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Who Receives Rehabilitation in Canadian Long-Term Care Facilities? A Cross-Sectional Study

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ABSTRACT

Purpose: To describe the proportion of residents receiving occupational therapy (OT) and physical therapy (PT) and the factors associated with receiving PT in long-term care (LTC) facilities across five provinces and one territory in Canada. ***Methods:*** Using a population-based, retrospective analysis of cross-sectional data, the proportion of LTC facility residents in each province or territory receiving three different amounts (time and frequency) of PT, OT, or both before July 1, 2013, was calculated according to the Resource Utilization Groups–III rehabilitation classifications. Twenty-three variables from the Resident Assessment Instrument 2.0, such as age and cognition, were examined as correlates; those significant at $p < 0.01$ were included in a multivariate logistic regression. ***Results:*** Between 63.7% and 88.6% of residents did not receive any PT or OT; 0.8%–12.6% received both PT and OT; 5.8%–29.5% received an unspecified amount of PT; 1.9%–7.0% received 45 minutes or more of PT 3 days or more per week; and fewer than 1% received 150 minutes or more of PT on 5 or more days per week. Province, age, cognitive status, depression, clinical status, fracture, multiple sclerosis, and self-rated potential for improvement were associated with PT irrespective of time intensity. ***Conclusions:*** The proportion of LTC residents receiving rehabilitation services varies across Canada and appears to be associated with physical impairments and the potential for improvement; older residents with cognitive impairment or mood disorders are less likely to receive rehabilitation services. Future recommendations should consider what is driving the patterns of service use, determine whether the resources available are appropriate, and address the most appropriate goals for residents in LTC.

Key Words: aged; long-term care; occupational therapy; rehabilitation.

RÉSUMÉ

Objet: Décrire la proportion de résidents qui reçoivent des soins d'ergothérapie (ET) et de physiothérapie (PT) ainsi que les facteurs associés à la réception de soins de PT dans des établissements de soins de longue de cinq provinces et d'un territoire au Canada. **Méthodes:** À l'aide d'une analyse rétrospective de donnés transversales fondée sur la population, la proportion de résidents des établissements de soins de longue durée dans chaque province ou territoire qui recevaient trois combinaisons différentes (temps et fréquence) de soins de PT ou d'ET avant le 1er juillet 2013 a été calculée en fonction des groupes d'utilisation des ressources—classifications de réadaptation III. Un total de 23 variables de la méthode d'évaluation RAI 2.0, comme l'âge et la cognition, ont été examinées en tant que corrélats; les variables significatives au seuil de $p < 0.01$ ont été incluses dans une régression logistique à variables multiples. **Résultats:** De 63,7% à 88,6% des résidents n'ont pas reçu de soins de PT ou d'ET; de 0,8% à 12,6% des résidents ont reçu les deux types de soins; de 5,8% à 29,5% des résidents ont reçu une quantité non précisée de soins de PT; de 1,9% à 7,0% des résidents ont reçu $\geq$45 minutes de soins de PT à raison de $\geq$3 jours par semaine et $<$1% des résidents ont reçu $\geq$150 minutes de soins de PT à raison de $\geq$5 jours par semaine. La province, l'âge, l'état cognitif, la dépression, l'état de santé, la présence de fracture, la sclérose en plaques (SP) et l'auto-évaluation du potentiel d'amélioration ont été associés aux soins de PT indépendamment du temps et de l'intensité. **Conclusions:** La proportion de résidents des établissements de soins de longue durée qui reçoivent des services de réadaptation varie d'un endroit à l'autre au Canada et semble être associée à la déficience physique et au potentiel d'amélioration, mais elle est moins probable parmi les résidents âgés ayant une déficience cognitive ou des troubles de l'humeur. Au stade des recommandations futures, il y aurait lieu de se pencher sur les éléments qui influencent les tendances en matière d'utilisation des services, de déterminer si les ressources disponibles sont appropriées et de mettre l'accent sur les objectifs les plus appropriés pour les résidents des établissements de soins de longue durée.

It has been estimated that by 2036, 25% of the Canadian population will be older than age 65 years, and the number living in special care facilities such as long-term care (LTC) will more than double.[1] Approximately 72% of new residents admitted to LTC have diverse needs and require the development of person-centred care plans

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by a team of allied health care professionals, including physical therapists and occupational therapists.[2]

In LTC, physical therapy (PT) and occupational therapy (OT) can play a role in targeting many aspects of residents' health and well-being. Maintaining or improving physical and mental functions is an identified priority for health care providers and residents alike.[3] A recent Cochrane review concluded that physical rehabilitation can maintain and improve the physical function and quality of life (QOL) of residents in LTC.[4] In addition, physical therapists can function as part of an integrated team to manage pain,[5,6] pressure ulcers,[7] urinary incontinence,[8] and falls.[9]

Although PT plays an important role in LTC, there is evidence of regional variation in the amount of rehabilitation resources allocated to LTC residents, both in Canada and around the world. In Canada, the proportion of LTC residents receiving PT in 2009–2010 ranged from 5.6% in Manitoba to 31.9% in Yukon.[10] Variation in use of rehabilitation within provinces has not previously been reported. Rates of therapy usage also vary between countries,[11] from 10% in the United Kingdom[12] to 11% in the United States, 30% in Iceland and Japan,[11] and 35%–90% in the Netherlands.[13]

In addition to these geographic variations, there is evidence that PT services may not include all those LTC residents who could benefit from them. In an international study, Berg and colleagues[11] reported that older residents with poorer cognitive function were less likely to receive therapy, and younger residents with good cognition but impairments in activities of daily living (ADLs) were most likely to receive therapy. A study in the Netherlands found that residents with dementia and those admitted for continuing care were less likely to receive PT.[13] Both findings contrast with evidence from other studies suggesting that residents admitted for continuing care and residents with dementia can benefit from therapy to slow the decline of ADLs and improve physical function.[14–16]

The rehabilitation funding model within Canadian LTC facilities is complex. The case mix system is used both to reimburse facilities on the basis of resident characteristics and as a management tool for the facility and to guide policy formation and regulation for the government.[17] Residents are categorized into resource utilization groups (RUGs) on the basis of characteristics associated with resource use.[17] The special rehabilitation RUG is divided on the basis of the number of minutes and days per week that specialized therapies, such as PT and OT, are provided.[17] On the basis of the facility's ownership (public or private), the facility can use rehabilitation services privately; publicly, through financial remuneration from provincial health insurance plans; or a combination of the two. To add to the complexity, provincial health insurance plans' policies on remuneration for rehabilitation services, including PT, vary across Canada.[18] These variations suggest that access to rehabilitation services may not be defined by the needs of residents, and there may be room for improving QOL, restoring function, and decreasing the rate of physical decline.[10]

Our cross-sectional study had three objectives: first, to describe the proportion of residents receiving rehabilitation services (defined as PT and OT); second, to describe the demographic and clinical characteristics of residents receiving PT in LTC; and, third, to determine what factors are associated with the receipt of PT, at three frequencies and time intensities, in LTC facilities across five provinces and one territory.

METHODS

Our study is a population-based retrospective analysis of cross-sectional data. We completed all analyses using data from the LTC Facility Resident Assessment Instrument (RAI) 2.0 (Centers for Medicare & Medicaid Services, Baltimore, MD) for British Columbia, Manitoba, Nova Scotia, Newfoundland and Labrador, Saskatchewan, and Yukon. Data from Ontario were not used because of concerns about quality of PT service use reporting,[19] and data from Alberta were not yet available via the Canadian Institute for Health Information database; the other provinces and territories do not use RAI 2.0. Data were abstracted from the most recent assessment before the reference date of July 1, 2013. One assessment per resident was included. On the basis of previous literature, we hypothesized that all variables included in the study would be associated with receiving PT in LTC.

The RAI 2.0, a standardized assessment tool used in health care settings such as LTC,[20,21] is currently used in eight of Canada's provinces and territories and has been shown to be highly reliable and valid.[10,22] The RAI 2.0 is administered by trained assessors who use available information from chart review and interaction with residents, their families, and the clinical staff who work with them. In Canada, it is administered within 14 days of admission to the LTC facility, on a quarterly basis thereafter, or as needed if there is a significant change in status.

To describe resident characteristics, and for examination as potential correlates of receipt of PT services, we extracted the following variables from RAI 2.0 data: province or territory, age, sex, day of stay, self- and staff-rated potential for improvement, clinical status (improved, deteriorating, stable), experiencing or not experiencing an acute episode, and diagnoses. Day of stay was calculated as the time between admission into the facility and the reference date of July 1, 2013. Diagnosis of acute events, such as fracture and pneumonia, occurred within the 180 days before the assessment, whereas diagnosis of chronic disease, such as multiple sclerosis (MS), did not have a timeframe. We used British Columbia as the reference category for province or territory because it has the largest population for comparison.

Validated clinical scales for ADLs, depression, cognitive performance, and pain are embedded within the RAI 2.0; we examined these as potential correlates. The ADL Hierarchy scale uses a combination of early (dressing and personal hygiene), mid (toilet use, transfer, and locomotion), and late loss (bed mobility and eating) ADLs and scores the resident on a 7-point scale (0 = ability to perform all ADLs independently; 6 = total dependency on others for all ADLs); both the items in the scale and the scale itself are highly reliable.[23] The Cognitive Performance Scale (CPS), a functional measure of cognitive status, combines cognitive, communication, and ADL measures to describe the resident's status; it is scored on a 7-point scale (0 = cognitively intact; 6 = very severely impaired).[24] The Depression Rating Scale (DRS) is a reliable scale scored on a scale ranging from 0 to 7, with 3 or more points indicating the need for further evaluation for depression.[25,26] The pain scale is scored from 0 to 3 and identifies residents with no pain, less than daily pain, daily mild to moderate pain, and daily excruciating pain.[27]

All these scales were collapsed into categories. For all scales, the 0 category indicated the absence of ADL impairment, cognitive impairment, depression, or pain. For the ADL Hierarchy scale and the CPS, the remaining categories were mild (score of 1–2), moderate (3–4), and severe (5–6) ADL or cognitive impairment; for the pain scale, daily mild to moderate pain (1–2) and daily excruciating pain (3); and for the DRS, mild depression (1–2) and evidence of depression (3+). When entering the scales into the simple logistic regression, we used the 0 category (no impairment, depression, or pain) as the reference value. All scales were entered as continuous explanatory variables in the multiple logistic regressions, and quadratic terms were used to test for curvilinearity.

Once the RAI 2.0 assessment was complete and outcome measures were calculated, clinical assessment protocols (CAPs) are triggered via a set of embedded algorithms.[28–30] CAPs are designed to identify residents who are at risk for adverse outcomes, identify those who have the potential to improve, and provide recommendations to the clinicians for appropriate interventions.[31–33] CAP triggers often have three levels: not triggered, triggered to facilitate improvement, and triggered to prevent decline. Our study examined whether triggering of the falls CAP or the urinary incontinence CAP were associated with receiving PT.

For the purposes of the study, we defined a resident as receiving rehabilitation services if any number of minutes of PT or OT on any number of days was recorded within the 7 days before assessment; the RAI 2.0 uses a 7-day look-back period for data collection. Those who received rehabilitation services were divided into three categories: receiving (1) only OT, (2) only PT, and (3) both PT and OT; those who did not receive PT or OT were in the no PT or OT category. To give a geographical representation of what proportion of residents receive rehabilitation services, those who received PT were then subdivided across each province or territory into three levels. The three levels correspond with the cut-points used in the Resource Utilization Groups–III (RUG–III) rehabilitation classifications:[17] (1) those receiving any amount of PT; (2) those receiving 45 minutes or more of PT on 3 or more days; and (3) those receiving 150 minutes or more of PT on 5 or more days. Residents are categorized into RUG–III on the basis of characteristics associated with resource use.[17]

Statistical analyses

The proportions of residents at each level of rehabilitation services are presented as percentages by province or territory. The demographic and descriptive clinical characteristics of residents receiving any amount of PT are presented as percentages. Variables hypothesized a priori to have a relationship with receiving PT were collected in contingency tables across the three levels of PT we have described, and the χ^2 statistic was computed for each variable. We then entered each variable into a simple logistic regression and tabulated the unadjusted odds ratios [ORs]. Finally, we built multiple logistic models for receiving the three levels of PT, using a stepwise approach, by first entering variables previously reported to be related to receiving PT in LTC and then systematically adding and removing variables on the basis of a significance level of $p < 0.01$. Quadratic terms were entered to assess curvilinearity for continuous variables; this method captures much of the curvilinearity, should any exist.[34] We entered the following interaction terms for variables hypothesized a priori to be associated with receiving PT: Age × Sex, Age × Day of Stay, and Sex × Day of Stay. All statistical analyses were completed using SAS version 9.2 (SAS Institute Inc., Cary, NC).

RESULTS

The effective sample size for our analyses was 87,869. The majority of residents in LTC did not receive any PT or OT (64.0%–88.8%) in the 7 days before assessment (see Table 1). The proportion who received any amount of PT ranged from 5.8% to 29.5% across the five provinces and one territory. The proportion who received PT for 45 minutes or more on 3 or more days per week was small, ranging from 1.9% to 7.1%, and the proportion who received PT for 150 minutes or more on 5 or more days per week was even smaller (<1% in all provinces and the territory). The proportion who received

Table 1 Proportion of Residents Receiving Various Levels of PT and OT in the 7 Days before Assessment across Five Canadian Provinces and One Canadian Territory

	No. (%)					
Rehab service	British Columbia	Manitoba	Newfoundland	Nova Scotia	Saskatchewan	Yukon
Any PT	5,913 (12.3)	725 (5.8)	438 (27.0)	620 (29.5)	2,226 (9.6)	83 (24.0)
PT ≥45 min on ≥3 d	1,545 (3.2)	233 (1.9)	49 (3.0)	148 (7.1)	1,283 (5.5)	19 (5.5)
PT ≥150 min on ≥5 d	116 (0.2)	5 (0.04)	2 (0.1)	10 (0.5)	170 (0.7)	1 (0.7)
Any OT	4,277 (8.9)	805 (6.4)	320 (19.7)	314 (15.0)	816 (3.5)	47 (13.6)
No PT or OT	39,490 (82.3)	11,173 (88.6)	1,071 (66.0)	1,337 (64.0)	20,602 (88.8)	241 (69.7)
OT only	2,595 (5.4)	711 (5.6)	115 (2.9)	143 (6.8)	364 (1.6)	22 (6.4)
PT only	4,231 (8.8)	631 (5.0)	233 (14.4)	449 (21.4)	1,774 (24.1)	58 (16.8)
PT and OT	1,682 (3.5)	94 (0.8)	205 (12.6)	171 (8.1)	452 (2.0)	25 (7.2)

PT = physical therapy; OT = occupational therapy.

Table 2 Descriptive Demographic and Clinical Characteristics of Residents Receiving Any Amount of PT in the 7 Days before Assessment in Five Canadian Provinces and One Canadian Territory ($n = 10{,}005$)

Characteristic	No. (%)
Sex	
Female	6,115 (61.1)
Age group	
<65 y	803 (8.0)
65–74 y	943 (9.4)
75–84 y	2,689 (26.9)
≥85 y	5,570 (55.7)
Day of stay	
<365 d	847 (8.5)
365–730 d	1,604 (16.0)
>730 d	7,554 (75.5)
Potential for improvement—self-rated	1,616 (16.7)
Potential for improvement—staff rated	1,245 (12.8)
Clinical status	
No change (stable)	6,559 (69.6)
Deteriorated	2,385 (25.3)
Improved	477 (5.1)
Conditions	319 (3.2)
Multiple sclerosis	319 (3.2)
Parkinson disease	592 (6.1)
Pneumonia	159 (1.6)
Stroke	2,027 (20.3)
Any fracture	1,480 (14.8)
Hip fracture	1,130 (11.3)
Osteoporosis	1,763 (18.2)
Arthritis	3,120 (32.1)
Huntington's chorea	12 (0.1)
ADL Hierarchy Scale score	
0 (no impairment)	505 (5.1)
1–2 (mild impairment)	1,717 (17.2)
3–4 (moderate impairment)	4,211 (42.1)
5–6 (severe impairment)	3,572 (35.7)
CPS score	
0 (no impairment)	1,387 (13.9)
1–2 (mild impairment)	2,853 (28.5)
3–4 (moderate impairment)	3,372 (33.7)
5–6 (severe impairment)	2,392 (23.9)

PT = physical therapy; ADL = activities of daily living; CPS = cognitive performance scale.

any amount of both PT and OT ranged from 0.8% to 12.6%.

The demographic and clinical characteristics of residents who received any amount of PT are described in Table 2. At the unadjusted level (see Table 3), statistically significant factors positively associated with receiving any amount of PT were province or territory (Newfoundland and Labrador, Nova Scotia, and Yukon vs. British Columbia); improved clinical status from previous assessment; self- and staff-rated potential for improvement; diagnosis of MS, Parkinson disease, stroke, pneumonia, any fracture, hip fracture, or osteoporosis; experiencing an acute episode; a higher ADL Hierarchy score; a higher pain score; falls CAP triggered at medium risk and high risk; and urinary incontinence CAP triggered at facilitate improvement and prevent decline. Factors negatively associated with receiving any amount of PT were sex, age, day of stay, a higher CPS score, a higher DRS score, and province (Manitoba and Saskatchewan vs. British Columbia).

Table 4 describes the final logistic models with variables that were statistically significant. The model for any amount of PT had 21 variables; the model for PT 45 minutes or more, 3 days per week or more, had 16 variables; and the model for PT 150 minutes or more, 5 days per week or more had 8 variables. Province, age, clinical status, CPS score, DRS score, any fracture, MS, and self-rated improvement were consistent correlates of receiving PT across all three models. After adjustment, we found that residents receiving PT for 150 minutes or more 5 days or more per week were most likely to live in Nova Scotia, Saskatchewan, or Yukon (vs. British Columbia), to be younger, to have an improved clinical status relative to their previous assessment, to be less cognitively impaired and less depressed, to have a fracture or a diagnosis of MS, and to have rated themselves as having the potential to improve.

Table 3 Univariate Logistic Regression Model and ORs for the Receipt of PT in LTC across Five Canadian Provinces and One Canadian Territory at Three Durations and Frequencies

	Any amount of PT ($n = 10,005$)		PT ≥45 min on ≥3 d ($n = 3,277$)		PT ≥150 min on ≥5 d ($n = 349$)	
Characteristic	No. (%)	OR (95% CI)	No. (%)	OR (95% CI)	No. (%)	OR (95% CI)
Sex						
Female (Ref.)	6,115 (10.7)	1.00	1,303 (4.2)	1.00	114 (0.4 (114)	1.00
Male	3,890 (12.6)	0.83 (0.80–0.87)*	1,973 (3.5)	0.81 (0.76–0.87)*	190 (0.3)	0.90 (0.72–1.14)
Age group						
<65 y (Ref.)	803 (19.1)	1.00	347 (8.3)	1.00	64 (1.5)	1.00
65–74 y	943 (13.8)	0.68 (0.61–0.75)	1,709 (3.2)	0.58 (0.50–0.68)	118 (0.2)	0.41 (0.28–0.60)
75–84 y	2,689 (11.3)	0.54 (0.49–0.59)	879 (3.7)	0.43 (0.37–0.48)	79 (0.3)	0.22 (0.15–0.30)
≥85 y	5,570 (10.5)	0.50 (0.46–0.54)*	342 (5.0)	0.37 (0.33–0.42)*	43 (0.6)	0.15 (0.11–0.20)*
Day of stay						
<365 d (Ref.)	847 (13.2)	1.00	208 (3.2)	1.00	17 (0.3)	1.00
365–730 y	1,604 (13.0)	0.98 (0.90–1.07)	495 (4.0)	1.25 (1.06–1.47)	31 (10.2)	0.95 (0.52–1.71)
>730 d	7,554 (10.9)	0.81 (0.75–0.87)*	2,574 (3.7)	1.16 (1.00–1.33)†	256 (0.4)	1.40 (0.86–2.29)
Potential for improvement—self rated	1,616 (15.1)	1.46 (1.38–1.55)*	626 (5.8)	1.74 (1.59–1.90)*	87 (0.8)	2.88 (2.24–3.70)*
Potential for improvement—staff rated	1,245 (15.0)	1.43 (1.34–1.53)*	483 (5.8)	1.69 (1.53–1.87)*	62 (0.8)	2.44 (1.84–3.23)*
Clinical status						
No change (stable; Ref.)	6,559 (11.4)	1.00	2,007 (3.5)	1.00	159 (0.3)	1.00
Deteriorated	2,385 (11.3)	0.99 (0.94–1.04)	713 (3.4)	0.97 (0.89–1.05)	63 (0.3)	1.08 (0.80–1.44)
Improved	477 (22.3)	2.23 (2.01–2.48)*	237 (11.1)	3.45 (3.00–3.98)*	63 (3.0)	10.96 (8.16–14.72)*
Experiencing acute episode	767 (13.9)	1.28 (1.18–1.39)*	241 (4.4)	1.12 (1.05–1.37)*	22 (0.4)	1.17 (0.76–1.80)
Conditions						
Multiple sclerosis	319 (20.2)	2.00 (1.76–2.26)*	140 (8.9)	2.57 (2.16–3.07)*	21 (1.3)	4.10 (2.62–6.39)*
Parkinson's disease	592 (15.4)	1.45 (1.32–1.58)*	183 (4.8)	1.30 (1.12–1.52)*	12 (0.3)	0.89 (0.50–1.58)
Pneumonia	159 (15.1)	1.40 (1.18–1.66)*	47 (4.5)	1.21 (0.90–1.63)	5 (0.5)	1.39 (0.57–3.36)
Stroke	2,027 (14.6)	1.42 (1.34–1.49)*	595 (4.3)	1.19 (1.09–1.30)*	38 (0.3)	0.76 (0.54–1.07)
Any fracture	1,480 (14.4)	1.36 (1.28–1.44)*	525 (5.1)	1.46 (1.33–1.61)*	68 (0.7)	2.18 (1.66–2.86)*
Hip fracture	1,130 (14.1)	1.31 (1.23–1.40)*	398 (5.0)	1.40 (1.26–1.56)*	48 (0.6)	1.87 (1.38–2.55)*
Osteoporosis	1,763 (12.0)	1.08 (1.02–1.43)*	583 (4.0)	1.08 (0.99–1.18)	47 (0.3)	0.90 (0.66–1.23)
Arthritis	3,120 (11.5)	1.02 (0.98–1.07)	1,041 (3.8)	1.04 (0.96–1.12)	91 (0.3)	0.94 (0.74–1.21)
Huntington's chorea	12 (6.6)	0.55 (0.30–0.98)†	1 (0.6)	0.14 (0.02–1.01)†	1 (0.6)	1.59 (0.22–11.35)
ADL Hierarchy scale score						
0 (no impairment; Ref.)	505 (9.0)	1.00	203 (3.6)	1.00	37 (0.7)	1.00
1–2 (mild impairment)	171 (9.8)	1.09 (0.99–1.21)	655 (3.7)	1.03 (0.88–1.21)	96 (0.6)	0.83 (0.57–1.21)
3–4 (moderate impairment)	4,211 (13.2)	1.53 (1.39–1.69)	1,470 (4.6)	0.79 (0.68–0.92)	106 (0.3)	0.30 (0.20–0.45)
5–6 (severe impairment)	3,572 (10.9)	1.23 (1.11–1.35)*	949 (2.9)	1.28 (1.10–1.49)*	65 (0.2)	0.50 (0.34–0.73)*
CPS score						
0 (no impairment; Ref.)	1,387 (16.7)	1.00	606 (7.3)	1.00	101 (1.2)	1.00
1–2 (mild impairment)	2,853 (13.0)	0.75 (0.70–0.80)	1,037 (4.7)	0.63 (0.57–0.70)	107 (0.5)	0.40 (0.30–0.52)
3–4 (moderate impairment)	3,372 (10.5)	0.59 (0.55–0.63)	1,031 (3.2)	0.42 (0.38–0.47)	66 (0.2)	0.17 (0.12–0.23)
5–6 (severe impairment)	2,393 (9.4)	0.52 (0.48–0.56)*	603 (2.4)	0.31 (0.27–0.35)*	30 (0.1)	0.10 (0.06–0.14)*
Pain score						
0 (no pain; Ref.)	4,227 (10.5)	1.00	1,291 (3.2)	1.00	115 (0.3)	1.00
1–2 (daily mild to moderate pain)	5,285 (12.2)	1.18 (1.13–1.24)	1,824 (4.2)	1.33 (1.23–1.43)	175 (0.4)	1.42 (1.12–1.79)
3 (daily excruciating pain)	493 (12.3)	1.20 (1.08–1.33)*	162 (4.1)	1.28 (1.08–1.51)*	14 (0.4)	1.23 (0.71–2.15)†
DRS score						
0 (no depression; Ref.)	5,016 (12.4)	1.00	1,703 (4.2)	1.00	191 (0.5)	1.00
1–2 (mild depression)	2,784 (10.4)	0.82 (0.78–0.87)	909 (3.4)	0.80 (0.74–0.87)	70 (0.3)	0.55 (0.42–0.73)
3+ (evidence of depression)	2,186 (10.7)	0.85 (0.81–0.90)*	656 (3.2)	0.76 (0.69–0.83)*	42 (0.2)	0.44 (0.31–0.61)*
Falls CAP						
Not triggered (Ref.)	8,352 (11.3)	1.00	2,776 (3.7)	1.00	250 (0.3)	1.00
Medium risk	1,043 (12.0)	1.07 (1.00–1.15)	318 (3.6)	0.97 (0.87–1.10)	47 (0.5)	1.60 (1.17–2.19)
High risk	603 (12.4)	1.11 (1.02–1.21)*	182 (3.7)	1.00 (0.86–1.16)	7 (0.1)	0.43 (0.20–0.90)*
Urinary incontinence CAP						
Not triggered (Ref.)	4,242 (10.6)	1.00	1,307 (3.3)	1.00	153 (0.4)	1.00
Facilitate improvement	509 (11.4)	1.08 (0.98–1.19)	166 (3.7)	1.14 (0.97–1.35)	106 (0.3)	1.46 (0.96–2.24)
Prevent decline	4,660 (12.9)	1.25 (1.19–1.30)*	1,478 (4.1)	1.26 (1.17–1.36)*	25 (0.6)	0.77 (0.60–0.98)
Province						
British Columbia (Ref.)	5,913 (12.3)	1.00	1,545 (3.2)	1.00	116 (0.2)	1.00
Manitoba	725 (5.8)	0.43 (0.40–0.47)	233 (1.9)	0.57 (0.49–0.65)	5 (0.04)	0.16 (0.07–0.40)
Newfoundland & Labrador	438 (27.0)	2.63 (2.35–2.94)	49 (3.0)	0.94 (0.70–1.25)	2 (0.1)	0.51 (0.13–2.06)
Nova Scotia	620 (29.5)	2.98 (2.71–3.29)	148 (7.1)	2.28 (1.92–2.72)	10 (0.5)	1.98 (1.03–3.77)
Saskatchewan	2,226 (9.6)	0.76 (0.72–0.80)	1,283 (5.5)	1.76 (1.63–1.90)	170 (0.7)	3.05 (2.41–3.86)
Yukon	83 (24.0)	2.25 (1.75–2.88)*	19 (5.5)	1.75 (1.10–2.78)*	1 (0.7)	1.20 (0.17–8.59)*

*$p < 0.01$. †$p < 0.05$.

PT = physical therapy; OR = unadjusted odds ratio; ADL = activities of daily living; CPS = Cognitive Performance Scale; DRS = Depression Rating Scale, CAP = Clinical Assessment Protocol.

Table 4 Final Step-wise Multivariate Logistic Regression Models and AORs for the Provision of PT across Five Canadian Provinces and One Territory at Three Durations and Frequencies

	AOR (95% CI)		
Parameter	Model 1: Any amount of PT ($n = 10,005$)	Model 2: PT $\geq$45 min on $\geq$3 d ($n = 3,277$)	Model 3: $\geq$150 min on $\geq$5 d ($n = 349$)
Province			
British Columbia (Ref.)			
Manitoba	0.42 (0.39–0.45)*	0.55 (0.47–0.63)*	0.18 (0.07–0.44)*
Newfoundland	2.50 (2.22–2.82)*	0.91 (0.68–1.22)	0.48 (0.12–1.93)
Nova Scotia	3.01 (2.77–3.41)*	2.29 (1.91–2.75)*	1.63 (0.79–3.36)
Saskatchewan	0.81 (0.76–0.86)*	1.93 (1.77–2.12)*	2.77 (2.15–3.58)*
Yukon	2.45 (1.89–3.19)*	1.89 (1.16–3.08)*	1.03 (0.14–7.47)
Age	1.00 (1.00–1.00)	0.99 (0.99–1.00)*	0.96 (0.96–0.97)*
Sex	1.75 (1.24–2.44)*		
Age $\times$ Sex	1.00 (0.99–1.00)*		
Day of stay	1.00 (1.00–1.00)*	1.00 (1.00–1.00)*	
Age $\times$ Day of Stay	1.00 (1.00–1.00)*	1.00 (1.00–1.00)*	
Clinical status			
Stable (Ref.)			
Deteriorated	0.97 (0.92–1.03)	1.01 (0.92–1.11)	1.36 (1.01–1.85)†
Improved	1.97 (1.76–2.21)*	2.45 (2.10–2.84)*	4.98 (3.61–6.88)*
Experiencing an acute episode	1.14 (1.05–1.25)*		
Potential for improvement—self rated	1.30 (1.22–1.39)*	1.42 (1.30–1.58)*	1.65 (1.26–2.18)*
Potential for improvement—staff rated	1.16 (1.08–1.25)*		
Conditions			
Any fracture	1.41 (1.32–1.51)*	1.51 (1.36–1.67)*	2.50 (1.87–3.36)*
Arthritis	1.09 (1.03–1.14)*		
Osteoporosis	1.14 (1.07–1.21)*	1.17 (1.06–1.29)*	
Stroke	1.33 (1.26–1.41)*	1.52 (1.37–1.68)*	
Multiple sclerosis	1.71 (1.48–1.98)*	1.72 (1.40–2.12)*	1.96 (1.19–3.23)*
Pneumonia	1.28 (1.17–1.41)*	1.38 (1.17–1.62)*	
ADL hierarchy score	1.53 (1.45–1.62)*	1.59 (1.45–1.74)*	
ADL hierarchy score^2	0.95 (0.94–0.96)*	0.93 (0.92–0.95)*	
CPS score	0.78 (0.74–0.81)*	0.69 (0.64–0.74)*	0.70 (0.65–0.76)*
CPS score^2	1.03 (1.02–1.04)*	1.04 (1.03–1.06)*	
DRS score	0.93 (0.91–0.95)*	1.26 (1.11–1.42)*	0.86 (0.80–0.93)*
DRS^2	1.01 (1.00–1.01)*	0.94 (0.90–0.99)*	
Pain scale score	1.18 (1.01–1.27)*	0.89 (0.85–0.99)*	
Pain scale score^2	1.96 (0.93–1.98)*	1.01 (1.01–1.01)*	
Urinary incontinence CAP			
Not triggered (Ref.)			
Facilitate improvement	0.90 (0.81–1.00)	0.79 (0.66–0.94)*	
Prevent decline	1.10 (1.04–1.17)*	1.09 (1.00–1.12)	
C statistic	0.67	0.69	0.82

*$p < 0.01$. †$p < 0.05$.
AOR = adjusted odds ratio; PT = physical therapy; ADL = activities of daily living; CPS = Cognitive Performance Scale; DRS = Depression Rating Scale; CAP = Clinical Assessment Protocol.

DISCUSSION

Our study demonstrates that the proportion of LTC residents receiving rehabilitation services varies significantly across Canada and that few residents receive OT and frequent, time-intensive PT. The data suggest that residents who are younger, have the potential to improve or are improving, do not have significant cognitive impairment or mood disorders, and have significant physical impairments due to disease or injury are more likely to receive PT in LTC. Our study describes current rehabilitation practices in LTC in Canada and can be used to inform future recommendations for resource allocation. In particular, resource allocation decisions should consider the factors driving patterns of PT service use, whether the rehabilitation resources available are appropriate to meet the needs of residents in LTC, and the most appropriate goals for residents in LTC.

Variability in the proportion of residents receiving PT across provinces is consistent with that previously reported in Canada.[11,13] Different provinces and territories have different policies on remuneration for services deemed not medically necessary, and different amounts of financial support are therefore available from provincial health insurance plans.[18] A study in the United Kingdom found that rates of PT usage were closely related to the availability of public or private funding,[12] and the

same pattern may be occurring in Canada. The number of hours of PT available as a result of provincial policies or of the ownership (public vs. private) of the LTC facility may also explain this variance. Our study did not examine the relationships between provincial health insurance plans, hours of PT available, and ownership of the LTC facility, but these areas deserve further investigation.

An improved clinical status was consistently a strong positive correlate of receiving PT. It is not clear why residents whose status had improved relative to their last assessment were more likely to be receiving PT. An improved clinical status may be a result of having received PT; however, because of the cross-sectional design of our study, it was not possible to distinguish the reasons why an improved clinical status might be associated with greater likelihood of receiving PT. Our findings on this point appear to contradict those of Berg and colleagues,[11] who found that in countries outside North America, the majority of residents receiving therapy were stable, whereas in the United States fewer were stable and more had experienced an acute event. However, the goals of rehabilitation vary from country to country. For example, the United States has skilled nursing facilities that have a strong focus on rehabilitating residents to return to the community.[35] It may be that in Canada, PT is targeting those residents who are already improving because they are willing and motivated to continue their improvement.

Age, cognition, and depression were three variables consistently correlated with receiving PT, but here the associations were negative. As their age increased, residents were less likely to be receiving PT, which does not align with evidence from recent trials demonstrating improved mobility, strength, and functional outcomes and decreased incidence of falls for frail, institutionalized elderly residents receiving PT.[36,37] Though older residents can improve with muscular training, they may not be referred to rehabilitation services if it is assumed that they do not have the potential to improve. Age would be an important factor for rehabilitation best-practice guidelines to address to ensure that older residents are not excluded from services on the basis of age.

Our findings also show that as cognitive impairment increased, likelihood of receiving PT decreased, which is consistent with other international studies.[11,13] Again, this pattern may reflect an assumption that cognitively impaired LTC residents have little or no potential to improve. Research evidence has contradicted this idea, however, demonstrating that LTC residents with cognitive impairment can demonstrate physical and functional improvements.[14–16,38] Depression, which has been identified as a barrier to the provision of therapy in LTC,[39] was also negatively associated with receiving PT. Although depression can be a barrier to participation in PT, physical rehabilitation may actually have the potential to indirectly improve mood; indeed, there is some evidence that physical rehabilitation can improve mood for residents in LTC, although results are conflicting.[40] Another potential explanation is that older residents and those with cognitive impairments may not actively seek out rehabilitation services and are therefore less likely to receive them. Although difficult clinical decisions arise about allocation of scarce rehabilitation services, it is important to ensure that cognitive impairment does not lead to automatic exclusion from referral to PT and OT.

Among clinical conditions that often require PT, such as stroke, Parkinson disease, and pneumonia, MS and any fracture were the only conditions that remained significant in the model for the most time-intensive level of PT. MS often has an early onset and can lead to long-term disability and physical impairment that usually culminates around the fifth to sixth decade of life.[41,42] In addition, MS is highly variable both from person to person and across time, with a complex, heterogeneous clinical presentation that can include impaired mobility, tremor, spasticity, fatigue, and bladder issues.[41,42] Residents in LTC with MS are therefore likely to be younger, with various levels of physical impairment.[43] Physical therapists have been identified as a necessary part of the interdisciplinary team to maintain and improve physical function for people with MS. Residents with MS may be more likely to receive PT at higher frequencies and durations than those with other conditions such as stroke because they are younger and present with more complex, long-term physical impairments.

Finally, the diagnosis of any fracture was consistently associated with receiving PT. Preventing fractures is of great concern in LTC, especially hip fractures, for which the consequences are often dire.[44,45] Fracture prevention often emphasizes falls prevention because residents in LTC are susceptible to falls, which puts them at increased risk of fracture.[46] Interestingly, at the unadjusted level for higher amounts of PT (PT $\geq$150 min $\geq$5 d/wk), those who triggered the falls CAP at high risk were less likely to be receiving PT than those who had not triggered the falls CAP. Triggering the falls CAP was also not a statistically significant variable associated with any of the three levels of PT in the final adjusted models. Because PT can function effectively as part of a multifactorial falls prevention program,[9] it could be used as a proactive strategy to effectively prevent falls from occurring rather than as a reactive strategy to treat fractures once they have occurred, with potentially more harmful consequences. Therefore, future recommendations should address whether the goals of rehabilitation in LTC should focus more on prevention or on improvement after an acute event.

Our study describes current patterns of rehabilitation resource use and the factors associated with receiving PT in LTC in Canada. Future studies should investigate the funding sources available for PT across provinces and territories and whether there is an association between

the funding available and the resources provided; further examine why older, cognitively impaired residents with depression are less likely to receive PT and whether this pattern is appropriate; and address the goals of rehabilitation appropriate for various clinical conditions of residents in LTC.

LIMITATIONS

Our study has several limitations. First, the cross-sectional design prevented us from ascertaining the outcomes of PT and from establishing the temporal relationships of some of the variables (e.g., improving clinical status). Second, minutes of PT could be captured for only the 7 days before assessment, which may have led us to underestimate the proportion of residents receiving PT if they received it less recently. Third, we could not determine the goals of PT or the type of PT interventions, which might have provided insight into clinical reasoning for allocation of resources. Last, we were not able to compare factors related to service availability—such as provincial health insurance plans, hours of PT available, or ownership of the LTC facility—between provinces or to examine the relationship between these factors and receiving PT.

CONCLUSION

Our results demonstrate that the proportion of residents receiving rehabilitation varies significantly between provinces and territories across Canada. Residents are more likely to receive PT if they are younger, have the potential to improve or are improving, do not have significant cognitive impairment or mood disorders, and have significant physical impairments due to disease or injury. Future recommendations for rehabilitation services in LTC should consider what is driving these patterns of service use, determine whether the available rehabilitation resources are appropriate, and address the most appropriate rehabilitation goals for residents in LTC.

KEY MESSAGES

What is already known on this topic

Residents in LTC have diverse needs that require the work of an interdisciplinary team, including rehabilitation professionals. Although rehabilitation can improve function and quality of life for residents in LTC, there are regional differences in the proportion of residents receiving rehabilitation services nationally and internationally, which suggests that access does not match need. Rehabilitation services in LTC have also been shown to vary internationally according to resident characteristics, such as age and cognitive impairment, and the availability of public or private funding for services.

What this study adds

In Canada, there is wide variability in the proportion of LTC residents receiving rehabilitation services, and few receive time-intensive PT. Receiving PT in LTC is associated with the province of residence, age, a self-rated potential to improve, an improved clinical status, cognition, mood, and significant physical impairment such as fracture or MS. This study describes current practice patterns of rehabilitation in LTC across Canada to lay the foundation for future decision making regarding rehabilitation resource allocation. Points for consideration include the factors driving the patterns of service use, whether the rehabilitation resources available are appropriate, and what the most appropriate goals are for residents in LTC.

REFERENCES

1. Statistics Canada. Living arrangements of seniors. Census in brief No. 4. Ottawa: Minister of Industry; 2011.
2. Doupe M, St John P, Chateau D, et al. Profiling the multidimensional needs of new nursing home residents: evidence to support planning. J Am Med Dir Assoc. 2012;13(5):e9–17. http://dx.doi.org/10.1016/j.jamda.2012.02.005. Medline:22483678
3. Akishita M, Ishii S, Kojima T, et al. Priorities of health care outcomes for the elderly. J Am Med Dir Assoc. 2013;14(7):479–84. http://dx.doi.org/10.1016/j.jamda.2013.01.009. Medline:23415841
4. Crocker T, Young J, Forster A, et al. The effect of physical rehabilitation on activities of daily living in older residents of long-term care facilities: systematic review with meta-analysis. Age Ageing. 2013;42(6):682–8. http://dx.doi.org/10.1093/ageing/aft133. Medline:24004604
5. Tse MMY, Ho SSK. Pain management for older persons living in nursing homes: a pilot study. Pain Manag Nurs. 2013;14(2):e10–21. http://dx.doi.org/10.1016/j.pmn.2011.01.004. Medline:23688367
6. Wright A, Sluka KA. Nonpharmacological treatments for musculoskeletal pain. Clin J Pain. 2001;17(1):33–46. http://dx.doi.org/10.1097/00002508-200103000-00006. Medline:11289087
7. Jaul E. Assessment and management of pressure ulcers in the elderly: current strategies. Drugs Aging. 2010;27(4):311–25. http://dx.doi.org/10.2165/11318340-000000000-00000. Medline:20359262
8. Vinsnes AG, Helbostad JL, Nyrønning S, et al. Effect of physical training on urinary incontinence: a randomized parallel group trial in nursing homes. Clin Interv Aging. 2012;7:45–50. http://dx.doi.org/10.2147/CIA.S25326. Medline:22334767
9. Cameron ID, Gillespie LD, Robertson MC, et al. Interventions for preventing falls in older people in care facilities and hospitals. Cochrane Db Syst Rev. 2012;12.
10. Hirdes JP, Mitchell L, Maxwell CJ, et al. Beyond the ''iron lungs of gerontology'': using evidence to shape the future of nursing homes in Canada. Can J Aging. 2011;30(3):371–90. http://dx.doi.org/10.1017/S0714980811000304. Medline:21851753
11. Berg K, Sherwood S, Murphy K, et al. Rehabilitation in nursing homes: a cross-national comparison of recipients. Age Ageing. 1997;26(Suppl 2):37–42. http://dx.doi.org/10.1093/ageing/26.suppl_2.37. Medline:9464553
12. Barodawala S, Kesavan S, Young J. A survey of physiotherapy and occupational therapy provision in UK nursing homes. Clin Rehabil. 2001;15(6):607–10. http://dx.doi.org/10.1191/0269215501cr454oa. Medline:11777091
13. Leemrijse CJ, de Boer ME, van den Ende CHM, et al. Factors associated with physiotherapy provision in a population of elderly nursing home residents: a cross sectional study. BMC Geriatr. 2007;7(1):7. http://dx.doi.org/10.1186/1471-2318-7-7. Medline:17407612
14. Christofoletti G, Oliani MM, Gobbi S, et al. A controlled clinical trial on the effects of motor intervention on balance and cognition in institutionalized elderly patients with dementia. Clin Rehabil. 2008;22(7):618–26. http://dx.doi.org/10.1177/0269215507086239. Medline:18586813

15. Littbrand H, Rosendahl E, Lindelöf N, et al. A high-intensity functional weight-bearing exercise program for older people dependent in activities of daily living and living in residential care facilities: evaluation of the applicability with focus on cognitive function. Phys Ther. 2006;86(4):489–98. Medline:16579666
16. Rolland Y, Pillard F, Klapouszczak A, et al. Exercise program for nursing home residents with Alzheimer's disease: a 1-year randomized, controlled trial. J Am Geriatr Soc. 2007;55(2):158–65. http://dx.doi.org/10.1111/j.1532-5415.2007.01035.x. Medline:17302650
17. Fries BE, Schneider DP, Foley WJ, et al. Refining a case-mix measure for nursing homes: Resource Utilization Groups (RUG-III). Med Care. 1994;32(7):668–85. http://dx.doi.org/10.1097/00005650-199407000-00002. Medline:8028403
18. Health Canada. Canada Health Act—frequently asked questions. Ottawa: Health Canada; c2011 [updated 2011 Oct 20; cited 2014 Jan 18]. Available from: http://www.hc-sc.gc.ca/hcs-sss/medi-assur/faq-eng.php#a3.
19. Hirdes JP, Poss JW, Caldarelli H, et al. An evaluation of data quality in Canada's Continuing Care Reporting System (CCRS): secondary analyses of Ontario data submitted between 1996 and 2011. BMC Med Inform Decis Mak. 2013;13(1):27. http://dx.doi.org/10.1186/1472-6947-13-27. Medline:23442258
20. Hirdes JP, Fries BE, Morris JN, et al. Integrated health information systems based on the RAI/MDS series of instruments. Healthc Manage Forum. 1999;12(4):30–40. http://dx.doi.org/10.1016/S0840-4704(10)60164-0. Medline:10788069
21. Morris JN, Fries BE, Steel K, et al. Comprehensive clinical assessment in community setting: applicability of the MDS-HC. J Am Geriatr Soc. 1997;45(8):1017–24. Medline:9256857
22. Hirdes JP, Ljunggren G, Morris JN, et al. Reliability of the interRAI suite of assessment instruments: a 12-country study of an integrated health information system. BMC Health Serv Res. 2008;8(1):277. http://dx.doi.org/10.1186/1472-6963-8-277. Medline:19115991
23. Morris JN, Fries BE, Morris SA. Scaling ADLs within the MDS. J Gerontol A Biol Sci Med Sci. 1999;54(11):M546–53. http://dx.doi.org/10.1093/gerona/54.11.M546. Medline:10619316
24. Morris JN, Fries BE, Mehr DR, et al. MDS cognitive performance scale. J Gerontol. 1994;49(4):M174–82. http://dx.doi.org/10.1093/geronj/49.4.M174. Medline:8014392
25. Burrows AB, Morris JN, Simon SE, et al. Development of a minimum data set-based depression rating scale for use in nursing homes. Age Ageing. 2000;29(2):165–72. http://dx.doi.org/10.1093/ageing/29.2.165. Medline:10791452
26. Koehler M, Rabinowitz T, Hirdes J, et al. Measuring depression in nursing home residents with the MDS and GDS: an observational psychometric study. BMC Geriatr. 2005;5(1):1. http://dx.doi.org/10.1186/1471-2318-5-1. Medline:15627403
27. Fries BE, Simon SE, Morris JN, et al. Pain in U.S. nursing homes: validating a pain scale for the minimum data set. Gerontologist. 2001;41(2):173–9. http://dx.doi.org/10.1093/geront/41.2.173. Medline:11327482
28. Brandeis GH, Berlowitz DR, Hossain M, et al. Pressure ulcers: The minimum data set and the resident assessment protocol. Adv Wound Care. 1995;8(6):18–25. Medline:8696573
29. Martin L, Hirdes JP, Morris JN, et al. Validating the mental health assessment protocols (MHAPs) in the Resident Assessment Instrument Mental Health (RAI-MH). J Psychiatr Ment Health Nurs. 2009;16(7):646–53. http://dx.doi.org/10.1111/j.1365-2850.2009.01429.x. Medline:19689558
30. Zhu M, Zhang Z, Hirdes JP, et al. Using machine learning algorithms to guide rehabilitation planning for home care clients. BMC Med Inform Decis Mak. 2007;7(1):41. http://dx.doi.org/10.1186/1472-6947-7-41. Medline:18096079
31. Resnick NM, Brandeis GH, Baumann MM, et al. Evaluating a national assessment strategy for urinary incontinence in nursing home residents: reliability of the minimum data set and validity of the resident assessment protocol. Neurourol Urodyn. 1996;15(6):583–98. http://dx.doi.org/10.1002/(SICI)1520-6777(1996)15:6<583::AID-NAU1>3.0.CO;2-B. Medline:8916112
32. Fries BE, Morris JN, Bernabei R, et al. Rethinking the resident assessment protocols. J Am Geriatr Soc. 2007;55(7):1139–40. http://dx.doi.org/10.1111/j.1532-5415.2007.01207.x. Medline:17608893
33. Mathias K, Hirdes JP, Pittman D. A care planning strategy for traumatic life events in community mental health and inpatient psychiatry based on the InterRAI assessment instruments. Community Ment Health J. 2010;46(6):621–7. http://dx.doi.org/10.1007/s10597-010-9308-2. Medline:20449657
34. Osbourne JW. Best practices in logistic regression. Thousand Oaks (CA): Sage; 2014.
35. Kochersberger G, Hielema F, Westlund R. Rehabilitation in the nursing home: how much, why, and with what results. Public Health Rep. 1994;109(3):372–6. Medline:8190860
36. Krist L, Dimeo F, Keil T. Can progressive resistance training twice a week improve mobility, muscle strength, and quality of life in very elderly nursing-home residents with impaired mobility? A pilot study. Clin Interv Aging. 2013;8:443–8. http://dx.doi.org/10.2147/CIA.S42136. Medline:23637524
37. Cadore EL, Casas-Herrero A, Zambom-Ferraresi F, et al. Multicomponent exercises including muscle power training enhance muscle mass, power output, and functional outcomes in institutionalized frail nonagenarians. Age (Dordr). 2014;36(2):773–85. http://dx.doi.org/10.1007/s11357-013-9586-z. Medline:24030238
38. Roach KE, Tappen RM, Kirk-Sanchez N, et al. A randomized controlled trial of an activity specific exercise program for individuals with Alzheimer disease in long-term care settings. J Geriatr Phys Ther. 2011;34(2):50–6. http://dx.doi.org/10.1519/JPT.0b013e31820aab9c. Medline:21937893
39. Ushikubo M. A study of factors facilitating and inhibiting the willingness of the institutionalized disabled elderly for rehabilitation: a United States-Japanese comparison. J Cross Cult Gerontol. 1998;13(2):127–57. http://dx.doi.org/10.1023/A:1006503909886. Medline:14617912
40. Crocker T, Forster A, Young J, et al. Physical rehabilitation for older people in long-term care. Cochrane Db Syst Rev. 2013;2.
41. Beer S, Khan F, Kesselring J. Rehabilitation interventions in multiple sclerosis: an overview. J Neurol. 2012;259(9):1994–2008. http://dx.doi.org/10.1007/s00415-012-6577-4. Medline:22772357
42. Pfleger CC, Flachs EM, Koch-Henriksen N. Social consequences of multiple sclerosis (1): early pension and temporary unemployment—a historical prospective cohort study. Mult Scler. 2010;16(1):121–6. http://dx.doi.org/10.1177/1352458509352196. Medline:20007430
43. Buchanan RJ, Wang S, Ju H. Analyses of the minimum data set: comparisons of nursing home residents with multiple sclerosis to other nursing home residents. Mult Scler. 2002;8(6):512–22. http://dx.doi.org/10.1191/1352458502ms823oa. Medline:12474994
44. Rubenstein LZ, Josephson KR, Robbins AS. Falls in the nursing home. Ann Intern Med. 1994;121(6):442–51. http://dx.doi.org/10.7326/0003-4819-121-6-199409150-00009. Medline:8053619
45. Nurmi I, Lüthje P. Incidence and costs of falls and fall injuries among elderly in institutional care. Scand J Prim Health Care. 2002;20(2):118–22. http://dx.doi.org/10.1080/pri.20.2.118.122. Medline:12184711
46. van Doorn C, Gruber-Baldini AL, Zimmerman S, et al. Dementia as a risk factor for falls and fall injuries among nursing home residents. J Am Geriatr Soc. 2003;51(9):1213–8. http://dx.doi.org/10.1046/j.1532-5415.2003.51404.x. Medline:12919232