

# Revisiting the O complex: urinary incontinence, delirium and polypharmacy in elderly patients

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## Abstract

URINARY INCONTINENCE, DELIRIUM and polypharmacy are common, challenging problems encountered in elderly patients. Review of the literature shows that these conditions are interrelated. For example, polypharmacy can lead to delirium, which, in turn, can lead to urinary incontinence. The drugs prescribed for urinary incontinence can precipitate delirium or contribute to polypharmacy. The underlying causes for these problems in elderly patients are frequently complex, and management in turn must often be multifactorial. The occurrence of these problems should lead to careful evaluation followed by thoughtful, responsive treatment. Brief updates are given with recommendations for management directed at primary care physicians.

## Résumé

L'INCONTINENCE URINAIRE, LE DÉLIRE et la polypharmacie sont des problèmes répandus et difficiles chez les patients âgés. Une recension des écrits démontre que les problèmes sont reliés. Par exemple, la polypharmacie peut provoquer le délire qui, en retour, peut entraîner l'incontinence urinaire. Les médicaments prescrits contre l'incontinence urinaire peuvent provoquer le délire ou contribuer à la polypharmacie. Comme les causes de ces problèmes sont souvent complexes, la prise en charge doit souvent tenir compte de facteurs multiples. Ces problèmes devraient entraîner une évaluation prudente suivie d'un traitement réfléchi et adapté. On présente des mises à jour et des recommandations sur la prise en charge qui s'adressent aux médecins de première ligne.

A pioneer of Canadian geriatrics, Ronald Cape, wrote about the O complex in his book *Aging: Its Complex Management*.<sup>1</sup> He felt that falling, confusion, incontinence, homeostatic disturbance and iatrogenic illness formed a quintet of interrelated clinical challenges. The name he chose, the O complex, comes from the symbol of the Olympic Games, which he used to represent these problems and their interrelationship. Cape felt that these problems represented "the core of knowledge unique to the medicine of the very old."<sup>1</sup> Thirteen years of practice as a consultant in geriatric medicine has confirmed to me that they are both common — and the older the patient, the more common they are — and interrelated.

These problems are arguably dealt with inadequately by physicians. For example, a Canadian study looking at continuing medical education needs in geriatrics showed that 70.8% of health care workers other than physicians felt that physicians were inadequately trained to deal with incontinence.<sup>2</sup> In this article I will provide necessarily brief updates for the primary care physician on the assessment and management of urinary incontinence (the most common form of incontinence encountered), delirium and polypharmacy (because adverse drug reactions are the commonest type of iatrogenic illnesses encountered). Because of limited space, falls could not be dealt with in this article. Recent clinical research has underscored the utility of exercise and multidimensional, targeted (to risk factors for falls) evaluation in the patient's home coupled with individualized interventions in decreasing the likelihood of further falls.<sup>3-6</sup>



*Body and mind*

*Corps et esprit*

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## Urinary incontinence

Urinary incontinence occurs when there is involuntary loss of urine that is a social or hygienic problem and is objectively demonstrable.<sup>7</sup> It has been reported that 15% to 30% of older people in the community and up to 50% of residents of long-term care facilities have this problem.<sup>8,9</sup> Women are more prone to urinary incontinence than men.

Urge incontinence is the most common type encountered. Large amounts of urine may be lost, typically preceded by a sense of urgency. This incontinence arises from involuntary bladder contractions, which increase intravesical pressures above urethral closure pressures. In a subtype of urge incontinence often found in frail elderly people, the hyperactivity is accompanied by impaired contractility of the bladder.<sup>9</sup> With stress incontinence the loss of urine classically occurs with activities that increase intra-abdominal pressure (e.g., coughing). The underlying cause is urethral sphincter incompetence. Stress incontinence is found predominantly in women. Frequent or constant loss of small amounts of urine accompanied by a poor stream and a sense of incomplete emptying suggests overflow incontinence. This may occur because of outflow obstruction (e.g., from benign prostatic hypertrophy) or bladder atony (e.g., from autonomic neuropathy). Continuous incontinence can also occur as a result of fistulas involving the bladder. Many patients have a mixed etiology; stress with urge incontinence and urge with overflow incontinence are particularly common. With so-called functional incontinence the primary problem is not with the bladder or sphincter; rather, the incontinence arises because the patient is unable to get to a toilet in time. Several conditions, such as delirium, urinary tract infection and atrophic urethritis, as well as certain drugs may worsen or precipitate incontinence in someone who is "just managing." It must be recognized that there is considerable overlap in symptoms among the various types of incontinence. History by itself is a suspect guide for diagnosis.<sup>10,11</sup>

### Assessment

Patients often do not report urinary incontinence and may even conceal it because of embarrassment. This is unfortunate, because treatment can usually provide at least partial relief. In the initial evaluation patients should be asked about the duration and mode of onset of the incontinence. There may be a clear association with a particular event, such as the prescription of a medication. Severity can be ascertained by obtaining a bladder record (or voiding diary) and asking about frequency (both day and night), the number of pads used per day and how often clothes and bedding have to be changed. The effect on the patient's activities and relationships should be as-

essed. Urologic symptoms may suggest one of the commoner types of incontinence. Obstetric/gynecologic, medical and medication histories should be obtained. Examinations of the abdomen (feeling for bladder distension and other masses), rectum (checking for prostate size, fecal impaction and anal tone) and vagina (looking for atrophy, prolapse and fistulas) should be performed. A manoeuvre to provoke stress incontinence (looking for leakage while the patient coughs or strains with a full bladder) can be helpful. Mobility, dexterity and cognition must be evaluated. Ascertaining the presence of residual urine after voiding, either by catheterization or by a bladder ultrasound examination, can determine the need for further evaluation and help plan treatment.

One should obtain at least a urinalysis, urine culture and a creatinine (or urea) level in all patients presenting with urinary incontinence. Referral to a specialist or for urodynamic studies, or both, is indicated if there is uncertainty about the cause, if the patient wishes it, if there are symptoms suggestive of mixed stress and urge incontinence, if there is considerable postvoid urine retention (200 mL or more), before incontinence surgery, after urologic or gynecologic surgery, in the presence of neurologic conditions (e.g., multiple sclerosis) or if the incontinence does not respond to the initial treatment plan.

Several algorithms have been developed for the diagnostic evaluation of urinary incontinence.<sup>12</sup> A simplified approach is outlined in Table 1. Transient and serious causes can generally be detected by the assessment outlined above. Detecting overflow incontinence by looking for residual urine after the patient has voided is the next step. If this is ruled out, for women the diagnosis is likely urge or stress incontinence.<sup>9</sup> The treatment approaches to these 2 types of incontinence do overlap.

### Management

Urinary incontinence can often be effectively managed with simple measures.<sup>8,9,13-15</sup> Patients should be encouraged to have a moderate fluid intake. There should be restricted consumption of caffeine-containing drinks. Aggravating or precipitating factors (including obesity) should be dealt with if possible. Eradicating bacteriuria, however, has not been found to affect the severity of chronic urinary incontinence in nursing home residents, and the practice of treating asymptomatic bacteriuria in this population is not justified.<sup>16</sup> All drugs being taken must be reviewed. Antidepressants and antihistamines taken regularly may worsen urinary symptoms and decrease flow rates in men.<sup>17</sup> Diuretics can precipitate or worsen incontinence.<sup>12</sup> Other drugs to be wary of include alcohol, caffeine, anticholinergics, antiparkinsonian medications, sedatives or hypnotics, disopyramide, narcotics, calcium-channel blockers,  $\alpha$ -



adrenergic agents and  $\beta$ -adrenergic agonists.<sup>12</sup> Continence aids (e.g., urinals, commodes, aids in the toilet and protective devices) are often useful treatment adjuncts.

Bladder retraining (or prompted voiding for cognitively impaired patients) is the mainstay of treatment for urge incontinence and may be useful in patients with stress incontinence.<sup>9</sup> Pelvic floor exercises can also help in women.<sup>18</sup> Drug therapy (e.g., imipramine hydrochloride, oxybutynin chloride and propantheline bromide) should be reserved for cases that do not respond adequately. Oxybutynin is the drug used most often. Although its effectiveness is open to question, it does appear to decrease frequency and produce subjective relief.<sup>19</sup> Urinary retention may occur, especially in patients with impaired bladder contractility.<sup>9</sup> For stress incontinence, pelvic floor exercises and estrogen therapy are often used initially. Alpha-adrenergic agonists (which include phenylpropanolamine hydrochloride and imipramine hydrochloride,

as it has  $\alpha$ -adrenergic agonist activity) can be used, often in combination with estrogen. Surgery to elevate and stabilize the urethrovesical junction is generally reserved for patients with severe symptoms that have not responded to more conservative measures. Overflow incontinence caused by prostate hypertrophy may respond to treatment with  $\alpha$ -adrenergic antagonists or 5- $\alpha$ -reductase inhibitors, or both. All such patients should be considered for surgery but not rushed into it. Patients with bladder atony may require intermittent catheterization. For functional incontinence a comprehensive rehabilitation program may be of the greatest utility.

## Delirium

With delirium intellectual function deteriorates abruptly. The differential diagnosis includes psychiatric disorders, including depression<sup>20</sup> and dementia.<sup>21</sup> Delirium can be caused by systemic illnesses, central nervous system (CNS) diseases, exogenous chemical agents and withdrawal from a substance of abuse, alone or in combination. The list of potential specific causes is lengthy. Drug- and sepsis-associated delirium are possibly the commonest types found in elderly people. Fluid and electrolyte abnormalities are frequently encountered as contributing factors.

This presentation is commonly encountered in older inpatients. About 10% to 20% of elderly people admitted to hospital are delirious, and a further 10% to 33% experience delirium while in hospital.<sup>21</sup> Postoperative delirium occurs in about one-third of elderly patients undergoing surgery.<sup>22</sup>

The underlying pathophysiology is poorly understood. It represents a global failure of brain metabolism. Delirium arises from an interplay of predisposing and precipitating factors. Postoperative delirium has been associated with increased age, pre-existing cognitive impairment, perioperative biochemical abnormalities, postoperative polypharmacy (defined as the use of 5 or more medications), preoperative use of anticholinergic drugs and cardiac surgery.<sup>22,23</sup> Marcantonio and colleagues<sup>20</sup> found 7 preoperative and operative factors that predicted the occurrence of delirium in patients undergoing surgery other than cardiac surgery and developed a scoring mechanism to classify patients (Table 2). They assigned 1 point for each factor except for abdominal aortic aneurysm repair, which received a score of 2. If the total score was 0 the incidence of postoperative delirium was 2%, if the score was 1 or 2 the incidence was 11%, and if the score was 3 or greater the incidence was 50%.

In medical patients Inouye and associates<sup>25</sup> found a number of predisposing factors for the development of delirium (Table 2). If none was present the incidence of delirium was 1% to 3%, if 1 or 2 were present the incidence was 16% to 23%, and if 3 or 4 were present the incidence was 32% to

**Table 1: An approach to the diagnostic evaluation of urinary incontinence in elderly patients.**<sup>8,9,12</sup>

1. Confirm history of urinary incontinence. Ask about duration, mode of onset, severity, effect, current medications, past medical history and associated symptoms. Consider obtaining a voiding diary
2. Rule out transient or reversible causes. A useful mnemonic is DIAPPERS (*d*elirium, *i*nfection of the urinary tract, *a*trophic urethritis or vaginitis, *p*harmaceuticals, *p*sychologic causes, especially severe depression, *e*xcess urine output from conditions or states such as hyperglycemia, *r*estricted mobility and stool impaction)
3. On physical examination check for bladder distension, perform rectal and vaginal examinations, assess mobility, dexterity and cognition, and perform a manoeuvre to provoke stress incontinence. Ascertain the presence of residual urine after voiding and select laboratory tests (e.g., urinalysis, urine culture and determination of urine creatinine level). If the postvoid amount of residual urine is over 200 mL, renal ultrasonography should be done to rule out hydronephrosis; if this condition is present the patient requires decompression
4. Decide whether the patient should be referred to a specialist or have urodynamic studies done, or both (see text for details)
5. Encourage all patients to have a moderate fluid intake, to restrict the consumption of caffeine-containing beverages, to try to alleviate aggravating or precipitating factors, and to use appropriate continence aids
6. Make an empirical diagnostic categorization. Bladder retraining (or prompted voiding for cognitively impaired patients) and pelvic floor exercises (for women) can be effective for both urge and stress incontinence. Use drugs for urge incontinence in patients who do not respond adequately to nonpharmacologic measures. Estrogen replacement is often used for stress incontinence in women. Augmented voiding techniques (such as Credé's method [application of suprapubic pressure], Valsalva's, or straining, manoeuvre and "double voiding") after voiding has begun can help in the presence of incomplete emptying. Consider surgery for overflow incontinence due to obstruction and for severe stress incontinence that does not respond to conservative measures. Bladder atony can often be managed by intermittent catheterization



83%. Precipitating factors identified by the same group are also shown in Table 2.<sup>26</sup> The incidence of delirium when none of these factors was present was 3% to 4%, if 1 or 2 were present the incidence was 20%, and if 3 or more were present the incidence was 35% to 59%. Increased numbers of both predisposing and precipitating factors increased the likelihood of delirium. They seemed to work in an independent but cumulative manner.

### Assessment

Delirium is often unrecognized by physicians.<sup>27</sup> A number of instruments can screen for this problem.<sup>28</sup> An easy one to use is the Confusion Assessment Method.<sup>29</sup> With this method the presence of acute onset and a fluctuating course (for the cognitive impairment) plus inattention coupled with either disorganized thinking or an altered level of consciousness are required to suggest the presence of delirium.

### Management

Management is empirical. Preventive strategies include identifying patients at high risk; cautiously using psychotropic medications and narcotics; ensuring adequate hydration, nutrition and oxygenation; promptly addressing medical concerns; and paying attention to the patient's physical environment. Patients at high risk require close monitoring and early, vigorous correction of abnormalities found on laboratory investigations. Postoperative delirium has been found to be associated with the postoperative use of meperidine hydrochloride and benzodiazepines (especially those with a long half-life or if used at a higher dosage).<sup>30</sup> Meperidine has both an active metabolite (normeperidine), which can accumulate, and more an-

ticholinergic activity than other narcotics. It seems reasonable to avoid meperidine and use other narcotics, such as morphine, in the care of elderly patients. There has been one report of an apparently successful program to reduce the incidence of postoperative delirium in patients with hip fractures.<sup>31</sup> The program consisted of a careful preoperative evaluation, routine anticoagulation therapy, oxygen administration, expeditious surgery and postoperative care by a geriatrician.

If delirium occurs one searches for the specific underlying cause(s) and deals with it (them) if at all possible. Routine laboratory studies would include a complete blood count, determination of the serum electrolyte levels and arterial blood gas values (or pulse oximetry), tests of renal function, a liver profile and screening for sepsis (chest radiography and urine culture).<sup>21,30</sup> Neuroimaging should be done in patients who are felt to have a structural brain lesion. Delirious patients are more likely to show ventricular dilation, cortical atrophy and focal changes (especially in the right hemisphere) on neuroimaging than unmatched control subjects.<sup>32</sup> Electroencephalographic abnormalities (e.g., predominant theta or delta waves, triphasic waves and suppression of voltages) are common and correlate with severity. Further investigations will depend on the findings of the initial assessment.

Supportive care includes hydration, nutrition and oxygenation. Nonessential drugs should be eliminated. Nursing interventions involve providing a tranquil environment, modifying sensory input, providing frequent reorientation, rectifying sensory impairments if possible, trying to provide familiarity (e.g., requesting family members to stay with the patient), simplifying communication, and encouraging self-care and other personal activities while ensuring safety.<sup>33</sup> Physical restraints should be avoided if at all possible because they may precipitate delirium or worsen agitation.<sup>26</sup>

If drugs are required for agitation or psychotic features, high-potency neuroleptics are favoured. Specific target symptom(s) should be identified and specific goal(s) set for therapy. The symptom(s) should be monitored carefully, with continued efforts to reduce and eventually stop the neuroleptics. Haloperidol is currently the preferred neuroleptic because of its familiarity and relative lack of anticholinergic, sedative and cardiorespiratory effects. Oral administration is preferred, although it can be given intramuscularly or intravenously. Initial doses as low as 0.5 mg may be effective in elderly patients. In severely agitated patients rapid loading can be done by doubling each successive dose at 30-minute intervals until the agitation is controlled. A maintenance dose of one-half of the total loading dose could then be administered in divided doses over the next day, with gradual tapering subsequent to this.<sup>17</sup> Intermediate-acting benzodiazepines (e.g., lor-

**Table 2: Predisposing and precipitating factors for the development of delirium in elderly hospital patients**

Type of factor	Group	
	Postoperative patients <sup>24</sup>	Medical inpatients <sup>25,26</sup>
Predisposing	Age ≥ 70 yr	Poor visual acuity
	History of alcohol abuse	Severe illness
	Impaired cognition	Impaired cognition
	Poor functional status	High urea/creatinine ratio
	Abnormal sodium, potassium or glucose level	
Precipitating	Noncardiac thoracic surgery	Use of physical restraints
	Abdominal aortic aneurysm repair	Malnutrition
		Addition of 4 or more medications
		Bladder catheterization iatrogenic event



azepam, at an initial dose of 1 to 2 mg given orally or 0.5 to 1.0 mg intramuscularly) can also be used to sedate an agitated patient, especially if the delirium is associated with withdrawal from a sedative or hypnotic.<sup>34</sup> Although prompt recognition and treatment appear to be worthwhile, a study of a structured program to do just this could not show clinically significant benefits.<sup>33</sup>

A meta-analysis of the prognosis for elderly inpatients with delirium showed that 1 month after hospital admission 46.5% were in institutions (as compared with 18.3% of control subjects), 14.2% had died (as compared with 4.8% of control subjects), and 54.9% had improved mentally.<sup>35</sup> At 6 months 43.2% were in institutions (8.3% of control subjects), and 22.2% had died (10.6% of control subjects). Delirious older patients often have longer hospital stays, are more likely to experience a functional decline and have cognitive impairment for a longer time.<sup>24,36-38</sup>

## Polypharmacy

Data from the prescription drug benefit program in British Columbia show that 84% of the elderly population in that province receive at least 1 prescription over a 1-year period.<sup>39</sup> In 1993 prescription and over-the-counter medications accounted for 15.1% of the total expenditures for health care in Canada and represented the area with the fastest growth.<sup>40</sup> What is driving these cost increases? Anderson and collaborators<sup>41</sup> found that during the 1980s 34% of the increase in drug costs for older people in BC was accounted for by new drugs, 24% by increases in age-specific rates of use, 21% by increases in prices for old drugs, and only 14% by increases in the elderly population. Efforts to control public expenditures for drugs in Canada have included the establishment of the Patented Medicines Prices Review Board,<sup>40</sup> drafting of pharmacoeconomic guidelines,<sup>40</sup> adoption of restricted provincial formularies,<sup>40,42</sup> rules for drug substitution,<sup>40</sup> rules for price selection,<sup>40</sup> changes in copayment amounts or deductibles for publicly funded drug benefit plans and reference-based pricing.<sup>43-45</sup> The rate of increase in drug expenditures is slowing down, possibly as a result of one or more of these measures.<sup>46</sup>

Increasing attention in our country has been directed to the issue of evaluating the appropriateness of prescriptions, trying to determine predictors of poor prescribing practices, and looking for potentially adverse drug interactions.<sup>47-53</sup> Appropriate prescribing is a complex task. Drugs should be prescribed only for an acceptable indication at a correct dose and frequency for an acceptable duration. Care must be taken to avoid inappropriate duplication of drugs, potentially adverse drug-disease interactions and potentially adverse drug-drug interactions. Even when used appropriately, bad things can happen with the use of

medications. For example, a “prescribing cascade” can occur, in which the use of one drug leads to the use of another to deal with the side effects of the first.<sup>51,54</sup>

Research suggests that inappropriate prescribing is common in Canada.<sup>47,52,55,56</sup> Although most attention has been focused on overuse of medications, there is evidence that certain medications are underused in older patients.<sup>57</sup> There appears to be significant warfarin underuse in the treatment of elderly patients with atrial fibrillation<sup>58</sup> and underuse of  $\beta$ -blockers in elderly survivors of acute myocardial infarction.<sup>59</sup> No patient should be denied a medication with a favourable benefit-risk ratio solely because of age.

Polypharmacy can be defined as any drug regimen with at least one unnecessary medication.<sup>60</sup> Excess use of medications is a serious, preventable public health problem. It increases the risk of iatrogenic illness, the likelihood of noncompliance and both direct and indirect (to deal with the drug-related illness) health care costs.<sup>60</sup>

A number of system-level initiatives may help in decreasing the prevalence of this problem. Trying to ensure that patients have a single primary care physician and a single dispensing pharmacy appears worthwhile.<sup>50</sup> Drug use reviews are formal programs designed to assess data on drug use against explicit, prospective standards and, as necessary, introduce remedial strategies to achieve some desired end.<sup>40</sup> Both retrospective (using archival data on drug prescribing) and prospective (point-of-prescribing or dispensing analysis) programs have been implemented. Efforts have been made to define inappropriate practices in a rigorous manner.<sup>61</sup> The interventions to improve the identified problematic practices have typically been educational in nature. The most effective method appears to

**Table 3: Strategy to reduce polypharmacy in elderly patients<sup>54,60,63,64</sup>**

1. Obtain and update regularly a listing of all medications being used by the patient
2. Be aware of current and relevant past medical problems
3. Periodically review the appropriateness of the patient's medication regimen and try to perform a “therapeutic débridement”
4. With any new problem:
  - Consider an adverse drug reaction as a cause
  - Consider nonpharmacologic approaches first
5. If a new drug is prescribed, ensure that:
  - There is an indication for it
  - It is effective for the condition
  - The dose is correct for an older patient (“start low and go slow”)
  - You take time for patient education: the directions for the patient must be correct, practical and understood
  - There are no clinically significant drug-drug interactions or drug-disease interactions
  - There is no unnecessary duplication of drugs
  - The duration is appropriate
  - It is the least expensive alternative compared to others of equal utility
  - There is no less toxic or otherwise more appropriate alternative



be one-on-one education for physicians by trained pharmacists ("academic detailing").<sup>56,62</sup>

A strategy to reduce polypharmacy for practising physicians is outlined in Table 3.<sup>54,60,63,64</sup> The appropriate use of drugs, however, involves more than physicians. The triad most directly involved is the prescribing physician, the dispensing pharmacist and the patient or consumer. A joint statement by the CMA and the Canadian Pharmaceutical Association on enhancing the quality of drug therapy has been published.<sup>65</sup> The role of consumers is critical because they are the final arbitrator of what is actually taken.<sup>66</sup>

## Conclusion

What becomes increasingly clear after a review of the literature is the interrelationship among the problems reviewed. Polypharmacy can lead to delirium, which, in turn, can lead to incontinence. The drugs prescribed for incontinence can precipitate delirium or lead to polypharmacy. Polypharmacy is an important public health issue. In Alberta the 4 categories of drugs most frequently prescribed for older people are cardiovascular agents, CNS drugs, gastrointestinal drugs, and hormones and synthetic substitutes.<sup>67</sup> The use of CNS agents (which include benzodiazepines, antidepressants, antipsychotics and analgesics) is particularly problematic in elderly patients. In 1995, there were over 1 million claims for CNS drugs by elderly people in Alberta — over 4 claims per person.

Falls, urinary incontinence, delirium and sensitivity to adverse effects from drugs may have an underlying, common predisposing risk factor — possibly what Cape<sup>1</sup> referred to as a homeostatic disturbance or what we would now call frailty. The underlying causes in elderly patients are frequently complex, and management in turn must often be multifactorial. The problems reviewed in this article should never be blamed on aging alone. Their occurrence should lead to careful evaluation followed by thoughtful, responsive treatment.

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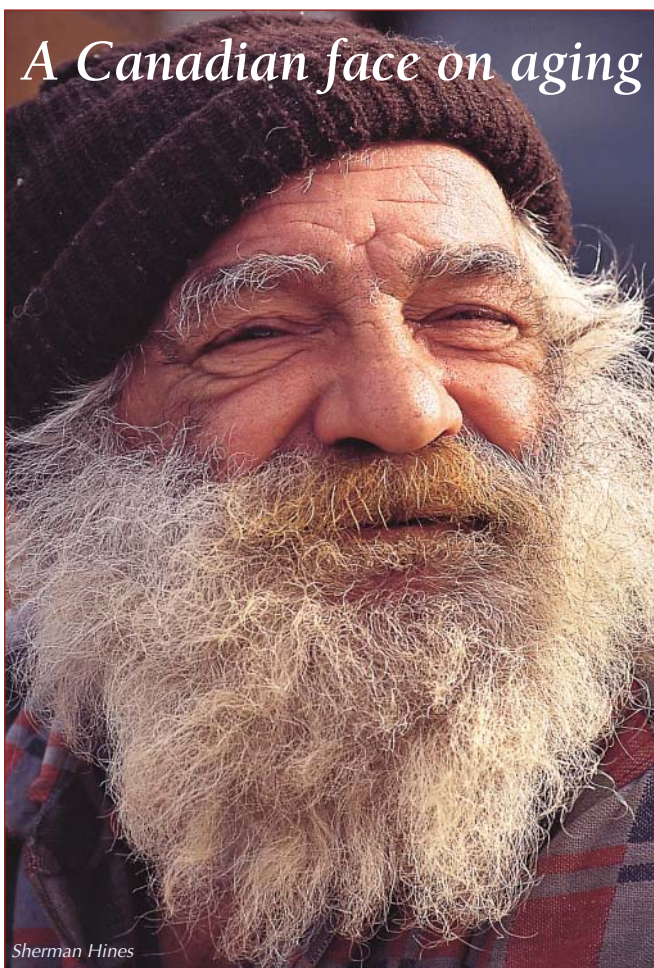
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## Aging

My body haunts me  
thieves in on me at night  
shattering sleep  
with nameless pointless pains

Where do you ache?  
The Chinese doctor's skill  
might poise with needle  
over my tossing form

but there's no  
one still spot no  
one still time I'd swear:  
*The pain is here.*

And every night  
my fingers search the wound, the old  
spine curvature, the creaking knees . . .  
but tongues, the darting tongues  
lick elsewhere, fan desire  
until all yesterdays are gulfed  
in freezing fire.

*Dorothy Livesay*

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