



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
Viral infections	<ul style="list-style-type: none"> • Endemic period (influenza) 	<ul style="list-style-type: none"> • Refer to the public health protocol • Vaccinations: against influenza, recommended on an annual basis
Bacterial respiratory tract infections (pneumonia)	<ul style="list-style-type: none"> • COPD • Weakened gag reflex • Dysphagia • Poor oral hygiene 	<ul style="list-style-type: none"> • Vaccinations: against <i>pneumococcus</i>, recommended at least once during lifetime • Place the patient in a half-sitting position (30 degrees) • Maintain good oral hygiene
Urinary tract infections (pyelonephritis)	<ul style="list-style-type: none"> • Diabetes • Incomplete bladder emptying • Presence of a urinary catheter • Fecal incontinence/constipation 	<ul style="list-style-type: none"> • Long-term prophylactic antibiotic therapy not recommended due to unproven effectiveness and an increase in microbial resistance • Limit the use of permanent urethral catheters¹: <ul style="list-style-type: none"> • Establish a bladder-voiding schedule • Promote hydration • Up to 40% could be unnecessary (used to control incontinence or monitor diuresis) • When possible, choose intermittent catheterization over permanent catheters
Skin and soft-tissue infections (cellulitis, wound superinfection, pressure ulcer)	<ul style="list-style-type: none"> • Diabetes • Protein-energy undernutrition • Poor skin health (maceration, dryness) • Immobility, confinement to bed • Increased skin fragility • Edema (peripheral vascular disease) • MRSA carrier 	<ul style="list-style-type: none"> • Limit the severity of the peripheral edema (use of diuretics or compression stockings, elevation of the extremities) • Frequent repositioning of bedridden patients • Protection of skin integrity • Nutritional status optimization
Gastrointestinal infections (<i>Clostridium difficile</i>-associated diarrhea)	<ul style="list-style-type: none"> • Recent antibiotic treatment • Chemotherapy • Gastrointestinal surgery • Enteral nutrition • Inadequate hygienic practices • Recent hospital stay 	<ul style="list-style-type: none"> • <i>Clostridium difficile</i>-associated diarrhea: <ul style="list-style-type: none"> • Avoid using antibiotics over a long period (avoid chronic use, define duration of treatment based on the indication) • Stop ongoing antibiotic treatment if initially asked cultures are negative and if there is a clinical correlation • Isolation is recommended for patients presenting with <i>Clostridium difficile</i>-associated diarrhea • Using probiotics is not recommended for now, due to the lack of supporting clinical data concerning its effectiveness

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

FACTORS ASSOCIATED WITH GREATER SUSCEPTIBILITY TO ADVERSE REACTIONS

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| <ul style="list-style-type: none"> • Increased frailty • Digestive disorders, disruption of intestinal flora | <ul style="list-style-type: none"> • Polymedication • Decreased renal or hepatic functions |
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RISKS ASSOCIATED WITH THE USE OF ANTIBIOTICS IN THE ELDERLY

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| <ul style="list-style-type: none"> • Antibiotic resistance • Drug interactions | <ul style="list-style-type: none"> • Adverse reactions • <i>Clostridium difficile</i>-associated diarrhea |
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RELEVANT INVESTIGATION TOOLS BASED ON USEFULNESS AND AVAILABILITY

	INVESTIGATION TOOLS	ADDITIONAL INFORMATION (indications, interpretations and other elements)
VERY USEFUL AND AVAILABLE	Urine culture and analysis	<p>Without a urethral catheter: perform on patients with urinary symptoms or in a feverish state</p> <p>With a urethral catheter¹: perform if urosepsis is suspected (fever, chills, hypotension or delirium)</p> <p>Interpretation:</p> <ul style="list-style-type: none"> • Positive result: does not allow to determine whether it is a real infection or asymptomatic bacteriuria <ul style="list-style-type: none"> • 15% to 50% have a bacteriuria higher than 10 x 10⁶ UFC/l even if they do not have any symptoms (100% in people with a urethral catheter) • 30% have pyuria • Negative result: rules out this source of infection
	Pulse oximetry	<p>Oxygen saturation under 90%, especially when associated with an increased respiratory rate:</p> <ul style="list-style-type: none"> • Strong predictor of respiratory distress • May be useful to the physician to decide whether the patient should be transferred to an acute care hospital
VARIABLE	Chest radiograph	<p>To be carried out if suspected or confirmed hypoxemia</p> <ul style="list-style-type: none"> • Most reliable test for pneumonia diagnosis (confirms a diagnosis of suspected pneumonia in 75% to 90% of cases) • Useful to rule out other diagnoses (e.g., heart failure, neoplasia, etc.)
	Complete blood count (CBC)	<p>White blood cell count higher than 14 x 10⁶ cells/l:</p> <ul style="list-style-type: none"> • Strongly associated with the presence of infection in the elderly
	Creatinine and urea	<p>May be useful to inform decisions on the need to adjust antibiotic dosage (clearance calcul) and to rehydrate the patient</p>
USEFUL BUT RARELY AVAILABLE	<i>Clostridium difficile</i> toxin investigation	<p>Confirms the diagnosis of <i>Clostridium difficile</i>-associated diarrhea¹</p> <ul style="list-style-type: none"> • Should be carried out if: <ul style="list-style-type: none"> • antibiotics taken within the 30 previous days and presence of diarrhea • diarrhea and endemic <i>C. diff.</i> in the LTCF • Should not be carried out if: <ul style="list-style-type: none"> • asymptomatic patient (10% to 30% of LTCFs residents are colonized with <i>Clostridium difficile</i>)
	Stool culture (enteropathogen investigation)	<ul style="list-style-type: none"> • Should be carried out if: <ul style="list-style-type: none"> • symptoms of colitis (high fever, griping, bloody diarrhea) without recent antibiotic use or negative screening for <i>Clostridium difficile</i> toxins <p>In case of outbreak, follow the public health protocol.</p>
	Sputum culture	<p>Disputed relevance:</p> <ul style="list-style-type: none"> • Difficulty in obtaining quality samples in the elderly • High level of asymptomatic colonization • Even when obtained, the sample is contaminated in 50% of cases • May be useful when pneumonia is diagnosed
	Hemoculture	<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