confinement to bed, immobility
- Presence of exogenous material (catheter, dentures, prostheses, etc.)
- Proximity to other residents, and staff movements between patient care units

## INFECTION DIAGNOSIS

### MAIN CLINICAL FEATURES THAT MAY INDICATE THE PRESENCE OF INFECTION

- **Fever** or hypothermia (temperature sometimes normal)
- Failure to cooperate with staff
- May be atypical and nonspecific: delirium, agitation, lethargy, falls, loss of autonomy when performing activities of daily living (ADLs) decreased food intake and hydration
- May be nonexistent in very old or severely impaired subjects

### FEVER IN ELDERS LIVING IN LONG-TERM CARE FACILITIES

- Temperature higher than 37.8°C when taken orally
- More than two oral temperature readings over 37.2°C, or 37.5°C rectally
- More than two oral temperature readings at least 1.1°C over the baseline oral temperature (which may be lower than 37.2°C in elderly patients)

## MOST COMMON INFECTIOUS CAUSES OF FEVER

CAUSES	PREDISPOSITIONS	PREVENTION PRINCIPLES
<b>Viral infections</b>	<ul style="list-style-type: none"> <li>• Endemic period (influenza)</li> </ul>	<ul style="list-style-type: none"> <li>• Refer to the public health protocol</li> <li>• Vaccinations: against influenza, recommended on an annual basis</li> </ul>
<b>Bacterial respiratory tract infections (pneumonia)</b>	<ul style="list-style-type: none"> <li>• COPD</li> <li>• Weakened gag reflex</li> <li>• Dysphagia</li> <li>• Poor oral hygiene</li> </ul>	<ul style="list-style-type: none"> <li>• Vaccinations: against <i>pneumococcus</i>, recommended at least once during lifetime</li> <li>• Place the patient in a half-sitting position (30 degrees)</li> <li>• Maintain good oral hygiene</li> </ul>
<b>Urinary tract infections (pyelonephritis)</b>	<ul style="list-style-type: none"> <li>• Diabetes</li> <li>• Incomplete bladder emptying</li> <li>• Presence of a urinary catheter</li> <li>• Fecal incontinence/constipation</li> </ul>	<ul style="list-style-type: none"> <li>• Long-term prophylactic antibiotic therapy not recommended due to unproven effectiveness and an increase in microbial resistance</li> <li>• Limit the use of permanent urethral catheters<sup>1</sup>: <ul style="list-style-type: none"> <li>• Establish a bladder-voiding schedule</li> <li>• Promote hydration</li> <li>• Up to 40% could be unnecessary (used to control incontinence or monitor diuresis)</li> <li>• When possible, choose intermittent catheterization over permanent catheters</li> </ul> </li> </ul>
<b>Skin and soft-tissue infections (cellulitis, wound superinfection, pressure ulcer)</b>	<ul style="list-style-type: none"> <li>• Diabetes</li> <li>• Protein-energy undernutrition</li> <li>• Poor skin health (maceration, dryness)</li> <li>• Immobility, confinement to bed</li> <li>• Increased skin fragility</li> <li>• Edema (peripheral vascular disease)</li> <li>• MRSA carrier</li> </ul>	<ul style="list-style-type: none"> <li>• Limit the severity of the peripheral edema (use of diuretics or compression stockings, elevation of the extremities)</li> <li>• Frequent repositioning of bedridden patients</li> <li>• Protection of skin integrity</li> <li>• Nutritional status optimization</li> </ul>
<b>Gastrointestinal infections (<i>Clostridium difficile</i>-associated diarrhea)</b>	<ul style="list-style-type: none"> <li>• Recent antibiotic treatment</li> <li>• Chemotherapy</li> <li>• Gastrointestinal surgery</li> <li>• Enteral nutrition</li> <li>• Inadequate hygienic practices</li> <li>• Recent hospital stay</li> </ul>	<ul style="list-style-type: none"> <li>• <b><i>Clostridium difficile</i>-associated diarrhea:</b> <ul style="list-style-type: none"> <li>• <b>Avoid</b> using antibiotics over a long period (avoid chronic use, define duration of treatment based on the indication)</li> <li>• <b>Stop</b> ongoing antibiotic treatment if initially asked cultures are negative and if there is a clinical correlation</li> <li>• Isolation is recommended for patients presenting with <i>Clostridium difficile</i>-associated diarrhea</li> <li>• Using probiotics is <b>not recommended</b> for now, due to the lack of supporting clinical data concerning its effectiveness</li> </ul> </li> </ul>

1. Refer to the health care facility protocol in effect.

## FACTORS ASSOCIATED WITH GREATER SUSCEPTIBILITY TO ADVERSE REACTIONS

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Increased frailty</li> <li>• Digestive disorders, disruption of intestinal flora</li> </ul> | <ul style="list-style-type: none"> <li>• Polymedication</li> <li>• Decreased renal or hepatic functions</li> </ul> |
|--|--|

## RISKS ASSOCIATED WITH THE USE OF ANTIBIOTICS IN THE ELDERLY

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• Antibiotic resistance</li> <li>• Drug interactions</li> </ul> | <ul style="list-style-type: none"> <li>• Adverse reactions</li> <li>• <i>Clostridium difficile</i>-associated diarrhea</li> </ul> |
|--|---|

## REFERENCES

- High KP, *et al.* Clinical practice guideline for the evaluation of fever and infection in older adult residents of long-term care facilities: 2008 update by the Infectious Diseases Society of America. *Clin Infect Dis* 2009;48:149-71.
- Hooton TM, *et al.* Diagnosis, prevention, and treatment of catheter-associated urinary tract infection in adults: 2009 international clinical practice guidelines from the Infectious Diseases Society of America. *Clin Infect Dis* 2010;50:625-63.
- MSSS. Info-hébergement : bulletin d'information présentant des statistiques de base sur l'hébergement des personnes âgées en perte d'autonomie. February 2010;6-7.
- Simor AE. Diagnosis, management, and prevention of *Clostridium difficile* Infection in Long-Term Care Facilities: A Review. *J Am Geriatr Soc* 2010;58:1556-64.
- Loeb M, *et al.* Development of minimum criteria for the initiation of antibiotics in residents of long-term-care facilities: results of a consensus conference. *Infect Control Hosp Epidemiol* 2001;22:120-4.
- Smith PW, *et al.* SHEA/APIC guideline: Infection prevention and control in the long-term care facility. *Am J Infect Control* 2008;36:504-35.

## RELEVANT INVESTIGATION TOOLS BASED ON USEFULNESS AND AVAILABILITY

	INVESTIGATION TOOLS	ADDITIONAL INFORMATION (indications, interpretations and other elements)
<b>VERY USEFUL AND AVAILABLE</b>	<b>Urine culture and analysis</b>	<p><b>Without a urethral catheter:</b> perform on patients with urinary symptoms or in a feverish state</p> <p><b>With a urethral catheter<sup>1</sup>:</b> perform if urosepsis is suspected (fever, chills, hypotension or delirium)</p> <p><b>Interpretation:</b></p> <ul style="list-style-type: none"> <li>• Positive result: does not allow to determine whether it is a real infection or asymptomatic bacteriuria <ul style="list-style-type: none"> <li>• 15% to 50% have a bacteriuria higher than 10 x 10<sup>6</sup> UFC/l even if they do not have any symptoms (100% in people with a urethral catheter)</li> <li>• 30% have pyuria</li> </ul> </li> <li>• <b>Negative result:</b> rules out this source of infection</li> </ul>
	<b>Pulse oximetry</b>	<p>Oxygen saturation under 90%, especially when associated with an increased respiratory rate:</p> <ul style="list-style-type: none"> <li>• Strong predictor of respiratory distress</li> <li>• May be useful to the physician to decide whether the patient should be transferred to an acute care hospital</li> </ul>
<b>VARIABLE</b>	<b>Chest radiograph</b>	<p><b>To be carried out if suspected or confirmed hypoxemia</b></p> <ul style="list-style-type: none"> <li>• Most reliable test for pneumonia diagnosis (confirms a diagnosis of suspected pneumonia in 75% to 90% of cases)</li> <li>• Useful to rule out other diagnoses (e.g., heart failure, neoplasia, etc.)</li> </ul>
	<b>Complete blood count (CBC)</b>	<p>White blood cell count higher than 14 x 10<sup>6</sup> cells/l:</p> <ul style="list-style-type: none"> <li>• Strongly associated with the presence of infection in the elderly</li> </ul>
	<b>Creatinine and urea</b>	<p>May be useful to inform decisions on the need to adjust antibiotic dosage (clearance calcul) and to rehydrate the patient</p>
<b>USEFUL BUT RARELY AVAILABLE</b>	<b><i>Clostridium difficile</i> toxin investigation</b>	<p><b>Confirms the diagnosis of <i>Clostridium difficile</i>-associated diarrhea<sup>1</sup></b></p> <ul style="list-style-type: none"> <li>• Should be carried out if: <ul style="list-style-type: none"> <li>• antibiotics taken within the 30 previous days and presence of diarrhea</li> <li>• diarrhea and endemic <i>C. diff.</i> in the LTCF</li> </ul> </li> <li>• Should not be carried out if: <ul style="list-style-type: none"> <li>• asymptomatic patient (10% to 30% of LTCFs residents are colonized with <i>Clostridium difficile</i>)</li> </ul> </li> </ul>
	<b>Stool culture (enteropathogen investigation)</b>	<ul style="list-style-type: none"> <li>• <b>Should be carried out if:</b> <ul style="list-style-type: none"> <li>• symptoms of colitis (high fever, griping, bloody diarrhea) without recent antibiotic use <b>or</b> negative screening for <i>Clostridium difficile</i> toxins</li> </ul> </li> </ul> <p><b>In case of outbreak, follow the public health protocol.</b></p>
	<b>Sputum culture</b>	<p>Disputed relevance:</p> <ul style="list-style-type: none"> <li>• Difficulty in obtaining quality samples in the elderly</li> <li>• High level of asymptomatic colonization</li> <li>• Even when obtained, the sample is contaminated in 50% of cases</li> <li>• May be useful when pneumonia is diagnosed</li> </ul>
	<b>Hemoculture</b>	<p>Useful to confirm a bacteriological diagnosis when bacteremia is suspected (septic patient with a permanent catheter, infected wound or pneumonia)</p>

1. Refer to the health care facility protocol in effect.

NB: Cultures from the wound's surface are not indicated for diagnosis (poor correlation with the causal agent due to its colonization by several bacteria)

## TREATMENT PRINCIPLES

- ▶ Consider the following elements when treating the elderly living in LTCFs:
    - Initial treatment is based on:
      - Signs and symptoms observed (indication, severity)
      - Patient history (previous pathogens, antibiotics taken during the previous three months, resistance and level of care)
      - Most frequently encountered pathogen for the established diagnosis
      - Facility's list of medications
    - Treatment response may be delayed in some cases.
  - ▶ **Minimize empirical use of broad-spectrum antibiotics**
    - Adjust the antibiotic treatment once the pathogen has been identified (prefer narrow-spectrum antibiotics)
  - ▶ **Avoid using antibiotics over a long period** (prophylaxis or chronic use)
    - Duration of treatment determined based on indications (when possible) and patient re-evaluation
  - ▶ Determine:
    - Interactions (e.g., iron intake, calcium, tube feeding, IPP)
    - The appropriate formulation (crushed tablets or liquid form may be necessary)
  - ▶ Choose the minimal dose and duration of treatment recommended, based on infection type and severity, and on the pathogen involved (if known):
    - Adjust dosage based on creatinine clearance:  
$$\text{Creatinine clearance (ml/min)} = \frac{(140 - \text{age}) \times \text{ideal weight (kg)} \times 1,2}{\text{serum creatinine } (\mu\text{mol/l})} \quad [\times 0,85 \text{ for women}]$$
- NB: Creatinemia is not a good marker due to the reduced muscle mass observed in the elderly.
- ▶ **The patient's state must improve within 72 hours of treatment (objective signs, such as lower temperatures).**
  - ▶ Stop ongoing antibiotic treatment if initially asked cultures are negative and if there is a clinical correlation.
  - ▶ **DO NOT TREAT ASYMPTOMATIC BACTERIURIA:**
    - A positive analysis or urine culture is considered a sign of urinary tract infection, which should be **treated only when urinary symptoms** (burning sensation when urinating, dysuria, urge to urinate, hematuria, *de novo* or increased incontinence) or **systemic clinical features (fever) are present**.
    - **Screening** and treatment of asymptomatic bacteriuria in diabetic patients is **not recommended**, as these measures do not prevent complications associated with urinary tract infections.
    - **Urine cultures and urinalysis are not indicated** for the elderly who present with changes in the smell, colour or turbidity of their urine without any associated urinary symptom: such changes are not indicative of a urinary tract infection.
  - ▶ Considered that antibiotic treatment alone may not be effective for patients who present a deep skin and soft-tissue infection that requires surgical intervention.
  - ▶ Do not use antibiotics in the following cases:
    - Newly purulent wound (or an increase in purulence) as the only symptom
      - Increase local wound care
    - Influenza or other viral infections without bacterial superinfection
    - Aspiration without bacterial superinfection