A Whole New World: Top ~~10~~ 12 Geriatric Papers of 2020

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- **No conflicts of interest to disclose**
  - No relationships with commercial interests
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  - Department of Medicine's Eliot Phillipson Clinician Scientist Training Program
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  - Vanier Canada Graduate Scholarship
  - Receive income as Associate Editor at CMAJ

DISCLAIMERS

1. The person originally scheduled to give this talk—Dr. Chris Brymer—was my first attending in medical school and forever changed my career. I have big shoes to fill.

2. I will not be limiting myself to 10 papers (as the title suggests, I will be presenting 12 papers).

3. It's somewhat obnoxious to present your own work, so I apologize in advance.

4. I will focus more on the clinical implications of the research presented rather than than critical appraisal.

5. I had to make subjective decisions of what to include and what to exclude.

OBJECTIVES

1. Examine new evidence on the care of frail older adults in Long-Term Care

2. Recognize the relevance of the research to one's Long-Term Care practice

3. Identify effective, targeted interventions from each article that could change one's practice

"METHODS"

1. Spoke with colleagues including Drs. Barry Goldlist and Dov Gandell who are giving or have given similar talks.

2. Reviewed evidence update talks from CGS webinar series and screened McMaster Evidence Alerts.

3. Searched websites of major general medical journals (NEJM, JAMA Network, BMJ, Lancet, Annals of Internal Medicine, CMAJ), geriatric medicine/LTC journals (JAGS, JAMDA), and the Cochrane Reviews library.

4. Included literature from October 2019-2020 (subsequent to last year's OLTCC).

5. Separated COVID and non-COVID literature.

“PRE-COVID” LITERATURE UPDATE

1. ELDERCARE-AF STUDY

Low-Dose Edoxaban in Very Elderly Patients with Atrial Fibrillation

K. Okumura, M. Akao, T. Yoshida, M. Kawata, O. Okazaki, S. Akashi, K. Eshima, K. Tanizawa, M. Fukuzawa, T. Hayashi, M. Akishita, G.Y.H. Lip, and T. Yamashita, for the ELDERCARE-AF Committees and Investigators*

- **Design and setting:** phase 3, multicentre, randomized, double-blind, placebo-controlled trial in Japan
- **Participants:** 984 older adults (age ≥80 years) with non-valvular AF
  - $CHADS_2$ score ≥2
  - Ineligible for available oral anticoagulants (warfarin, dabigatran, rivaroxaban, apixaban, or edoxaban) at the approved dosage with at least 1 of the following bleeding risks:
    - Renal impairment (eGFR of ≥15 mL/min and <30 mL/min)
    - History of bleeding from critical area or organ
    - Low body weight (≤45 kg)
    - Continuous use of NSAID
    - Patients using 1 antiplatelet drug (for a purpose other than prophylaxis of cardioembolic stroke)

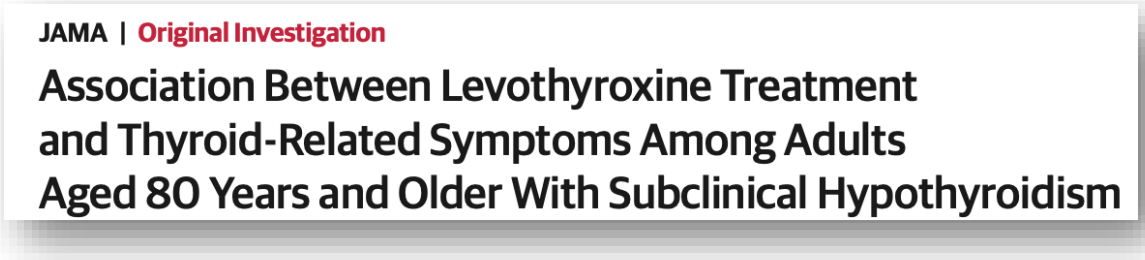
N Engl J Med. 2020 Aug 30. doi: 10.1056/NEJMoa2012883.
Am Heart J. 2017 Dec;194:99-106.

1. ELDERCARE-AF STUDY

- **Intervention:** randomized 1:1 to receive Edoxaban 15 mg PO daily (usual dose = 60 mg PO daily) or Placebo.
- **Primary outcomes:** primary efficacy outcome was stroke or systemic embolism, and primary safety endpoint was major bleeding)
- **Results:** median trial participation of 466 days (IQR range, 293.5-708):
  - Annualized rate of stroke or systemic embolism was 2.3% in the edoxaban group and 6.7% in the placebo group (HR = 0.34; 95% CI = 0.19-0.61)
  - Annualized rate of major bleeding was 3.3% in the edoxaban group and 1.8% in the placebo group (HR, 1.87; 95% CI, 0.90 to 3.89)
- **Notable limitations:** 303/984 discontinued the trial (158 withdrew, 135 died, and 10 for other reasons; only 6 withdrew for bleeding-related concerns. Did not specify residence (LTC vs. community-dwelling) of trial participants.
- **Bottom line:** low-dose edoxaban may be an option in the very elderly with contraindications to VKAs and DOACs at approved dosages

N Engl J Med. 2020 Aug 30. doi: 10.1056/NEJMoa2012883.
Am Heart J. 2017 Dec;194:99-106.

2. SUBCLINCAL HYPOTHYROIDISM AND SYMPTOMS



- **Design and setting:** Pooled analysis of 2 randomized placebo-controlled trials (IEMO 80-plus thyroid trial and a subgroup ≥ 80 years of age from the TRUST trial) in the Netherlands, Switzerland, Ireland and the UK

- **Participants:** : 251 community-dwelling older adults ≥ 80 years of age (mean age 85 y, 53% men, mean baseline TSH = 6.4 mIU/L) who:

  - Had persistent subclinical hypothyroidism (TSH levels 4.6 to 19.9 mIU/L on ≥ 2 tests measured 3 months – 3 years apart
  - Normal free thyroxine levels
  - Excluded individuals with dementia

2. SUBCLINCAL HYPOTHYROIDISM AND SYMPTOMS

- **Intervention:** Levothyroxine starting at 50 mcg/day adjusted in 25-mcg increments using an algorithm and based on TSH levels measured every 6 to 8 weeks until within reference range (0.4 to 4.6 mIU/L) (n = 112), or placebo with an identical adjustment schedule (n = 139)
- **Primary outcomes:** questionnaire scores for the domains of hypothyroid symptoms and tiredness at 1 year
- **Results:** treatment was **not** associated with improvement in hypothyroid symptoms or fatigue
- **Notable limitations:** 32% of patients discontinued treatment.
- **Bottom line:** don't treat subclinical hypothyroidism in older adults. Accompanying editorial suggests increasing upper range of normal for TSH to 7 mIU/L for patients aged 80 years and older.

JAMA. 2019;322(20):1977-1986.
JAMA. 2019;322(20):1961-1962.

3. LANCET DEMENTIA COMMISSION UPDATE

Dementia prevention, intervention, and care: 2020 report of the *Lancet* Commission

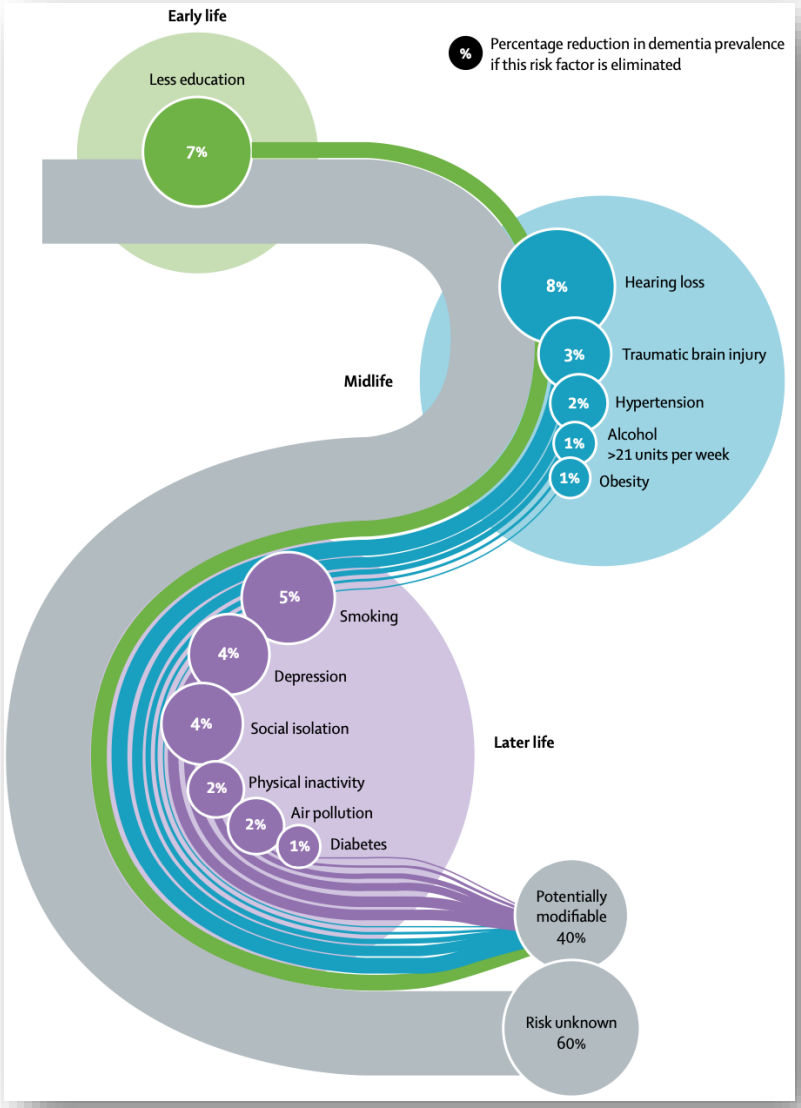
Gill Livingston, Jonathan Huntley, Andrew Sommerlad, David Ames, Clive Ballard, Sube Banerjee, Carol Brayne, Alistair Burns, Jiska Cohen-Mansfield, Claudia Cooper, Sergi G Costafreda, Amit Dias, Nick Fox, Laura N Gitlin, Robert Howard, Helen C Kales, Mika Kivimäki, Eric B Larson, Adesola Ogunniyi, Vasiliki Orgeta, Karen Ritchie, Kenneth Rockwood, Elizabeth L Sampson, Quincy Samus, Lon S Schneider, Geir Selbæk, Linda Teri, Naaheed Mukadam

- **Design and methods:** interdisciplinary, international group of experts presented, debated, and agreed on the best available evidence
  - Adopted a triangulation framework evaluating the consistency of evidence from different lines of research and used that as the basis to evaluate evidence
  - Summarized best evidence using, where possible, good-quality systematic reviews, meta-analyses, or individual studies
  - Performed systematic literature reviews and meta-analyses where needed
  - Narrative synthesis of evidence including systematic reviews and meta-analyses
  - Nearly all evidence was from high income countries

3. LANCET DEMENTIA COMMISSION UPDATE

	Relative risk for dementia (95% CI)	Risk factor prevalence	Communality	Unweighted PAF	Weighted PAF*
Early life (<45 years)					
Less education	1·6 (1·3–2·0)	40·0%	61·2%	19·4%	7·1%
Midlife (age 45–65 years)					
Hearing loss	1·9 (1·4–2·7)	31·7%	45·6%	22·2%	8·2%
TBI	1·8 (1·5–2·2)	12·1%	55·2%	9·2%	3·4%
Hypertension	1·6 (1·2–2·2)	8·9%	68·3%	5·1%	1·9%
Alcohol (>21 units/week)	1·2 (1·1–1·3)	11·8%	73·3%	2·1%	0·8%
Obesity (body-mass index ≥30)	1·6 (1·3–1·9)	3·4%	58·5%	2·0%	0·7%
Later life (age >65 years)					
Smoking	1·6 (1·2–2·2)	27·4%	62·3%	14·1%	5·2%
Depression	1·9 (1·6–2·3)	13·2%	69·8%	10·6%	3·9%
Social isolation	1·6 (1·3–1·9)	11·0%	28·1%	4·2%	3·5%
Physical inactivity	1·4 (1·2–1·7)	17·7%	55·2%	9·6%	1·6%
Diabetes	1·5 (1·3–1·8)	6·4%	71·4%	3·1%	1·1%
Air pollution	1·1 (1·1–1·1)	75·0%	13·3%	6·3%	2·3%

3. LANCET DEMENTIA COMMISSION UPDATE



Lancet. 2020 Aug 8;396(10248):413-446.

3. LANCET DEMENTIA COMMISSION UPDATE

- **Specific actions for risk factors across the life course:**
  - Aim to maintain SBP ~130 mmHg
  - Encourage use of hearing aids and prevent hearing loss
  - Reduce exposure to air pollution and second-hand tobacco smoke
  - Prevent head injury
  - Limit alcohol use
  - Avoid smoking
  - Provide all children with primary and secondary education
  - Reduce obesity and the linked condition of diabetes
  - Sustain midlife, and possibly later life physical activity
  - Addressing other putative risk factors for dementia, like sleep, through lifestyle interventions, will improve general health.

3. LANCET DEMENTIA COMMISSION UPDATE

Care for people living with dementia:

1. Provide holistic post-diagnostic care

- Post-diagnostic care for people with dementia should address physical and mental health, social care, and support. Most people with dementia have other illnesses and might struggle to look after their health and this might result in potentially preventable hospitalizations.

2. Manage neuropsychiatric symptoms

- Specific multicomponent interventions decrease neuropsychiatric symptoms in people with dementia and are the treatments of choice. Psychotropic drugs are often ineffective and might have severe adverse effects.

3. Care for family carers

- Specific interventions for family carers have long-lasting effects on depression and anxiety symptoms, increase quality of life, are cost-effective and might save money.

4. ATYPICAL FEMORAL #'S WITH BISPHOSPHONATES

Atypical Femur Fracture Risk versus Fragility Fracture Prevention with Bisphosphonates

Dennis M. Black, Ph.D., Erik J. Geiger, M.D., Richard Eastell, M.D., Eric Vittinghoff, Ph.D., Bonnie H. Li, M.S., Denison S. Ryan, M.P.H., Richard M. Dell, M.D., and Annette L. Adams, Ph.D.

- **Design and setting:** population-based retrospective cohort study using linked administrative data from the the Kaiser Permanente Southern California health care system (population >4.6 million)
- **Participants:** : 196,129 women ≥50 years of age (59.5% age ≥65 years; 53.3% white, 24.0% Hispanic, 13.5% Asian):
  - Received at least one prescription for oral or intravenous bisphosphonate for osteoporosis (91.6% were taking for <3 years)
  - Had at least 12 months of continuous enrollment in health care system
- **Exposure:** cumulative annual exposure of bisphosphonate.

4. ATYPICAL FEMORAL #'S WITH BISPHOSPHONATES

- **Outcomes:** the primary outcome was atypical femoral fracture, and the secondary outcome was hip fracture.
  - The numbers of fractures prevented were calculated by estimating the cumulative incidence of each in a cohort of 9704 women studied before bisphosphonate therapy
- **Results:** There were 277 atypical femur fractures among 196,129 women followed from 2007-2017.
  - Risk increased with longer duration, Asian race, decreasing height, increasing weight and glucocorticoid use ≥1 year
  - After 3 years, 149 hip fractures were prevented and 2 bisphosphonate associated atypical fractures occurred in Whites, as compared with 91 and 8, respectively, in Asians.
  - Stopping bisphosphonate associated with decreased risk of atypical femoral fractures
- **Notable limitations:** no information on denosumab and usual limitations with observational cohorts using administrative data.
- **Bottom line:** benefits outweigh risks but remain vigilant for AFFs

5. COMPRESSION THERAPY FOR RECURRENT CELLULITIS

Compression Therapy to Prevent Recurrent Cellulitis of the Leg

Elizabeth Webb, M.P.H., Teresa Neeman, Ph.D., Francis J. Bowden, M.D., Jamie Gaida, Ph.D., Virginia Mumford, Ph.D., and Bernie Bissett, Ph.D.

- **Design and setting:** randomized, controlled, single-center trial in Canberra, Australia
- **Participants:** 84 adults (mean age 64 y, 51% men, 79% with chronic edema, mean of 2 episodes of cellulitis in previous 2 years) who:
  - Had a history of two or more episodes of cellulitis in the same leg in the prior 2 years

  AND
  - Had edema lasting longer than 3 months in one or both legs, with recurrent cellulitis
  - Excluded patients already wearing compression garments or who had chronic wounds

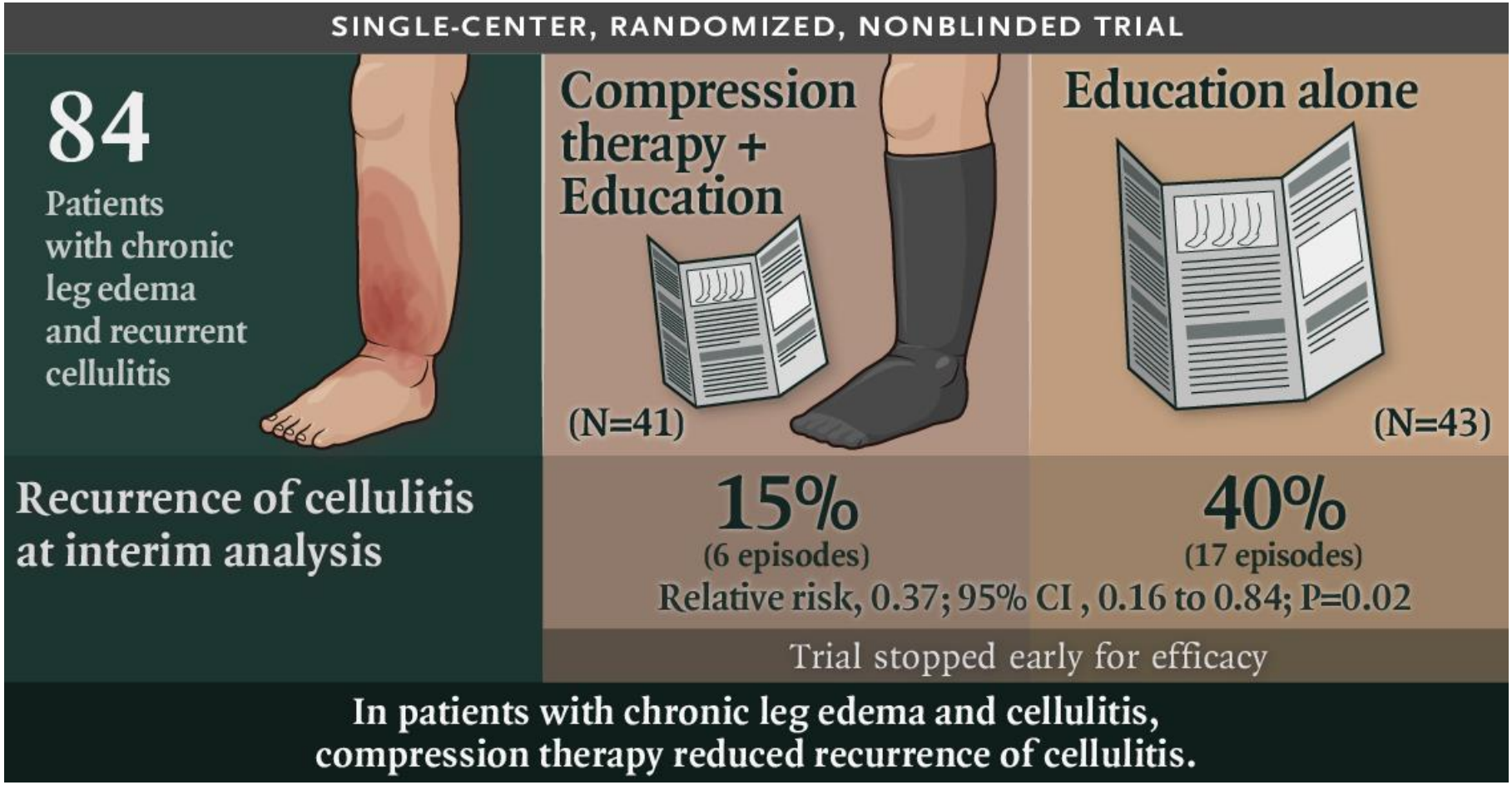
N Engl J Med. 2020 Aug 13;383(7):630-639.

5. COMPRESSION THERAPY FOR RECURRENT CELLULITIS

- **Intervention:** Participants were randomly assigned in a 1:1 ratio to receive either compression therapy plus education regarding prevention of cellulitis (compression group) or education alone (control group).
  - Education: benefits of skin care, prevention of interdigital fungal infections, healthy body weight, and regular exercise.
  - Compression therapy: compression garments throughout the day with information on use, safety, cleanliness, and application and removal of the garments. When appropriate, a short period (typically 3 to 5 days) of therapist-applied compression bandaging to minimize edema was provided before compression therapy.
  - Participants in the control group who had an episode of cellulitis crossed over to the compression group to receive compression therapy.
- **Primary outcome:** recurrence of cellulitis
  - The statistical analysis plan prespecified that after 23 episodes of cellulitis had occurred, an independent data monitoring committee would review the results of the interim analysis and recommend whether the trial should stop early.

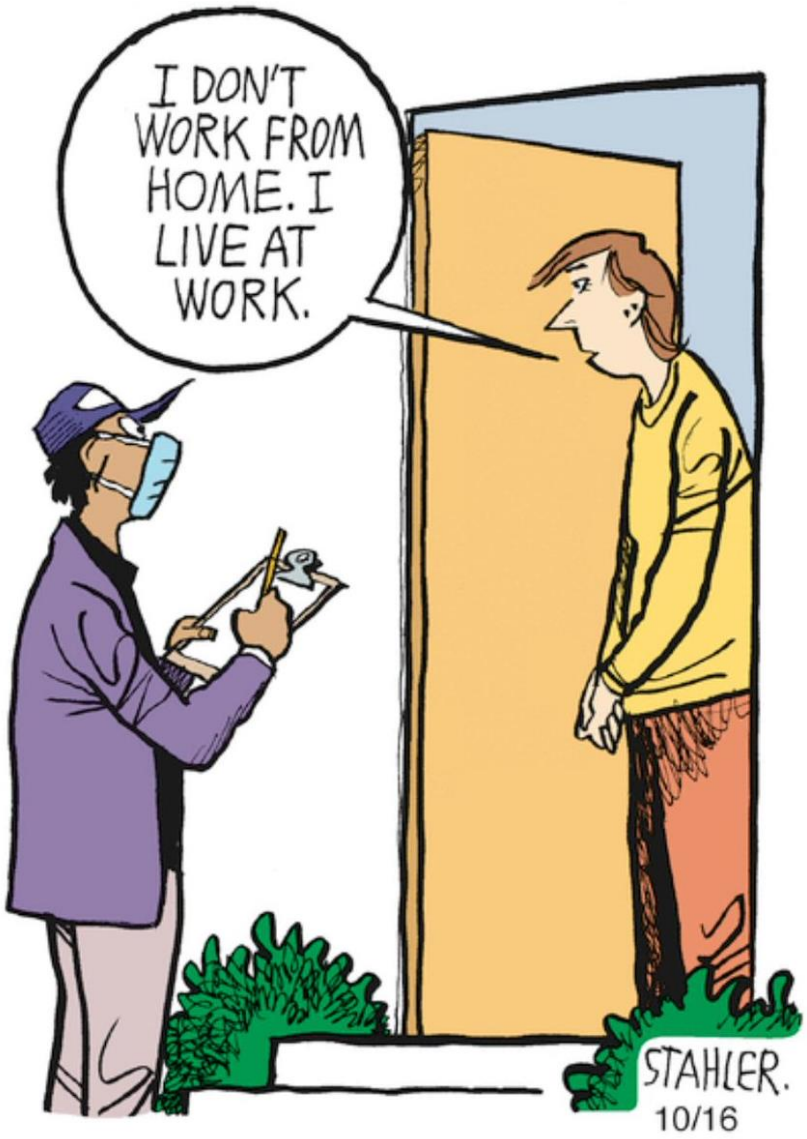
5. COMPRESSION THERAPY FOR RECURRENT CELLULITIS

- Median follow-up time of 186 days



N Engl J Med. 2020 Aug 13;383(7):630-639.

“POST-COVID” LITERATURE UPDATE

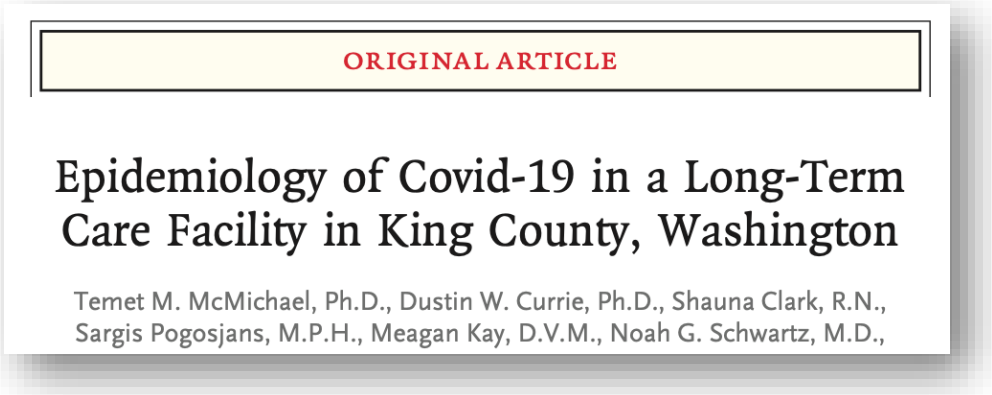


THE COVID-19 INFODEMIC

"We're not just fighting a pandemic; we're fighting an infodemic"

— Dr. Tedros Adhanom Ghebreyesus

6. EPIDEMIOLOGY OF COVID-19 IN A LTC HOME



ORIGINAL ARTICLE

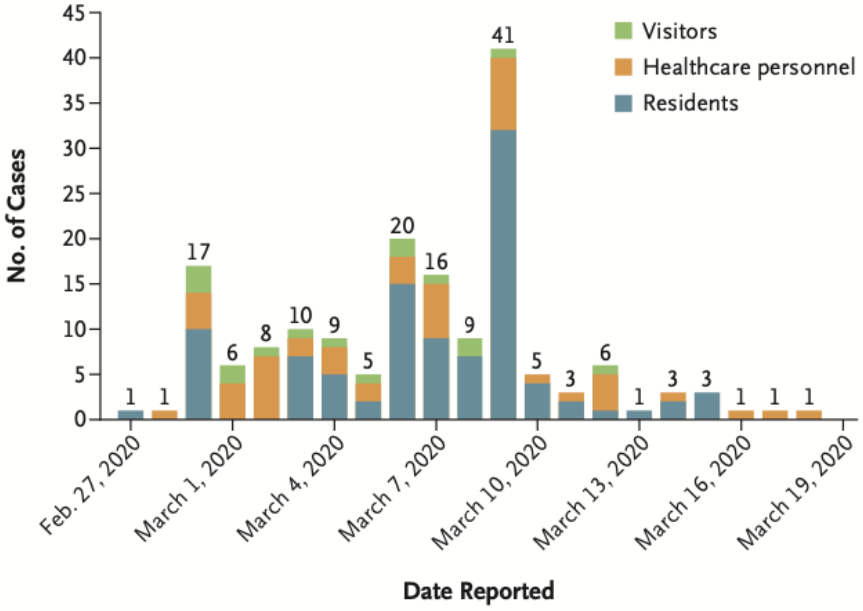
Epidemiology of Covid-19 in a Long-Term Care Facility in King County, Washington

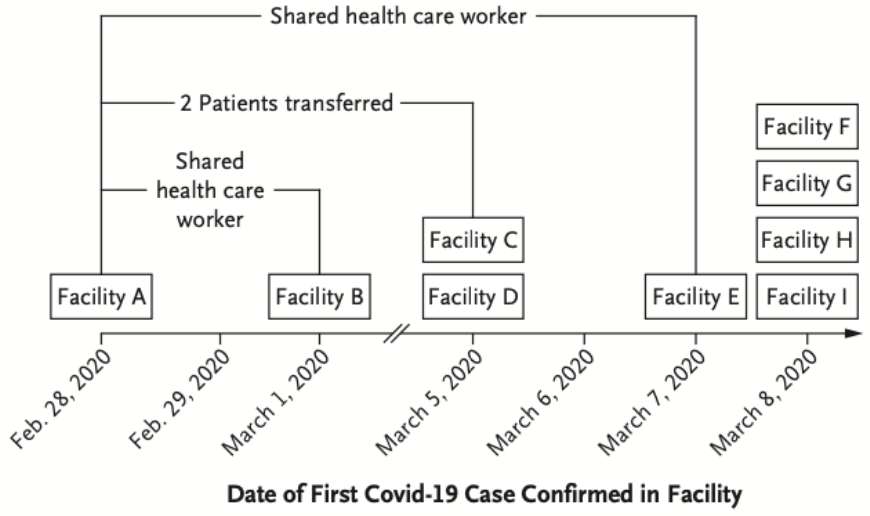
Temet M. McMichael, Ph.D., Dustin W. Currie, Ph.D., Shauna Clark, R.N., Sargis Pogosjans, M.P.H., Meagan Kay, D.V.M., Noah G. Schwartz, M.D.,

- **Design and setting:** case investigation and contact tracing involving 100 LTC homes in King County, Washington (February 28-March 18, 2020) following identification of COVID-19 case in a resident from 'Facility A'
- **Methods:**
  - Residents, visitors and staff with COVID-19 were interviewed to collect information on symptoms, severity, coexisting conditions, travel history, and close contacts
  - At least 100 LTC homes in King County were contacted by survey to obtain information on residents or staff with COVID or on clusters of influenza-like illness (ILI)
  - Countywide databases that capture all EMS transfers from LTC homes to acute care facilities were reviewed on a daily basis for evidence of cases or clusters of ILI

6. EPIDEMIOLOGY OF COVID-19 IN A LTC HOME

- A total of 167 confirmed cases of COVID-19 affecting 101 residents, 50 staff, and 16 visitors were epidemiologically linked to 'Facility A'
- 30 LTC homes with at least one confirmed case
- **Case fatality rate = 33.7%**





N Engl J Med. 2020 May 21;382(21):2005-2011.

7. PRE-SYMPOMATIC COVID-19 IN A NURSING HOME

Presymptomatic SARS-CoV-2 Infections and Transmission in a Skilled Nursing Facility

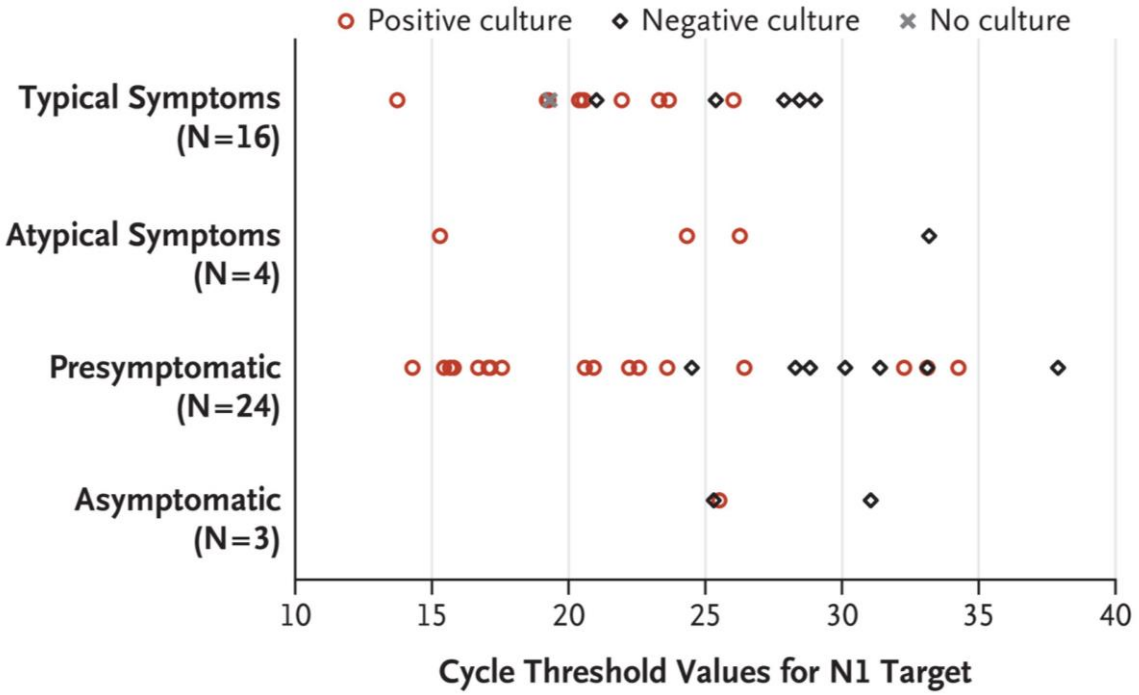
M.M. Arons, K.M. Hatfield, S.C. Reddy, A. Kimball, A. James, J.R. Jacobs, J. Taylor, K. Spicer, A.C. Bardossy, L.P. Oakley, S. Tanwar, J.W. Dyal, J. Harney, Z. Chisty, J.M. Bell, M. Methner, P. Paul, C.M. Carlson,

- **Design and setting:** two serial COVID-19 point-prevalence surveys (1 week apart) in a 116-bed skilled nursing facility (SNF) in King County, Washington housing 89 residents on March 3, 2020 (date of first COVID-19 positive resident)
- **Methods:**
  - All residents offered SARS-CoV-2 testing on March 13th and March 19-20th
  - On the day of testing, nurses screened for symptoms in the preceding 14 days
    - Typical: fever, cough, shortness of breath
    - Atypical: sore throat, chills, confusion, rhinorrhea or congestion, myalgia, dizziness, malaise, headache, nausea, diarrhea

N Engl J Med 2020; 382:2081-2090.

7. PRE-SYMPOMATIC COVID-19 IN A NURSING HOME

- Among 76 residents who participated in point-prevalence surveys, 48 (63%) tested positive
- Of these 48 residents, 27 (56%) were asymptomatic at the time of testing; 24 subsequently developed symptoms (median time to onset, 4 days)



N Engl J Med 2020; 382:2081-2090.

8. TEMPERATURE IN LTC RESIDENTS WITH COVID-19

Temperature in Nursing Home Residents Systematically Tested for SARS-CoV-2

James L. Rudolph MD [a,b,c,*], Christopher W. Halladay ScM [a], Malisa Barber BS [a], Kevin W. McConeghy PharmD [a], Vince Mor PhD [a,b], Aman Nanda MD [c], Stefan Gravenstein MD [a,b,c]

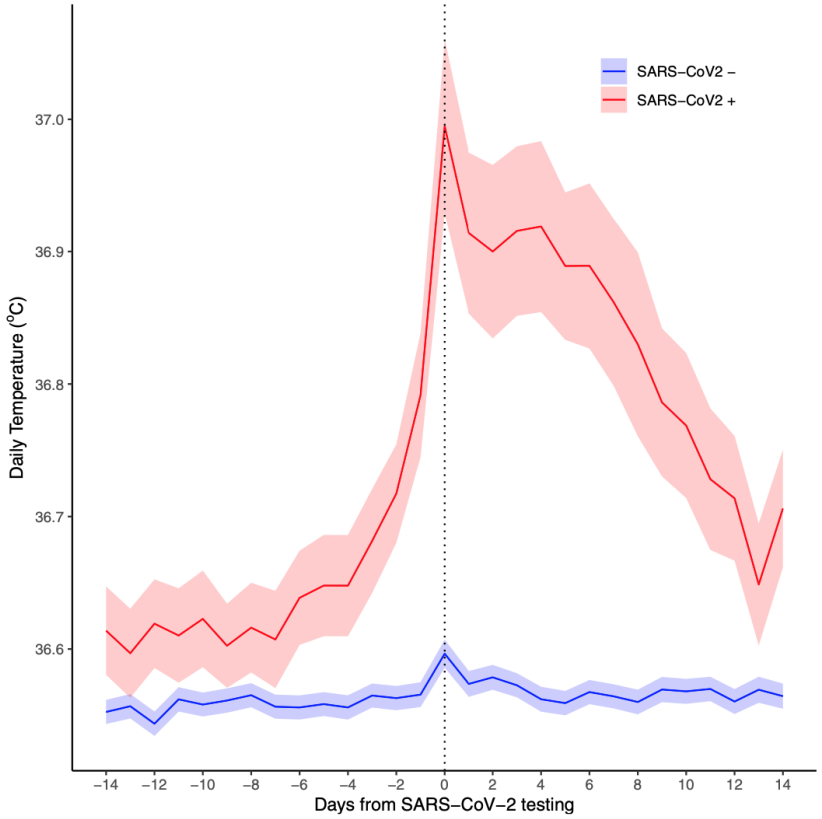
- **Design and setting:** retrospective cohort study of VA Healthcare System administrative records
- **Participants:** 7325 veterans residing in 134 nursing homes in the State of Rhode Island during the period of March 1, 2020 until May 4, 2020
  - Daily monitoring of temperature started on March 10, 2020
  - Excluded residents without COVID-19 testing or who were symptomatically tested before universal testing
- **Analysis:** compared temperatures in those testing positive and negative for SARS-CoV-2

J Am Med Dir Assoc. 2020 Jul;21(7):895-899.e1.

8. TEMPERATURE IN LTC RESIDENTS WITH COVID-19

- Only 26.6% of residents with COVID-19 met the fever threshold of 38.0C
  - Most residents (62.5%) with COVID-19 experienced 2 or more 0.5C elevations above their baseline temperature values

	Mean (SD), n (%)		*P* value
	SARS-CoV-2+	SARS-CoV-2−	
N	443	6882	
Age, y	76.3 (10.8)	74.2 (10.9)	<.001
Sex			
Male	432 (97.5%)	6605 (96.0%)	.085
Female	11 (2.5%)	277 (4.0%)	
Race			.084
White	286 (64.56%)	4724 (68.64%)	
Black	123 (27.77%)	1593 (23.15%)	
Other races	34 (7.67%)	565 (8.21%)	
Comorbidities			
Obesity	101 (22.8%)	1913 (27.8%)	.026
Hypertension	309 (69.8%)	4805 (69.8%)	1.00
Heart failure	102 (23.0%)	1865 (27.1%)	.069
Lung disease	142 (32.0%)	2525 (36.7%)	.056
Diabetes	165 (37.2%)	2780 (40.4%)	.208
Dementia	301 (68.0%)	4298 (62.4%)	.023
Temperature			
Maximum,* °C	37.66 (0.69)	37.11 (0.36)	<.001
Any fever*	118 (26.64%)	201 (2.92%)	<.001
Baseline temperature, °C			
Average†	36.59 (0.21)	36.56 (0.24)	.001



J Am Med Dir Assoc. 2020 Jul;21(7):895-899.e1.

9. RISK FACTORS FOR LTC RESIDENT COVID-19 MORTALITY

Original Investigation | Infectious Diseases

Risk Factors Associated With Mortality Among Residents With Coronavirus Disease 2019 (COVID-19) in Long-term Care Facilities in Ontario, Canada

David N. Fisman, MD, MPH; Isaac Bogoch, MD, MS; Lauren Lapointe-Shaw, MD, PhD; Janine McCready, MD; Ashleigh R. Tuite, PhD, MPH

- **Design and setting:** retrospective cohort study using COVID-19 tracking data from the Ontario Ministries of Health and Long-Term Care
- **Participants:** all community dwelling Ontarians and all residents of Ontario's 627 LTC homes
- **Analysis:** compared incidence rate ratios (IRRs) for COVID-19 deaths in LTC residents compared with deaths in community-living adults
  - Evaluated risk of death within LTC facilities as a function of the number of residents with laboratory-confirmed infection as well as lagged staff infection

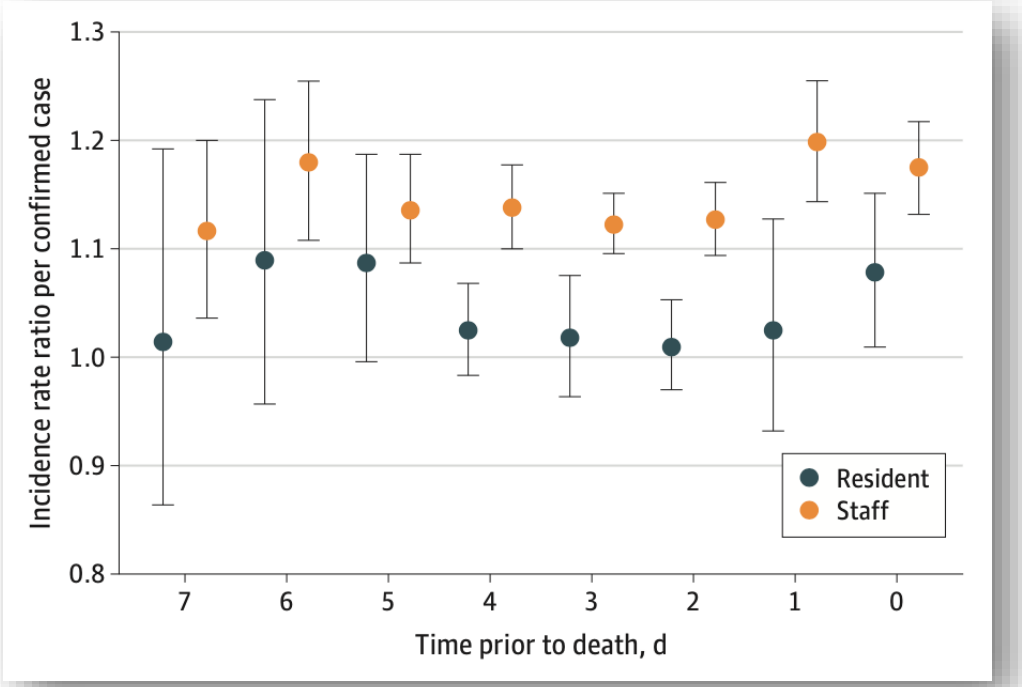
JAMA Netw Open. 2020 Jul; 3(7): e2015957.

9. RISK FACTORS FOR LTC RESIDENT COVID-19 MORTALITY

- Deaths:
  - 269 community-living adults >69 years (until Apr 11)
  - 83 LTC residents (until Apr 10)
- IRR for COVID-19–related death in LTC residents was **13.1 (95% CI, 9.9-17.3)** compared with community-living adults >69 years
- Infection among LTC staff was associated with death among residents with a 6-day lag

Table 2. IRR for Coronavirus Disease 2019 Mortality in Long-term Care Residence[a]

Comparator population	Total deaths	Comparator population size	IRR (95% CI)
All ages	269	14 566 547	90.4 (68.9-117.6)
≥60 y	252	3 447 723	23.1 (17.6-30.2)
≥70 y	229	1 731 315	13.1 (9.9-17.3)
≥80 y	169	642 571	7.6 (5.5-10.4)



JAMA Netw Open. 2020 Jul; 3(7): e2015957.

10. FOR-PROFIT LTC HOMES AND COVID-19 OUTBREAKS

For-profit long-term care homes and the risk of COVID-19 outbreaks and resident deaths

Nathan M. Stall MD, Aaron Jones MSc PhD, Kevin A. Brown MSc PhD, Paula A. Rochon MD MPH, Andrew P. Costa PhD

- **Design and setting:** retrospective cohort study of all LTC homes (n = 623) in Ontario using data from the Ontario MLTC (including their COVID-19 tracking tool) and Public Health Ontario's iPHIS database
- **Participants:** 75,676 LTC residents (March 29-May 20, 2020)
- **Exposure:** profit status of LTC homes (for-profit, non-profit, municipal)
- **Outcomes of interest:**
  - COVID-19 outbreaks in the LTC home (at least 1 resident case)
  - Extent of COVID-19 outbreaks (number of resident cases among homes with outbreaks)
  - Number of COVID-19 resident deaths (among homes with outbreaks)

10. FOR-PROFIT LTC HOMES AND COVID-19 OUTBREAKS

Table 1: Characteristics of all 623 Ontario long-term care homes, by profit status

Measure	Profit status of LTC home: No. (%)* of for-profit LTC homes† *n* = 360	No. (%)* of nonprofit LTC homes‡ *n* = 162	No. (%)* of municipal LTC homes§ *n* = 101	*p* value¶
No. of residents, mean	113.2	119.6	155.2	< 0.001
Older design standard**	193 (53.6)	30 (18.5)	12 (11.9)	< 0.001
Accommodation type				
% single occupancy, mean	31.6	49.2	52.8	< 0.001
% double occupancy, mean	38.5	39.9	39.7	0.52
% quadruple occupancy, mean	28.3	8.7	6.6	< 0.001
LTC home chains				
≥ 20 homes	145 (40.3)	0 (0)	0 (0)	< 0.001
10–19 homes	104 (28.9)	0 (0)	0 (0)	
2–9 homes	56 (15.6)	50 (30.9)	0 (0)	
1 home: not a chain	55 (15.3)	112 (69.1)	101 (100)	
Staff (full-time equivalent):bed ratio, mean	0.70	0.72	0.77	< 0.001
Population size of the community in which the LTC home is situated				
≥ 500 000	145 (40.3)	82 (50.6)	28 (27.7)	0.002
10 000–499 999	143 (39.7)	37 (22.8)	45 (44.5)	
< 10 000: rural	72 (20.0)	43 (26.5)	28 (27.7)	
Cumulative incidence of COVID-19 in the public health unit region surrounding the LTC home	1.00 per 1000	1.06 per 1000	0.89 per 1000	0.045

10. FOR-PROFIT LTC HOMES AND COVID-19 OUTBREAKS

Table 2: COVID-19 outbreaks and deaths in Ontario long-term care homes, by profit status (Mar. 29 to May 20, 2020)

Measure	Profit status of LTC home			
	No. (%)* of for-profit LTC homes† *n* = 360	No. (%)* of nonprofit LTC homes‡ *n* = 162	No. (%)* of municipal LTC homes§ *n* = 101	*p* value¶
COVID-19 outbreaks				
Any LTC home outbreak	154 (42.8)	73 (45.1)	41 (40.6)	0.77
Outbreaks involving both residents and staff	51 (14.2)	29 (17.9)	13 (12.9)	0.44
Outbreaks involving residents only	59 (16.4)	26 (16.0)	12 (11.9)	0.53
Outbreaks involving staff only	44 (12.2)	18 (11.1)	16 (15.8)	0.51
COVID-19 outbreaks involving residents				
Total no. of COVID-19 cases	3599	1239	380	–
Cumulative incidence of COVID-19 cases	85.1 per 1000	61.4 per 1000	23.4 per 1000	< 0.001
Homes with a resident outbreak	110 (30.6)	55 (34.0)	25 (24.8)	0.29
Percentage of residents infected per outbreak home, median (IQR)	4.8 (1.1–49.6)	5.6 (1.5–33.8)	1.1 (0.6–4.6)	0.01
No. of cases per outbreak home, median (IQR)	5 (1–55)	10 (1–35)	2 (1–10)	0.20
COVID-19 resident deaths				
Total no. of COVID-19 deaths	989	368	95	–
COVID-19 death rate	23.4 per 1000	18.2 per 1000	5.8 per 1000	< 0.001
Homes with any resident death	51 (14)	33 (20)	11 (11)	0.086
Percentage of resident deaths per home, median (IQR)	13.0 (5.1–19.6)	7.0 (2.4–12.7)	2.3 (1.0–6.8)	0.0019
Median no. of deaths per home (IQR)	14 (8–27)	10 (4–16)	3 (2–13)	0.013
Case fatality rate, %	27.5	29.7	25.0	0.14

10. FOR-PROFIT LTC HOMES AND COVID-19 OUTBREAKS

Table 3: Odds of a COVID-19 outbreak in a long-term care home, by profit status

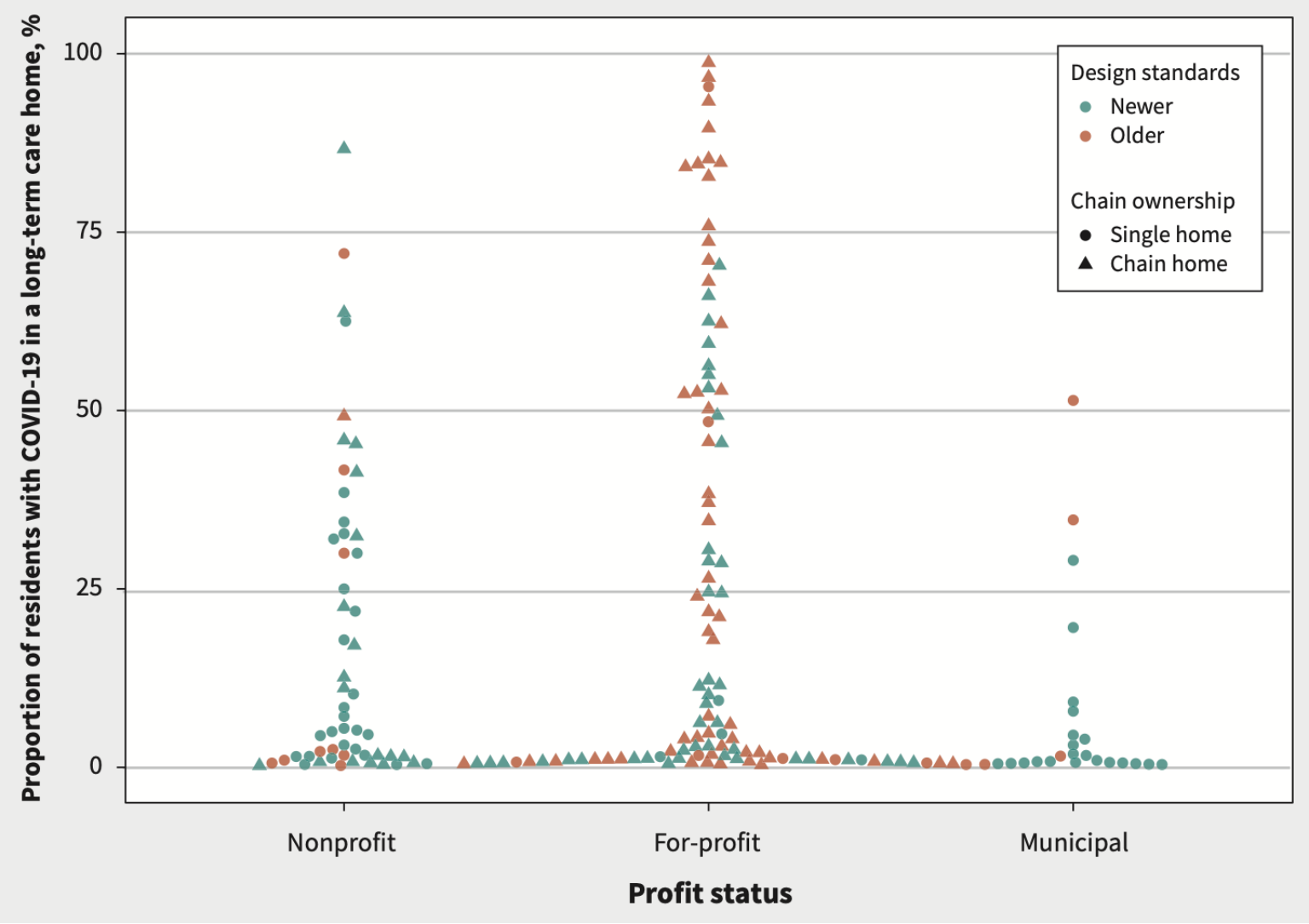
Variable	Model 1 (profit status only), adjusted OR (95% CI)	Model 2 (+ adjustment for health region characteristics), adjusted OR (95% CI)	Model 3 (explanatory) (+ adjustment for LTC home characteristics), adjusted OR (95% CI)
Profit status			
Nonprofit (Ref.)	–	–	–
For-profit	1.01 (0.64–1.57)	0.96 (0.61–1.49)	0.71 (0.40–1.25)
Municipal	0.83 (0.45–1.54)	0.85 (0.46–1.58)	0.71 (0.36–1.42)
Health region characteristics			
COVID-19 cumulative incidence in the public health unit region (1 case per 1000)	–	2.02 (1.20–3.38)	1.91 (1.19–3.05)
Population			
≥ 500 000 (Ref.)	–	–	–
10 000–499 999	–	0.57 (0.32–1.00)	0.56 (0.33–0.95)
< 10 000 (rural)	–	0.27 (0.13–0.58)	0.39 (0.18–0.83)
LTC home characteristics			
No. of residents (unit of 50)	–	–	1.38 (1.18–1.61)
Older design standards	–	–	1.55 (1.01–2.38)
Chain ownership (v. single home)	–	–	1.47 (0.86–2.51)
Staff (full-time equivalent):bed ratio	–	–	1.98 (0.39–9.97)

10. FOR-PROFIT LTC HOMES AND COVID-19 OUTBREAKS

Table 4: Extent* of COVID-19 outbreaks in long-term care homes, by profit status

Variable	Model 1 (profit status only), adjusted RR (95% CI)	Model 2 (+ adjustment for health region characteristics), adjusted RR (95% CI)	Model 3 (explanatory) (+ adjustment for LTC home characteristics), adjusted RR (95% CI)
Profit status			
Nonprofit (Ref.)	–	–	–
For-profit	1.83 (1.18–2.84)	1.96 (1.26–3.05)	0.96 (0.57–1.61)
Municipal	0.60 (0.28–1.30)	0.64 (0.29–1.40)	0.85 (0.40–1.82)
Health region characteristics			
COVID-19 cumulative incidence in the public health unit region (cases per 1000)	–	1.84 (1.10–3.08)	1.65 (1.02–2.67)
Population			
≥ 500 000 (ref)	–	–	–
10 000–499 999	–	0.65 (0.33–1.24)	0.55 (0.30–0.99)
< 10 000 (rural)	–	0.85 (0.22–3.28)	0.53 (0.15–1.83)
LTC home characteristics			
No. of residents (unit of 50)	–	–	0.84 (0.73–0.95)
Older design standards	–	–	1.88 (1.27–2.79)
Chain ownership (v. single home)	–	–	1.84 (1.08–3.15)
Staff (full-time equivalent):bed ratio	–	–	0.73 (0.10–5.35)

10. FOR-PROFIT LTC HOMES AND COVID-19 OUTBREAKS

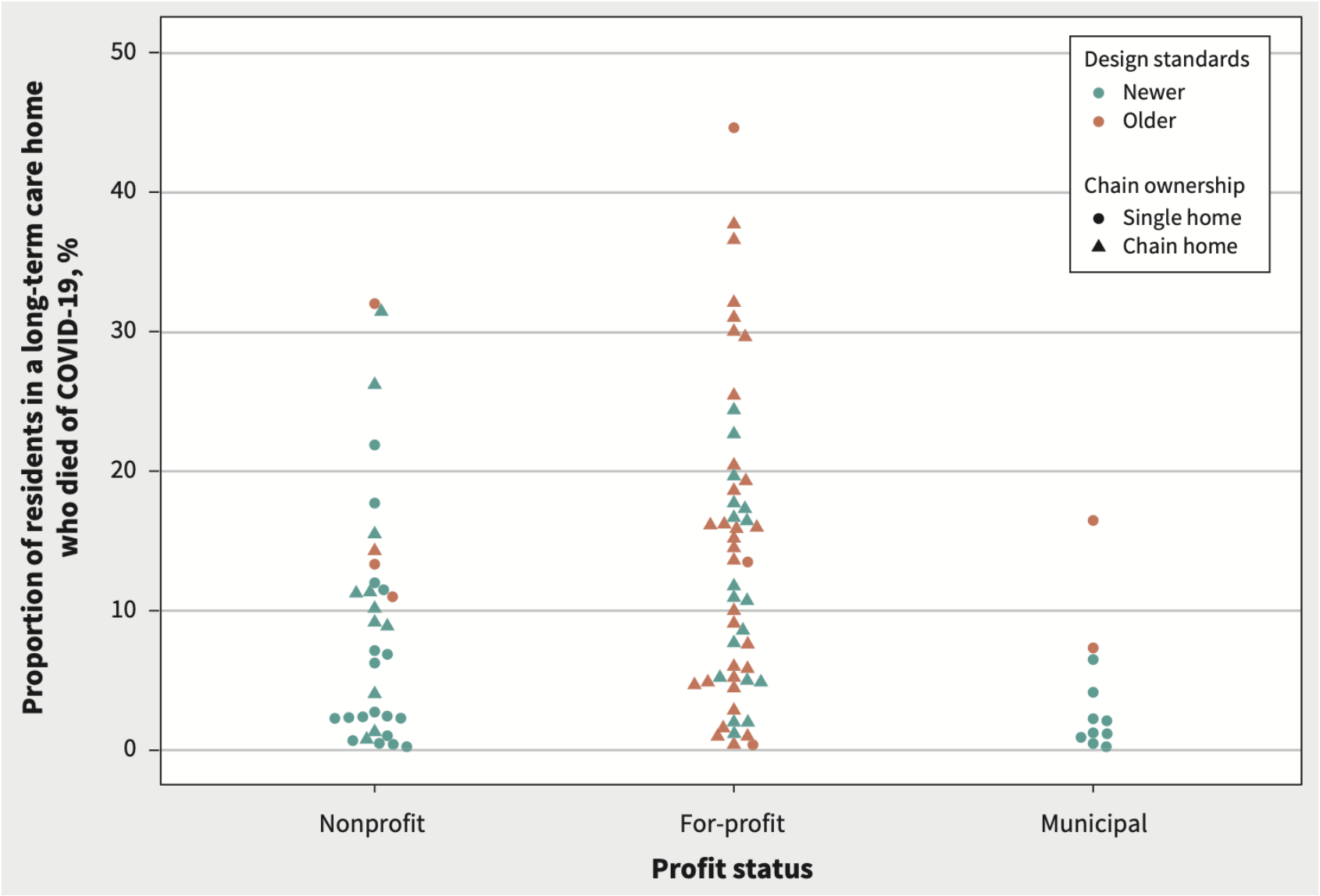


10. FOR-PROFIT LTC HOMES AND COVID-19 OUTBREAKS

Table 5: Number of deaths from COVID-19 among long-term care home residents, by profit status

Variable	Model 1 (profit status only), adjusted RR (95% CI)	Model 2 (+ adjustment for health region characteristics), adjusted RR (95% CI)	Model 3 (+ adjustment for LTC home characteristics), adjusted RR (95% CI)
Profit status			
Nonprofit (Ref.)	–	–	–
For-profit	1.67 (0.99–2.79)	1.78 (1.03–3.07)	0.82 (0.44–1.54)
Municipal	0.50 (0.19–1.29)	0.54 (0.20–1.49)	0.73 (0.28–1.88)
Health region characteristics			
COVID-19 cumulative incidence in the public health unit region (cases per 1000)	–	1.77 (0.47–6.60)	1.44 (0.81–2.55)
Population			
≥ 500 000 (ref)	–	–	–
10 000–499 999	–	0.62 (0.26–1.47)	0.51 (0.25–1.05)
< 10 000 (rural)	–	0.72 (0.12–4.25)	0.40 (0.08–1.89)
LTC home characteristics			
No. of residents (unit of 50)	–	–	0.81 (0.70–0.95)
Older design standards	–	–	2.08 (1.28–3.36)
Chain ownership (v. single home)	–	–	1.89 (1.00–3.59)
Staff (full-time equivalent):bed ratio	–	–	0.84 (0.09–8.75)

10. FOR-PROFIT LTC HOMES AND COVID-19 OUTBREAKS



11. LTC HOME CROWDING AND COVID-19 INFECTION

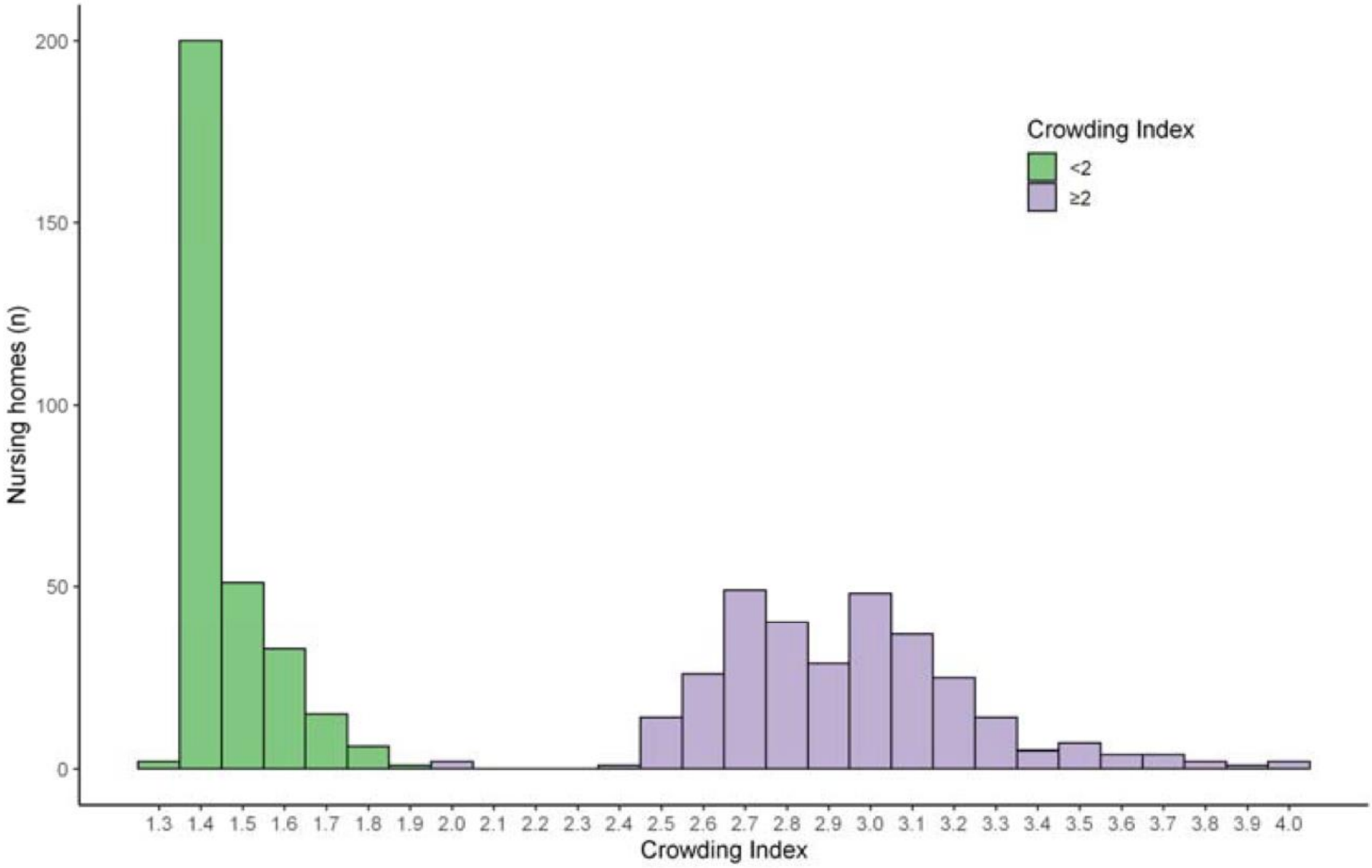
Association Between Nursing Home Crowding and COVID-19 Infection and Mortality in Ontario, Canada

Kevin A Brown, Aaron Jones, Nick Daneman, Adrienne K Chan, Kevin L Schwartz, Gary E Garber, Andrew Costa, Nathan M Stall

- **Design and setting:** retrospective cohort study of all LTC homes (n = 623) in Ontario using data from the Ontario MLTC (including their COVID-19 tracking tool) and Public Health Ontario's iPHIS database
- **Participants:** 75,676 LTC residents (March 29-May 20, 2020)
- **Exposure:** crowding index (average number of residents per room and bathroom)
- **Outcomes of interest:**
  - Cumulative incidence of COVID-19 infection and mortality
  - Introduction of COVID-19 into a home (negative tracer)

medRxiv 2020.06.23.20137729

11. LTC HOME CROWDING AND COVID-19 INFECTION



medRxiv 2020.06.23.20137729

11. LTC HOME CROWDING AND COVID-19 INFECTION

Table 2. Nursing home characteristics and incidence of COVID-19 infections (per 100 residents) and mortality (per 100 residents)

	COVID-19 Incidence RR (95% CI)		COVID-19 Mortality RR (95% CI)		COVID-19 Introduction (≥1 Infection) OR (95% CI)	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Regional factors						
Regional COVID-19 incidence (per 10,000 residents)						
1st Quartile (0.11, 0.46)	Reference	Reference	Reference	Reference	Reference	Reference
2nd Quartile (0.51, 0.93)	1.79 (0.37-8.77)	1.20 (0.27-5.42)	2.57 (0.34-19.62)	1.68 (0.27-10.45)	1.35 (0.61-2.99)	1.10 (0.51-2.34)
3rd Quartile (0.94, 1.29)	6.74 (1.70-26.78)	2.43 (0.58-10.15)	8.68 (1.40-53.65)	2.88 (0.49-17.08)	1.89 (0.87-4.09)	0.87 (0.37-2.03)
4th Quartile (1.30, 1.88)	10.00 (2.53-39.59)	4.11 (1.01-16.67)	13.94 (2.30-84.42)	5.38 (0.94-30.83)	2.69 (1.21-5.96)	1.57 (0.69-3.59)
Community population size						
<10,000	Reference	Reference	Reference	Reference	Reference	Reference
10,000-499,999	1.95 (0.43-8.80)	1.59 (0.38-6.69)	2.15 (0.34-13.54)	1.91 (0.34-10.80)	2.50 (1.29-4.85)	2.08 (0.99-4.37)
≥500,000+	8.64 (1.99-37.49)	4.63 (1.05-20.44)	9.94 (1.67-59.16)	5.79 (0.98-34.31)	6.11 (3.00-12.43)	5.17 (2.06-12.94)
Nursing home factors						
Ownership						
Municipal	Reference	Reference	Reference	Reference	Reference	Reference
Private, for-profit	3.30 (1.72-6.32)	2.40 (1.14-5.06)	3.67 (1.68-8.03)	2.60 (1.04-6.51)	1.23 (0.71-2.12)	0.98 (0.54-1.80)
Private, non-profit	2.00 (0.98-4.09)	2.07 (0.92-4.67)	2.48 (1.06-5.78)	2.37 (0.88-6.34)	1.22 (0.66-2.27)	1.31 (0.68-2.53)
Size of home (beds)						
<100	Reference	Reference	Reference	Reference	Reference	Reference
≥100	0.83 (0.49-1.40)	0.90 (0.51-1.59)	0.70 (0.40-1.22)	0.74 (0.39-1.39)	1.77 (1.17-2.69)	1.48 (0.91-2.41)
Crowding Index						
1.5 (lowest)	Reference	Reference	Reference	Reference	Reference	Reference
2	1.27 (1.14-1.41)	1.20 (1.04-1.38)	1.25 (1.11-1.42)	1.20 (1.01-1.42)	1.03 (0.91-1.16)	1.05 (0.90-1.23)
2.5	1.61 (1.30-1.99)	1.43 (1.07-1.92)	1.57 (1.23-2.01)	1.44 (1.02-2.02)	1.06 (0.84-1.36)	1.11 (0.82-1.51)
3	2.05 (1.49-2.82)	1.72 (1.11-2.65)	1.97 (1.36-2.84)	1.72 (1.03-2.86)	1.10 (0.76-1.58)	1.17 (0.74-1.86)
3.5 (highest)	2.60 (1.70-3.98)	2.06 (1.15-3.67)	2.47 (1.51-4.02)	2.06 (1.05-4.07)	1.13 (0.70-1.84)	1.24 (0.67-2.29)

11. LTC HOME CROWDING AND COVID-19 INFECTION

Table 2. Nursing home characteristics and incidence of COVID-19 infections (per 100 residents) and mortality (per 100 residents)

	COVID-19 Incidence RR (95% CI)		COVID-19 Mortality RR (95% CI)		COVID-19 Introduction (≥1 Infection) OR (95% CI)	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Regional factors						
Regional COVID-19 incidence (per 10,000 residents)						
1st Quartile (0.11, 0.46)	Reference	Reference	Reference	Reference	Reference	Reference
2nd Quartile (0.51, 0.93)	1.79 (0.37-8.77)	1.20 (0.27-5.42)	2.57 (0.34-19.62)	1.68 (0.27-10.45)	1.35 (0.61-2.99)	1.10 (0.51-2.34)
3rd Quartile (0.94, 1.29)	6.74 (1.70-26.78)	2.43 (0.58-10.15)	8.68 (1.40-53.65)	2.88 (0.49-17.08)	1.89 (0.87-4.09)	0.87 (0.37-2.03)
4th Quartile (1.30, 1.88)	10.00 (2.53-39.59)	4.11 (1.01-16.67)	13.94 (2.30-84.42)	5.38 (0.94-30.83)	2.69 (1.21-5.96)	1.57 (0.69-3.59)
Community population size						
<10,000	Reference	Reference	Reference	Reference	Reference	Reference
10,000-499,999	1.95 (0.43-8.80)	1.59 (0.38-6.69)	2.15 (0.34-13.54)	1.91 (0.34-10.80)	2.50 (1.29-4.85)	2.08 (0.99-4.37)
≥500,000+	8.64 (1.99-37.49)	4.63 (1.05-20.44)	9.94 (1.67-59.16)	5.79 (0.98-34.31)	6.11 (3.00-12.43)	5.17 (2.06-12.94)
Nursing home factors						
Ownership						
Municipal	Reference	Reference	Reference	Reference	Reference	Reference
Private, for-profit	3.30 (1.72-6.32)	2.40 (1.14-5.06)	3.67 (1.68-8.03)	2.60 (1.04-6.51)	1.23 (0.71-2.12)	0.98 (0.54-1.80)
Private, non-profit	2.00 (0.98-4.09)	2.07 (0.92-4.67)	2.48 (1.06-5.78)	2.37 (0.88-6.34)	1.22 (0.66-2.27)	1.31 (0.68-2.53)
Size of home (beds)						
<100	Reference	Reference	Reference	Reference	Reference	Reference
≥100	0.83 (0.49-1.40)	0.90 (0.51-1.59)	0.70 (0.40-1.22)	0.74 (0.39-1.39)	1.77 (1.17-2.69)	1.48 (0.91-2.41)
Crowding Index						
1.5 (lowest)	Reference	Reference	Reference	Reference	Reference	Reference
2	1.27 (1.14-1.41)	1.20 (1.04-1.38)	1.25 (1.11-1.42)	1.20 (1.01-1.42)	1.03 (0.91-1.16)	1.05 (0.90-1.23)
2.5	1.61 (1.30-1.99)	1.43 (1.07-1.92)	1.57 (1.23-2.01)	1.44 (1.02-2.02)	1.06 (0.84-1.36)	1.11 (0.82-1.51)
3	2.05 (1.49-2.82)	1.72 (1.11-2.65)	1.97 (1.36-2.84)	1.72 (1.03-2.86)	1.10 (0.76-1.58)	1.17 (0.74-1.86)
3.5 (highest)	2.60 (1.70-3.98)	2.06 (1.15-3.67)	2.47 (1.51-4.02)	2.06 (1.05-4.07)	1.13 (0.70-1.84)	1.24 (0.67-2.29)

12. IMPROVING MEDICAL SERVICES IN LTC HOMES

Improving medical services in Canadian long term care homes

Rhonda Collins, MD BScN, Jocelyn Charles, MD MScCH, Andrea Moser, MD MSc, Brad Birmingham, MD, Allan Grill, MD MPH and Maureen Gottesman, MD MEd

October 07, 2020

Recommendations:

1. **Time commitment:** 4 hours/week for every 25-30 residents

2. **Physical presence and virtual care:** standardized process for virtual care, but in-person assessment for acute illness or significant changes in a resident's condition

3. **Adequate remuneration:** update fee codes to reflect increasing complexity and acuity of resident conditions and medical director stipend to reflect increased work during a pandemic and outbreaks

12. IMPROVING MEDICAL SERVICES IN LTC HOMES

4. **Maintenance of competency:** CME for all LTC physicians and added training for medical directors. Peer reviews should address performance expectations.

5. **Access to clinical resources:** availability of laboratory services, diagnostic imaging, medical supplies, staff trained in intravenous therapy and specialist consults.

6. **Access to PPE:** funding for PPE should take the number of physicians into account to ensure adequate supply.

7. **Credentialling:** standardized credentialling process.

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