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Original Study

Hospitalization and Mortality Rates in Long-Term Care Facilities: Does For-Profit Status Matter?



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A B S T R A C T

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Objectives: To establish if proprietary status (ie, for-profit or not-for-profit) is associated with mortality and hospitalizations among publicly funded long-term care (nursing) homes.

Methods: We conducted a retrospective cohort study of new admissions in 640 publicly funded long-term care facilities in Ontario, Canada (384 for-profit, 256 not-for-profit). A population-based cohort of 53,739 incident admissions into long-term care facilities between January 1, 2010, and March 1, 2012, was observed. We measured adjusted rates of hospital admissions and mortality, per 1000 person-years (PY) of follow-up, among for-profit and not-for-profit facilities at 3, 6, and 12 months postadmission. Rates were measured postadmission and until discharge or death, whichever came first.

Results: One year after admission and before discharge, 11.7% of residents died and 25.7% had at least one hospitalization. After 12 months of follow-up, residents in for-profit facilities had a hospitalization rate of 462 per 1000 PY versus 358 per 1000 PY in not-for-profit facilities. During this period, the crude mortality rate in for-profit facilities was 208 per 1000 PY versus 185 per 1000 PY in not-for-profit facilities. At 3, 6, and 1 year after admission, for-profit facilities had an adjusted hazard ratio of 1.36 (95% confidence interval [CI] 1.28–1.43), 1.33 (95% CI 1.27–1.39), and 1.25 (95% CI 1.21–1.30) for hospitalizations and hazards of 1.20 (95% CI 1.11–1.29), 1.16 (95% CI 1.09–1.24), and 1.10 (95% CI 1.05–1.16) for mortality, respectively.

Conclusions: Publicly funded for-profit facilities have significantly higher rates of both mortality and hospital admissions.

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We have gone through and met the STROBE checklist for observational studies in our manuscript. More details of this process can be requested from the corresponding author.

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Long-term care (LTC) facilities, also commonly known as nursing homes, deliver care to individuals unable to live in the community due to illness and/or disability. In addition to housing, LTC facilities provide personal and medical support, including 24-hour nursing care. The need for LTC facilities increases with age, and is expected to increase in aging populations.^{1,2} Discussions on quality of care in LTC facilities are widespread,^{3–6} and monitoring of performance indicators is becoming increasingly common.^{7–12}

Internationally, there is significant heterogeneity in how LTC facilities are owned and operated; for example, more than half of facilities in Canada, the United States, and the United Kingdom are managed by for-profit institutions,^{13–15} and not-for-profit facilities can be managed by private (eg, religious or lay) or public (eg, municipal, provincial, or federal) corporations. Homes across jurisdictions have varying mixes of public/private funding, depending on factors such as legislation and level of government involvement in

care delivery. The effect of LTC facilities' proprietary status on quality of care has been studied, and one review in 2009 suggested that not-for-profit nursing homes provide superior care.¹⁵ There were, however, considerable inconsistencies across the studies and among outcomes. Only 40 of 82 studies reviewed showed statistically significant findings in favor of not-for-profit facilities for all outcomes, a few showed findings in favor of for-profit facilities, and many showed non-statistically significant findings.¹⁵ Several reasons have been proposed for the inconsistencies across studies, including underlying differences in the characteristics of residents that for-profit and not-for-profit homes attract and accept, differences in public and private funding levels both within and across profit status, and inadequate risk-adjustment.⁵ In addition, most studies rely on publicly reported quality indicators (eg, prevalence of pressure ulcers or use of physical restraints) that are often tied to remuneration, introducing potential reporting biases.^{16,17} It has also been suggested that some quality-of-care indicators may reflect clinical outcomes that are too insignificant to affect important health care events, such as hospitalizations.^{18,19}

We examined mortality and hospitalizations in a large, population-based cohort of newly admitted residents in Ontario, Canada. We did so in an environment in which funding mechanisms and resident-placement schemes are structured uniformly across all facilities. First, all facilities receive standardized base public funding, with co-payments (within this funding) paid by the resident based on financial means. Funding is set relative to the needs of residents, measured using internationally validated interRAI Long-Term Care Facilities Assessment System tools.²⁰ Unlike other jurisdictions, such as the United States, England, and other European countries, all Ontario homes are legislated against charging patients additional funds for core services. This largely addresses concerns of differential funding/payer levels and mixes observed in other jurisdictions.¹⁵ Despite the uniformity of public funding, for-profit facilities in Ontario are able to draw funds deemed as profit for the financial benefit of owners and/or shareholders. Not-for-profit facilities can also make profit, but such funds must be reserved and used solely for the purposes of facility matters.

Second, the resident-to-facility matching process in Ontario has features that remove biases in patient and facility preferences. Ontario's referral system is organized centrally; potential residents choose a number of facilities (currently 5), and are placed on the wait list of those facilities. Where applicants fall on each of the facilities' respective wait lists depends primarily on the relative needs of other applicants on the list. When a facility has an open bed, the first person on the list is offered the bed. Profit status is typically not a consideration when patients choose their list of facilities. Where patients fall on each list, and how quickly a list moves is out of the control the applicant. Significant disincentive is placed on applicants to avoid rejecting a matched home; these clients would automatically be put on the bottom of the wait list, and can be financially penalized if waiting from an acute care bed. Conversely, a recent report shows that facilities in Ontario rarely reject a matched resident.²¹ This is in contrast to most other jurisdictions, such as in the United States and England, where homes have greater control on who to admit and how many (if any) government-funded residents they accept. Finally, our study considers and adjusts for a large set of both individual- and facility-level covariates, largely not done in previous studies.¹⁵ We aimed to conclusively determine whether proprietary status (for-profit or not-for-profit) is associated with rates of hospitalizations and mortality in the LTC population.

Methods

We carried out a population-based retrospective cohort study to examine the differences between rates of hospitalization and

mortality in for-profit and not-for-profit LTC homes. We captured all incident admissions to LTC facilities between January 1, 2010, and March 31, 2012, in Ontario, Canada. To accomplish this, we applied several exclusions, including removing an admission if it was observed that the resident was transferred from another facility or had a previous admission in a LTC facility (Appendix Figure 1). Using encrypted health card numbers as unique but encoded identifiers, records of health care use were linked across various administrative databases. No written consent was obtained; all data were encrypted using health card numbers as unique identifiers. Thus all records used were de-identified and anonymized. All data were housed and analyzed at the Institute for Clinical Evaluative Sciences (ICES), a prescribed entity for the purposes of section 45 Ontario's Personal Health Information Privacy Act. Ethics approval was obtained from ICES at the Sunnybrook Health Sciences Centre Research Ethics Board in Toronto, Ontario, and from the Ottawa Hospital Research Institute Ethics Board in Ottawa, Ontario (Protocol 20130579-01H).

Data Sources and Definitions

Incident admissions to LTC facilities were identified using the Canadian Continuing Care Reporting System (CCRS). The CCRS collects information on all residents and facilities using the validated Resident Assessment Instrument Minimum Data Set (RAI-MDS).^{20,22} Assessments are done at entry, quarterly, and on any significant health status changes. We used the CCRS to capture information on patient demographics, clinical status, and functional status.²² We categorized facilities by for-profit and not-for-profit (religious, lay, or government) ownership, and by facility size. All homes fall under the same provincial LTC legislation; for-profit facilities typically distribute a portion of net revenues to investors, whereas not-for-profits do not. Information from the CCRS is used to support system planning and clinical practice, and directly affects the level of funding provided by the government, based on level of need for services for each resident.

Data on hospitalizations and mortality were obtained using linkage of individuals in the CCRS to the Discharge Abstract Database (DAD) and the Registered Persons Database (RPDB), respectively. The RPDB also was used to obtain patient age, sex, and postal code. Following well-established methods, both neighborhood income of client's last residence and rurality were captured by linking to Statistics Canada census data using postal codes.²³

Outcomes

Outcomes were calculated at 3, 6, and 12 months after admission using rates per 1000 person-years (PY) of follow-up in LTC. Patients were followed from admission to any discharge, death, or for 365 days, whichever came first. We examined time to first hospitalization and time to death for each individual, during the follow-up period, while residents were in their incident LTC facility. Hospitalizations that occur before discharge from the LTC facility are captured by observing a record in the DAD with an admission date that overlapped the length of stay in the LTC facility.

Some hospitalizations and all deaths led to discharge from a LTC facility. The date of such events are captured in the DAD admission date or RPDB death date, which should be the same as the CCRS discharge date (end of follow-up period for each resident); to account for administrative discrepancies in these dates, hospitalizations (in DAD) and deaths (in RPDB) captured 3 days post-CCRS discharge date were included if it was noted in the CCRS that these discharges occurred to hospital or death, respectively.

Table 1
Number of Facilities by Facility Ownership and Facility Type

	No. (%) of For-Profit Facilities	No. (%) of Not-For-Profit Facilities				All
		Religious	Lay	Government	Total Not-For-Profit	
All LTC facilities, % total facilities	384 (60.0)	25 (3.9)	95 (14.8)	136 (21.3)	256 (40.0)	640 (100)
No. of beds						
1–19	0 (0)	1 (4)	0 (0)	12 (8.8)	13 (5.1)	13 (2.03)
20–49	29 (7.6)	1 (4)	10 (10.5)	15 (11.0)	26 (10.2)	55 (8.6)
50–99	150 (39.1)	8 (32)	32 (33.7)	18 (13.2)	58 (22.7)	208 (32.5)
100–149	97 (25.3)	6 (24)	27 (28.4)	28 (20.6)	61 (23.8)	158 (24.7)
≥150	108 (28.1)	9 (36)	26 (27.4)	63 (46.3)	98 (38.3)	206 (32.2)
Facility neighborhood quintile						
1 (lowest)	85 (22.1)	3 (12)	21 (22.1)	43 (31.6)	67 (26.2)	152 (23.8)
2	68 (17.7)	8 (32)	21 (22.1)	14 (10.3)	43 (16.8)	111 (17.3)
3	86 (22.4)	6 (24)	14 (14.7)	30 (22.1)	50 (19.5)	136 (21.3)
4	76 (19.8)	3 (12)	18 (18.9)	29 (21.3)	50 (19.5)	126 (19.7)
5 (highest)	67 (17.5)	5 (20)	21 (22.1)	20 (14.7)	46 (18.0)	113 (17.7)
Missing	2 (0.5)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0.3)
Facility urbanicity						
Urban	299 (77.9)	23 (92)	76 (80)	89 (65.4)	188 (73.4)	487 (76.1)
Rural	85 (22.1)	2 (8)	19 (20)	47 (34.6)	68 (26.6)	153 (23.9)

Statistical Analysis

Facility-level rates of hospitalization and mortality per 1000 PY were calculated. Facilities were grouped into 2 sets of quintiles, according to each facility's overall rate of hospitalization and mortality after 12 months of follow-up for all resident admissions. The facilities were then divided among for-profit and not-for-profit status. Hospitalization and mortality rates for all residents in all for-profit and not-for-profit facilities were also calculated at 3, 6, and 12 months.

Multivariable models

Using individual-level data, we created separate multivariable models for time to hospitalization and time to mortality, examining the effect of for-profit status while adjusting for patient demographics (age, sex, marital status, neighborhood income before entry), facility variables (facility urbanicity and facility size), and for patient illness and acuity (location before admission, and Changes in Health, End-stage disease, and Signs and Symptoms [CHESS] score).²⁴ CHESS was chosen as a prevalidated, composite measure of illness and disability; it includes components of cognitive and physical disability (eg, change in decision-making and activities of daily living), and various signs and symptoms of illness and decline (eg, dyspnea, vomiting, decreased fluid intake, and weight loss). We examined differences in residents between profit status for various other potential confounding variables; we chose not to include these variables in our model (in addition to CHESS), for reasons of parsimony and collinearity between variables.

Cox-proportional hazards were used to model time to death. Competing risk models were used to explore the impact of covariates on hospitalizations. Competing risk models weight each individual and, if they experience a competing event (ie, mortality) that prevents the event of interest (ie, hospitalizations), the model calculates the probability of experiencing the event of interest had the competing event never occurred. The *P* values and 95% confidence intervals (CIs) of each hazard ratio were calculated. We used SAS 9.3 (SAS Institute, Inc, Cary, NC) for all analyses.

Sensitivity analyses

As part of our sensitivity analyses, to examine the consistency of our findings, we compared rates of hospitalizations and mortality in for-profit and not-for-profit homes across a large number of subgroups. In addition to our main outcomes, we examined rates of publicly reported quality-of-care indicators on admission and at 3 months after admission: use of physical restraints, pressure ulcers,

incontinence, and falls.¹² We also examined a subset of hospitalizations that have been previously determined to be care-sensitive and potentially preventable (anemia, dehydration, urinary tract infection, decubitus ulcers, and gangrene).^{25,26} Finally, to ensure that our selection criteria did not bias our results, we examined the effect of removing those classified as short stays (expected to stay fewer than 90 days) and, separately, the effect of including all admissions (ie, including nonincident admissions).

Results

We examined LTC admissions in 640 facilities, 384 (60.0%) of which were for-profit and 256 (40.0%) were not-for-profit (Table 1). More than half of not-for-profit facilities were governmentally (municipal, provincial, or federal) owned, with the rest being operated by lay private or religious organizations. About one-third of all facilities had 150 beds or more (28.1% among for-profits versus 38.3% among for-profits), and 89% (92.5% among for-profits versus 84.8% among not-for-profits) had more than 50 beds.

There were 53,739 new, distinct residents admitted (Table 2). There was a predominance of women (64.9%), and those older than 80 years (68.3%). Most were admitted from an inpatient acute care facility (38.6%) or from home (34.5%). Residents tended to live in poorer neighborhoods before entry. A higher proportion of residents in for-profit facilities were admitted from inpatient acute care (41.6% versus 33.5%), whereas a higher proportion of residents in not-for-profit facilities were admitted from home (38.7% versus 33.0%). There were otherwise minimal differences in residents by proprietary status.

Table 3 compares the clinical characteristics of residents by facility proprietary status. Overall, residents had significant limitations in cognition and in performing activities of daily living, regardless of facility ownership. Most residents fell into the clinically complex (25.8%) or reduced physical function (35.0%) resource utility groups (RUGs). RUGs are used in Ontario to determine the level of funding for each individual. Most residents had low instability, as measured by the CHESS score.²⁴ More than half of residents (55.7%) were recorded as having dementia on admission. There were very small differences in the clinical characteristics of residents across proprietary status.

Rates of Mortality and Hospitalization

In the year of follow-up after admission, 11.7% of residents died and 25.7% had at least one hospitalization before discharge. It should

Table 2
Characteristics of Residents in Facilities of For-Profit and Not-For-Profit Facilities, Obtained from the CCRS

Characteristics	For-Profit	Not-For-Profit	Total
Sex			
Female	21,886 (64.6)	12,993 (65.5)	34,879 (64.9)
Male	11,991 (35.4)	6817 (34.4)	18,808 (35.0)
Unspecified	28 (0.1)	24 (0.1)	52 (0.1)
Age at entry			
18–49	414 (1.2)	251 (1.3)	665 (1.2)
50–59	1011 (3.0)	499 (2.5)	1510 (2.8)
60–69	2520 (7.4)	1260 (6.4)	3780 (7.0)
70–79	7176 (21.2)	3895 (19.6)	11,071 (20.6)
80–89	15,901 (46.9)	9641 (48.6)	25,542 (47.5)
90+	6883 (20.3)	4288 (21.6)	11,171 (20.8)
Marital status			
Never married	2586 (7.6)	1456 (7.3)	4042 (7.5)
Married	10,187 (30.1)	6315 (31.8)	16,502 (30.7)
Widowed	17,529 (51.7)	10,282 (51.8)	27,811 (51.8)
Separated	788 (2.3)	374 (1.9)	1162 (2.2)
Divorced	2197 (6.5)	1021 (5.2)	3218 (6.0)
Unknown	618 (1.8)	386 (2.0)	1004 (1.9)
Lived alone before entry			
No	25,702 (75.8)	15,030 (75.8)	40,732 (75.8)
Yes	7081 (20.9)	4214 (21.3)	11,295 (21.0)
Unknown	1122 (3.3)	590 (3.0)	1712 (3.2)
Language spoken at home			
Non-English	5806 (17.1)	3776 (19.0)	9582 (17.8)
English	28,099 (82.9)	16,058 (81.0)	44,157 (82.2)
Last residence income quintile			
1 (lowest)	7926 (23.4)	4366 (22.0)	12,292 (22.9)
2	6353 (18.7)	3481 (17.6)	9834 (18.3)
3	6169 (18.2)	3678 (18.5)	9847 (18.3)
4	5366 (15.8)	3172 (16.0)	8538 (15.9)
5 (highest)	4925 (14.5)	3029 (15.3)	7954 (14.8)
Unknown	3166 (9.3)	2108 (10.6)	5274 (9.8)
Previous stay in board and care, assisted living, or group home in past 5 years			
No	26,325 (77.6)	14,919 (75.2)	41,244 (76.7)
Yes	6055 (17.9)	3703 (18.7)	9758 (18.2)
Unknown	1525 (4.5)	1212 (6.1)	2737 (5.1)
Admitted From			
Ambulatory health service	636 (1.9)	163 (0.8)	799 (1.5)
Inpatient acute care service	14,113 (41.6)	6636 (33.5)	20,749 (38.6)
Inpatient rehabilitation service	1177 (3.4)	607 (3.1)	1784 (3.3)
Inpatient continuing care service	2035 (6.0)	1473 (7.4)	3508 (6.5)
Inpatient psychiatry service	418 (1.2)	242 (1.2)	660 (1.2)
Home care service	2854 (8.4)	2305 (11.6)	5159 (9.1)
Residential care service (board and care)	4262 (12.6)	2867 (14.5)	7129 (13.3)
Private home (no home care)	8324 (24.6)	5369 (27.1)	13,693 (25.5)

be noted that residents who were discharged before the full year of follow-up (eg, back home, or to another facility) were no longer followed for hospitalization or mortality and did not contribute to the follow-up (PY) denominator. Overall, not accounting for such censoring, 24.7% of residents 1 year postadmission died and 31.8% were hospitalized (data not shown). Not including death, 46.5% of the admission cohort was discharged before the full year of follow-up.

The rates of mortality per 1000 PY of follow-up were 291.0, 238.1, and 198.7 at 3, 6, and 12 months, respectively (Table 4). For hospitalizations, the rates were 608.3, 508.8, and 422.1 per 1000 PY, respectively. Compared with not-for-profit facilities, for-profit facilities had 18.4%, 16.7%, and 12.3% greater mortality rates per 1000 PY and 38.2%, 35.9%, and 29.2% greater hospitalization rates at 3, 6, and 12 months, respectively ($P < .01$). For the 12-month follow-up period, for-profit facilities had 14.3% and 12.0% of its facilities in the lowest quintiles for mortality and hospitalizations (as opposed to the expected 20%), whereas not-for-profit facilities had 28.4% and 32.4% in the same quintiles, respectively. Conversely, for-profit homes had

Table 3
Number of Residents in For-Profit and Not-For-Profit Homes, by Clinical Variables, Obtained from the CCRS

Characteristics	For-Profit	Not-For-Profit	Total
Activities of daily living limitations			
Independent	1992 (5.9)	1573 (7.9)	3565 (6.6)
Supervision	2955 (8.7)	2003 (10.1)	4958 (9.2)
Limited	6439 (19.0)	3910 (19.7)	10,349 (19.3)
Extensive 1	8833 (26.1)	5196 (26.2)	14,029 (26.1)
Extensive 2	5241 (15.5)	2619 (13.2)	7860 (14.6)
Dependent	6696 (19.7)	3647 (18.4)	10,343 (19.3)
Total Dependence	1749 (5.2)	886 (4.5)	2635 (4.9)
Cognitive Performance Scale			
0: Intact	6618 (19.5)	4256 (21.5)	10,874 (20.2)
1: Borderline Intact	4670 (13.8)	2706 (13.6)	7376 (13.7)
2: Mild impairment	7737 (22.8)	4065 (20.5)	11,802 (22.0)
3: Moderate Impairment	9646 (28.5)	5657 (28.5)	15,303 (28.5)
4: Moderate Severe Impairment	2030 (6.0)	1089 (5.5)	3119 (5.8)
5: Severe Impairment	2066 (6.1)	1470 (7.4)	3536 (6.6)
6: Very Severe Impairment	1138 (3.4)	591 (3.0)	1729 (3.2)
Resource Utility Group: III (44-group)			
Behavioral problems	954 (2.8)	529 (2.7)	1483 (2.8)
Clinically complex	8545 (25.2)	5302 (26.7)	13,847 (25.8)
Impaired cognition	4028 (11.9)	2873 (14.5)	6901 (12.8)
Reduced physical function	12,186 (35.9)	6597 (33.3)	18,783 (35.0)
Special rehabilitation	4259 (12.6)	2516 (12.7)	6775 (12.6)
Extensive care	912 (2.7)	439 (2.2)	1351 (2.5)
Special care	3021 (8.9)	1578 (8.0)	4599 (8.6)
CHES score			
0 (no instability)	16,738 (49.4)	9861 (49.7)	26,599 (49.5)
1	10,542 (31.1)	6109 (30.8)	16,651 (31.0)
2	4652 (13.7)	2659 (13.4)	7311 (13.6)
3	1447 (4.3)	850 (4.3)	2297 (4.3)
4	463 (1.4)	306 (1.5)	769 (1.4)
5 (highest level of instability)	63 (0.2)	49 (0.3)	112 (0.2)
Chronic disease prevalence:			
Alzheimer	4698 (13.9)	3202 (16.1)	7900 (14.7)
Dementia other than Alzheimer	14,207 (41.9)	7808 (39.4)	22,015 (41.0)
Cancer	3618 (10.7)	2073 (10.5)	5691 (10.6)
Stroke	7227 (21.3)	3564 (18.0)	10,791 (20.1)
Congestive heart failure	4911 (14.5)	2525 (12.7)	7436 (16.9)
Emphysema/COPD	5665 (16.7)	2881 (14.5)	8546 (15.9)
Depression	7504 (22.1)	4321 (21.8)	11,825 (22.0)
Diabetes	9442 (27.9)	4858 (24.5)	14,300 (26.6)
Arthritis	12,912 (38.1)	7434 (37.5)	20,346 (37.9)
Number of Medications:			
0	242 (0.7)	104 (0.52)	346 (0.6)
1–5	4577 (13.5)	2645 (13.3)	7222 (13.4)
6–10	13,923 (41.1)	8031 (40.5)	21,954 (40.9)
11–15	11,113 (32.8)	6517 (32.9)	17,630 (32.8)
16–20	3366 (9.9)	2097 (10.6)	5463 (10.2)
21+	684 (2.0)	440 (2.2)	1124 (2.1)

COPD, chronic obstructive pulmonary disease.

23.7% and 25.5% of its homes in the highest quintiles for mortality and hospitalizations (at 12 months), whereas not-for-profit homes had 14.2% and 11.3% in the same quintiles, respectively.

Multivariable Models for Mortality and Hospitalizations

At 12 months after admission, for-profit homes had an adjusted hazard ratio of 1.10 (95% CI 1.05–1.16) for mortality (Table 5) and 1.25 (95% CI 1.21–1.30) for hospitalization relative to not-for-profit homes (Table 6). These models were adjusted for individual demographic variables (age, sex, marital status, and resident neighborhood income quintile), facility variables (urbanicity and size), and measures of illness and acuity (location before admission and CHES score). The adjusted hazards for hospitalizations and mortality generally trended higher when observing periods closer to admission (models at 3 and 6 months) (Tables 5 and 6). Increasing facility size was protective for mortality but was a risk for hospitalization.

Table 4

Crude Mortality and Hospitalization Rates per PY in the 3, 6, and 12 Months After Admission to For-Profit and Not-For-Profit LTC Facilities

Characteristics	No. of Facilities (%)		
	For-Profit	Not-For-Profit	All Facilities
Mortality rate per 1000 PY			
Q1*: 0–115.0	54 (14.1)	73 (28.7)	127 (19.9)
Q2: 115.0–168.9	81 (21.1)	47 (18.5)	128 (20.1)
Q3: 168.9–216.0	78 (20.3)	50 (19.7)	128 (20.1)
Q4: 216.0–283.4	81 (21.1)	47 (18.5)	128 (20.1)
Q5: 283.4–785.9	90 (23.4)	37 (14.6)	127 (19.9)
Overall rate, 12 mo	207.5	184.7 [†]	198.7
Overall rate, 6 mo	251.8	215.7 [†]	238.1
Overall rate, 3 mo	308.9	261.0 [†]	291.0
Hospitalization rate, per 1000 PY			
Q1*: 0–269.3	51 (13.3)	76 (29.9)	127 (19.9)
Q2: 269.3–344.5	65 (16.9)	63 (24.8)	128 (20.1)
Q3: 344.5–426.0	77 (20.1)	51 (20.1)	128 (20.1)
Q4: 426.0–537.0	85 (22.1)	43 (16.9)	128 (20.1)
Q5: 537.0–1229.8	106 (27.6)	21 (8.3)	127 (19.9)
Overall rate, 12 mo	462.4	358.0 [†]	422.1
Overall rate, 6 mo	565.4	416.1 [†]	508.8
Overall rate, 3 mo	678.4	490.9 [†]	608.3

*All facilities were sorted into quintiles by their 12-month mortality or hospitalization rate, where Q1 identifies the 20% of all facilities with the lowest rates of outcome and Q5 the facilities with the highest outcome rates.

[†] $P < .01$ (compared with rates in for-profit facilities).

Sensitivity Analyses

Hospitalization and mortality rates were lower in not-for-profit facilities in 48 and 43 of the 48 subgroups examined, respectively (Appendix Tables 1 and 2). For publicly reported quality of care indicators, the prevalence of worsening/any incontinence, ulcers, and falls were similar between for-profit and not-for-profit facilities. The prevalence of physical restraints was lower in for-profit facilities on admission (4.7% versus 6.4%) and at 3 months (7.0% versus 8.9%) (Appendix Table 3). When looking at only care-sensitive conditions, the overall 12-month hospitalization rates were 87.7 per 1000 PY in for-profit facilities, and 78.4 per 1000 PY in not-for-profit facilities (data not shown).

Excluding all short stays, defined as stays of fewer than 90 days that led to discharge to the community, led to a very similar 12-month hazard ratio of 1.11 for mortality, and 1.20 for hospitalization ($P < .01$) (data not shown). Separately, including nonincident admissions, led to a 12-month hazard of 1.15 for mortality and 1.22 for hospitalization ($P < .01$) (data not shown).

Discussion

In the 1 year of follow-up after admission to a LTC facility, residents living in for-profit homes had an adjusted 10% higher risk of mortality and 25% higher risk of hospitalization; in the 3 months immediately after admission, the hazards were higher at 20% and 36%, respectively. Unadjusted numbers consistently favor not-for-profit facilities for the vast majority of subgroups examined, including across 14 geographic regions and 10 chronic conditions. Facility size was also a predictor of outcome, with smaller facilities (ie, fewer than 50 beds) showing higher mortality rates and, conversely, lower hospitalization rates.

Five studies have examined the effect of profit status on mortality and/or hospitalizations, all using data before 2000.^{25,27–30} For each outcome, only one study significantly and clearly favored not-for-profit facilities.^{25,28} Our study adds to previous literature by examining both outcomes in a large, more current, population-based setting, and by addressing major limitations of previous studies, including the control

Table 5

Hazard Ratios for Mortality (Cox-Proportional Hazard) Model at 3, 6, and 12 Months After Admission to For-Profit and Not-For-Profit LTC Facilities

Parameter Variable	Hazard Ratio (95% Confidence Interval)		
	12 mo	6 mo	3 mo
Ownership			
Not-for-profit	1.00	1.00	1.00
For-profit	1.10 (1.05–1.16) [†]	1.16 (1.09–1.24) [†]	1.20 (1.11–1.29) [†]
Age, y			
18–49	1.00	1.00	1.00
50–59	1.49 (0.83–2.69)	1.96 (0.92–4.20)	1.81 (0.75–4.37)
60–69	2.13 (1.24–3.67) [†]	2.63 (1.29–5.37) [†]	2.50 (1.10–5.70)*
70–79	2.85 (1.68–4.86) [†]	3.48 (1.73–7.02) [†]	3.16 (1.41–7.11) [†]
80–89	4.04 (2.38–6.86) [†]	4.94 (2.45–9.93) [†]	4.43 (1.98–9.95) [†]
90+	6.68 (3.93–11.35) [†]	7.98 (3.96–16.07) [†]	6.94 (3.09–15.59) [†]
Sex			
Male	1.00	1.00	1.00
Female	0.68 (0.64–0.72) [†]	0.68 (0.63–0.72) [†]	0.68 (0.63–0.73) [†]
Unspecified	0.95 (0.45–2.00)	0.76 (0.28–2.03)	0.78 (0.25–2.44)
Marital Status			
Never married	1.00	1.00	1.00
Divorced	1.05 (0.89–1.23)	0.98 (0.81–1.19) ⁸	1.00 (0.79–1.26)
Married	1.24 (1.10–1.40) [†]	1.18 (1.03–1.36)*	1.17 (0.99–1.38)
Separated	0.91 (0.72–1.16)	0.82 (0.61–1.10)	0.81 (0.57–1.16)
Unknown	1.13 (0.90–1.42)	1.04 (0.79–1.37)	1.07 (0.77–1.50)
Widowed	1.14 (1.01–1.28)*	1.08 (0.94–1.24)	1.08 (0.91–1.28)
Resident income quintile			
Q1	1.00	1.00	1.00
Q2	1.01 (0.93–1.09)	1.02 (0.93–1.12)	0.96 (0.85–1.07)
Q3	1.07 (0.99–1.15)	1.08 (0.99–1.19)	1.07 (0.96–1.19)
Q4	1.07 (0.99–1.16)	1.04 (0.95–1.15)	0.98 (0.87–1.11)
Q5	1.08 (0.99–1.17)	1.09 (0.98–1.20)	1.11 (0.99–1.25)
Missing	1.12 (1.02–1.23)*	1.12 (1.00–1.25)	1.06 (0.93–1.21)
Facility urbanicity			
Urban	1.00	1.00	1.00
Rural	0.94 (0.88–1.02)	0.91 (0.84–1.00)*	0.89 (0.80–0.99)*
Admitted from			
Home care	1.00	1.00	1.00
Ambulatory or other services	1.47 (1.23–1.76) [†]	1.53 (1.23–1.90) [†]	1.62 (1.26–2.10) [†]
Inpatient services	1.32 (1.26–1.39) [†]	1.43 (1.34–1.52) [†]	1.49 (1.38–1.60) [†]
Facility size, no. beds			
1–49	1.00	1.00	1.00
50–99	0.90 (0.79–1.01)	0.93 (0.80–1.07)	1.04 (0.87–1.24)
100–149	0.72 (0.63–0.81) [†]	0.71 (0.61–0.83) [†]	0.79 (0.65–0.94) [†]
150+	0.70 (0.62–0.79) [†]	0.70 (0.61–0.81) [†]	0.77 (0.65–0.92) [†]
CHESS score, continuous	1.68 (1.64–1.72) [†]	1.83 (1.79–1.88) [†]	1.99 (1.94–2.05) [†]

* $P < .05$.

[†] $P < .01$.

for a large set of potential confounders.¹⁵ The one Canadian study, using unadjusted analyses, found lower hospitalization rates for not-for-profit facilities and no significant relationship for mortality.²⁵

We have shown that residents in for-profit homes consistently and robustly experience higher mortality and hospitalization rates. This occurred in an environment with common funding mechanisms, and a centralized system that leads to largely similar residents being accepted in both types of homes. It has been hypothesized that differences in outcomes may be related to reinvestments that not-for-profit facilities make into patient care that otherwise would be consumed as profit in for-profit facilities.^{25,31} Unlike other jurisdictions, for-profit homes (along with not-for-profit homes) in Ontario are unable to bill patients for additional funds. Under legislation, Ontario LTC homes are required to have at least one registered nurse on duty at all times; however, staffing levels and mixes, including registered practical nurses, personal support workers, and therapists, are otherwise unregulated.⁶ For-profit facilities in Canada and elsewhere have been shown to have lower staffing levels.^{32,33}

Table 6
Hazard Ratios for Hospitalization (Competing Risk) Model at 3, 6, and 12 Months After Admission to For-Profit and Not-For-Profit LTC Facilities

Parameter Variable	Hazard Ratio (95% Confidence Interval)		
	12 mo	6 mo	3 mo
Ownership			
Not-for-profit	1.00	1.00	1.00
For-profit	1.25 (1.21–1.30) [†]	1.33 (1.27–1.39) [†]	1.36 (1.28–1.43) [†]
Age, y			
18–49	1.00	1.00	1.00
50–59	1.10 (0.90–1.36)	1.09 (0.86–1.39)	1.22 (0.92–1.62)
60–69	1.14 (0.94–1.38)	1.11 (0.89–1.39)	1.13 (0.87–1.46)
70–79	1.16 (0.96–1.39)	1.15 (0.92–1.41)	1.15 (0.89–1.49)
80–89	1.13 (0.94–1.36)	1.11 (0.85–1.38)	1.20 (0.87–1.44)
90+	1.07 (0.88–1.29)	1.06 (0.75–1.31)	1.08 (0.84–1.40)
Sex			
Male	1.00	1.00	1.00
Female	0.80 (0.77–0.83) [†]	0.78 (0.75–0.82) [†]	0.77 (0.73–0.81) [†]
Other	0.92 (0.50–1.67)	1.20 (0.66–2.18)	1.16 (0.59–2.30)
Marital status			
Never married	1.00	1.00	1.00
Divorced	1.14 (1.04–1.26) [†]	1.10 (0.98–1.23)	1.10 (0.96–1.26)
Married	1.23 (1.14–1.33) [†]	1.20 (1.10–1.31) [†]	1.20 (1.08–1.34) [†]
Separated	1.22 (1.07–1.38) [†]	1.24 (1.07–1.44) [†]	1.20 (1.00–1.44) [*]
Unknown	1.26 (1.10–1.45) [*]	1.19 (1.00–1.41) [*]	1.33 (1.10–1.62) [†]
Widowed	1.20 (1.11–1.29) [†]	1.17 (1.07–1.28) [†]	1.16 (1.04–1.29) [†]
Resident income quintile			
Q1	1.00	1.00	1.00
Q2	0.96 (0.91–1.01) [†]	0.98 (0.92–1.04)	0.97 (0.90–1.04)
Q3	0.94 (0.89–0.99) [†]	0.96 (0.90–1.02)	0.97 (0.90–1.05)
Q4	0.95 (0.90–1.01)	0.96 (0.90–1.02)	0.96 (0.88–1.04)
Q5	0.93 (0.88–0.98) [†]	0.95 (0.89–1.02)	0.95 (0.87–1.03)
Missing	0.94 (0.89–1.01)	0.94 (0.88–1.02)	0.95 (0.87–1.04)
Facility urbanicity			
Urban	1.00	1.00	1.00
Rural	0.91 (0.86–0.97)	0.93 (0.86–0.99) [*]	0.90 (0.83–0.98) [*]
Admitted from			
Home care	1.00	1.00	1.00
Ambulatory or other services	1.26 (1.11–1.43) [†]	1.35 (1.17–1.56) [†]	1.48 (1.25–1.74) [†]
Inpatient services	1.29 (1.25–1.34) [†]	1.37 (1.32–1.43) [†]	1.44 (1.36–1.51) [†]
Facility size, no. of beds			
1–49	1.00	1.00	1.00
50–99	1.41 (1.25–1.58) [†]	1.39 (1.21–1.60) [†]	1.46 (1.23–1.73) [†]
100–149	1.50 (1.33–1.68) [†]	1.50 (1.30–1.72) [†]	1.59 (1.34–1.88) [†]
150+	1.61 (1.44–1.81) [†]	1.61 (1.40–1.84) [†]	1.72 (1.46–2.03) [†]
CHES score, continuous	1.12 (1.10–1.14) [†]	1.19 (1.16–1.21) [†]	1.26 (1.23–1.28) [†]

^{*}*P* < .05.

[†]*P* < .01.

Some not-for-profit facilities also have been hypothesized to be closer associated with acute care facilities and provide more specialized care.^{25,32} Other potential differences include level of ties to the community (including volunteer presence), being associated with a chain or multisite enterprise,²⁵ differences in capital funding, and differences in fundraising. We do not provide data supporting these hypotheses, which provide potential explanations for our findings. We do observe robust differences in “hard” outcomes. These differences are interestingly largely not present when we examine regularly reported quality-of-care indicators.¹² This discordance was observed in a previous study³⁴ and could be related to inaccuracies in indicator data, or to observed performance for narrow indicators of care that do not affect broader outcomes.^{18,19}

Strengths

First, we examined a large, population-based cohort with similar characteristics on admission (Tables 2 and 3), regardless of facility proprietary status. The similarity of the populations is likely related to Ontario’s formalized placement process. This is unlike facilities in the

United States (where the majority of studies have been published), for example, that admit differing populations according to the focus of each home. This standardization across homes allowed us to explore the role of proprietary status independent of funding or selection biases.

Second, our cohort was assessed using validated interRAI tools that capture detailed clinical and demographic information. These data are tied directly to funding and take into account patient complexity, thus increasing the impetus to ensure data quality, and reducing the incentive to preferentially accept patients of certain complexity. The data enabled control for multiple confounders at the individual level, adding to the strength of the comparison.

Third, along with the comparability of patient populations, the comparability of funding payment levels across all facilities is an issue that has challenged other studies. Among those who enter LTC facilities in Ontario, funding is fully public, with patient copayments linked directly to income, and set according to patient need. This process leads to comparable base funding (although not necessarily spending) among facilities, as suggested by the similar proportions of residents across RUGs that affect funding (Table 3). Finally, we examine differences in “hard” outcomes that reflect meaningful clinical changes that are not subject to misclassification or selective (under or over) reporting.

Weakness

We are unable to take into account all factors previously hypothesized to be associated with quality of care, including facility staffing levels and mixes, whether or not the facility belongs to a corporate chain, other sources of income (eg, from donations), and how closely associated the facility is with specialized medical services.^{15,25,32} Many of these factors, however, can be thought of as explanatory factors to differences in outcomes, or quality indicators themselves. The comparability of residents and payment models, resulting from a matching process with randomlike elements (ie, from a centralized process with multiple wait lists for each resident), also likely reduces the effect of unmeasured confounders.

Our study was conducted on an incident admission cohort to improve the comparability of the cohorts created; it does not examine outcomes past 1 year after admission. Furthermore, although examining “hard” outcomes of hospitalizations and mortality adds an objective dimension to quality of care, we recognize that some hospitalizations may be appropriate and that death may not necessarily reflect a poor outcome (eg, in palliative care). Nevertheless, our sensitivity analyses show that the higher hospitalization rate for for-profit facilities remained when looking at a subset of potentially avoidable causes (Appendix Table 3). We also showed that residents with similar health conditions and with similar levels of health (ie, CHES score) died at a higher rate in for-profit facilities (Appendix Table 2).

Conclusions

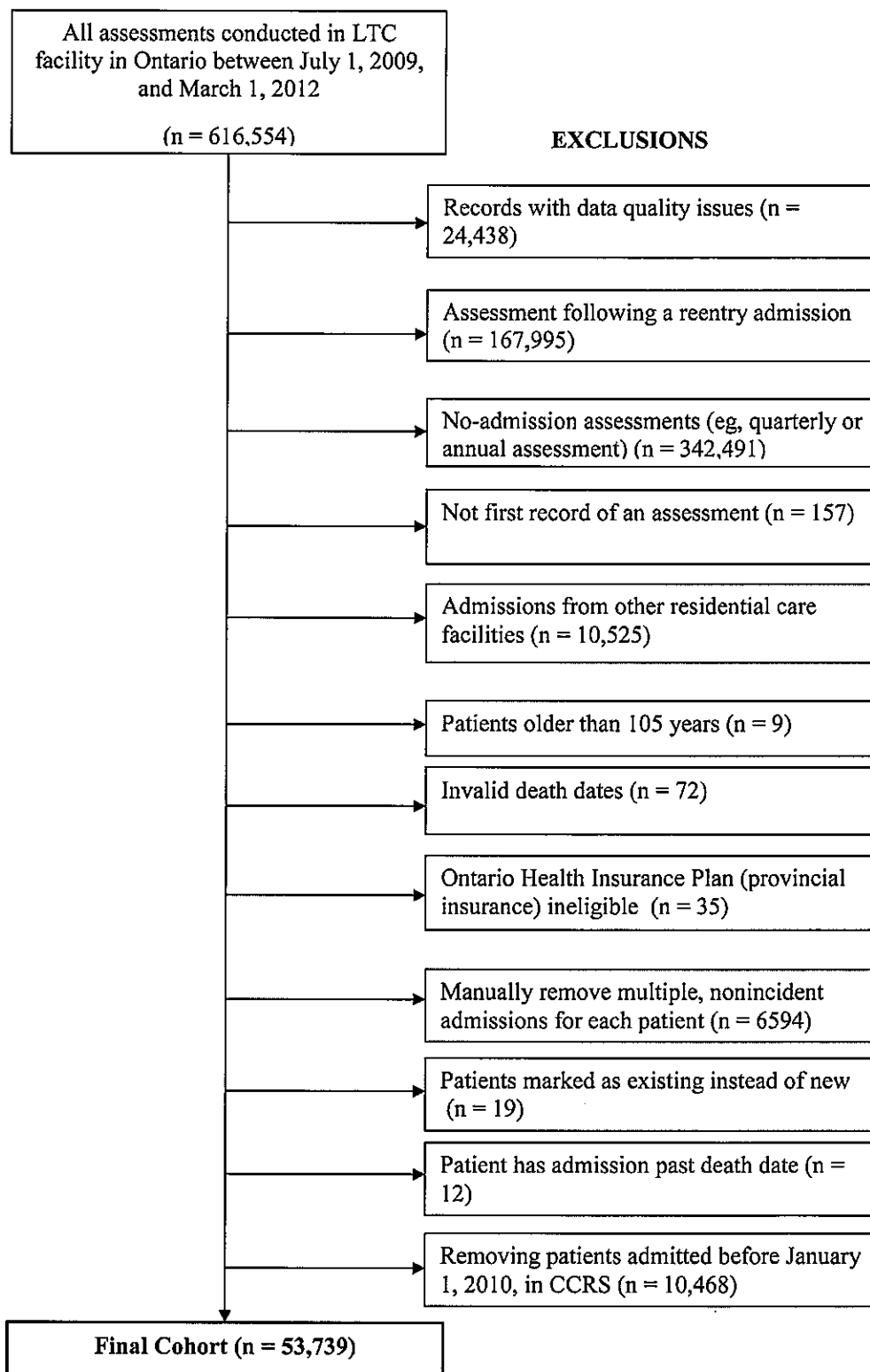
The differences in outcomes among residents in for-profit and not-for-profit homes suggest differences in patient experience, and likely influences health care costs. Our results should be generalizable particularly to jurisdictions where LTC is publicly funded, and where funding and placement processes are standardized. In jurisdictions without such systems, we highlight the potential effect of profit status alone, adjusting for these differences. Improving care, avoiding hospitalizations, and appropriately caring for residents until death are meaningful goals, with increasing relevance as need for LTC rises with the aging population. Future work can elucidate the narratives behind differences in outcomes across ownership status and facility size, both

of which are amenable to policy change. Policy needs to accordingly evolve to ensure that all residents equally receive optimal care.

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Appendix



Appendix Figure 1. Study cohort creation for all incident Ontario LTC admissions.

Appendix Table 1

Twelve-Month Hospitalization Rates by Proprietary Status of Facility, Across Patient and Facility Characteristics

	For-Profit	Not-For-Profit	Total
Hospitalizations			
Age, y, at entry			
18–49	377.1	251.2	332.0
50–59	433.6	304.2	392.2
60–69	454.4	375.8	428.7
70–79	471.5	372.3	435.9
80–89	475.2	348.1	424.1
90+	435.6	374.2	410.8
Sex			
Female	423.3	322.2	383.9
Male	538.8	432.2	498.7
Other	516.2	445.5	490.3
Admitted from			
Ambulatory and other services	562.9	325.6	469.9
Inpatient services	548.0	422.5	505.2
Home services	376.6	315.1	350.6
No. of beds			
1–49	380.5	216.7	289.0
50–99	428.3	344.1	409.3
100–149	446.8	357.8	415.2
≥150	495.7	372.8	439.8
Facility urbanicity			
Urban	469.9	364.0	429.5
Rural	415.0	324.8	377.9
CHES score:			
0 (no instability)	384.5	297.1	350.8
1	500.2	388.3	457.3
2	632.3	486.2	576.1
3	657.7	502.7	595.4
4	787.1	610.4	710.9
5 (highest level of instability)	852.0	504.8	681.5
Chronic disease prevalence			
Alzheimer	341.1	252.7	303.3
Dementia other than Alzheimer	407.5	308.4	370.4
Cancer	551.7	443.8	510.0
Stroke	498.5	404.6	465.9
Congestive heart failure	738.0	566.7	675.8
Atherosclerotic heart disease	559.8	447.2	512.7
Emphysema/chronic obstructive pulmonary disease	662.2	522.3	612.3
Depression	436.2	353.5	404.5
Diabetes	594.5	451.8	543.3
Arthritis (osteoarthritis, rheumatoid)	449.3	360.3	415.0
Local Health Integration Network (LHIN)			
Erie St. Clair	500.0	322.7	457.1
South West	454.1	363.1	423.3
Waterloo Wellington	324.5	293.5	314.8
Hamilton Niagara Haldimar Brant	390.5	282.8	348.2
Central West	595.1	381.5	525.2
Mississauga Halton	521.8	433.7	501.2
Toronto Central	553.0	420.5	475.8
Central	559.9	446.6	520.0
Central East	476.3	335.1	430.6
South East	377.9	319.3	356.5
Champlain	402.4	373.8	388.0
North Simcoe Muskoka	474.5	214.4	394.5
North East	475.5	399.8	433.6
North West	555.4	408.6	462.7

Appendix Table 2

Twelve-month Mortality Rates by Proprietary Status of Facility, Across Patient and Facility Characteristics

	For-Profit	Not-For-Profit	Total
Age, y, at entry			
18–49	48.2	23.6	39.4
50–59	63.0	63.1	63.0
60–69	96.7	107.4	100.2
70–79	144.1	131.5	139.5
80–89	205.8	175.5	194.2
90+	340.9	288.3	319.7
Sex			
Female	190.5	167.8	181.6
Male	239.5	218.5	231.6
Other	322.6	222.8	286.0
Admitted from			
Ambulatory and other services	249.5	202.9	231.2
Inpatient services	247.7	238.6	244.6
Home services	166.7	146.8	158.3
No. of beds			
1–49	298.7	282.9	289.8
50–99	262.1	177.6	243.1
100–149	196.7	176.3	189.5
≥150	175.5	180.4	177.7
Facility urbanicity			
Urban	194.8	183.4	190.5
Rural	284.3	189.0	245.1
CHES score			
0 (no instability)	118.6	102.6	112.5
1	228.8	202.8	218.8
2	355.7	311.2	338.6
3	570.6	511.6	546.9
4	1082.3	900.3	1003.8
5 (highest level of instability)	6572.2	5174.6	5886.1
Chronic disease prevalence			
Alzheimer	160.6	140.7	152.1
Dementia other than Alzheimer	208.8	192.3	202.6
Cancer	422.2	369.8	401.9
Stroke	219.7	196.2	211.5
Congestive heart failure	370.9	349.5	363.1
Atherosclerotic heart disease	272.5	229.5	254.5
Emphysema/chronic obstructive pulmonary disease	279.0	271.9	276.5
Depression	184.7	160.7	175.5
Diabetes	214.4	187.7	204.8
Arthritis (osteoarthritis, rheumatoid)	210.6	185.8	201.1
Local Health Integration Network (LHIN)			
Erie St. Clair	212.2	218.9	213.8
South West	246.3	213.3	235.1
Waterloo Wellington	280.2	212.8	259.1
Hamilton Niagara Haldimar Brant	227.7	208.4	220.1
Central West	170.7	135.5	159.2
Mississauga Halton	151.3	117.8	143.5
Toronto Central	145.1	128.4	135.4
Central	151.5	151.3	151.4
Central East	185.6	183.3	184.9
South East	261.5	210.9	243.1
Champlain	231.1	200.5	215.7
North Simcoe Muskoka	217.4	285.0	238.2
North East	189.3	165.9	176.3
North West	149.1	139.1	142.8

Appendix Table 3
Prevalence of Quality Indicators on Admission and 3 Months After Admission, by Proprietary Status

Quality Indicators	On Admission, % Residents			3-Months After Admission, % Residents		
	For-Profit	Not-For-Profit	Total	For-Profit	Not-For-Profit	Total
Physical restraints	4.7	6.4	5.3	7.0	8.9	7.8
Any pressure ulcer	11.4	9.4	10.7	5.6	5.4	5.5
Worsening pressure ulcer	—	—	—	4.1	4.2	4.2
Any incontinence	54.0	51.9	53.2	63.6	65.4	64.4
Worsening incontinence	—	—	—	31.8	33.4	32.5
Falls	21.3	21.0	21.2	13.3	14.7	13.9

Note: The dashes signify that the values were not measured.