Factors associated with COVID-19 outbreaks, transmission and poor outcomes in Ontario's LTC Homes

Presentation to the Ontario Long-Term Care Commission

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Land acknowledgement

As CIHI works toward better health for all Canadians, we are mindful that we live on the traditional territories of and work with First Nations, Inuit and Métis in a respectful way.

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CIHI would like to thank and acknowledge the long-term care home staff who provided this valuable data during a very challenging time. While we focus on numbers in our conclusions, we acknowledge that these numbers represent people who have been impacted by COVID-19.

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Recap

- **In September 2020, CIHI presented to Ontario's Long-Term Care COVID-19 Commission**

- **The Commission engaged CIHI to prepare a report that answers the question:**

  – What home-level characteristics were most associated with COVID-19 outbreaks, spread within homes, and poor resident outcomes in Ontario's long-term care homes during the *initial wave* of the pandemic (March 1 to June 30, 2020)?

- **The Commission released a survey in January 2021 to gather data from long-term care homes that was not already available**

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Research questions

Multivariate modelling was used to determine the relationship between characteristics of long-term care homes and surrounding regions on the following outcomes in Ontario long-term care homes:

1. Likelihood of COVID-19 outbreak (defined as 1 or more resident cases)

2. Severity of COVID-19 outbreak (defined as percentage of residents infected)

3. Resident mortality rate due to COVID-19 (defined as percentage of residents dying)

4. High resident mortality due to COVID-19 (defined as 20% or more of residents dying)

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Previous Ontario-specific research findings

- **Risk factors for greater likelihood of COVID-19 outbreak include:**
  - COVID-19 incidence in the region surrounding the home
  - Large facility size

- **Risk factors for greater COVID-19 spread and deaths within homes include:**
  - Old facility design standards (ward-style rooms)
  - Chain ownership
  - Greater facility crowding

Reference: Stall NM, Brown KA, Maltsev A, et al. COVID-19 and Ontario's long-term care homes. Science Briefs of the Ontario COVID19 Science Advisory Table. 2021;2(7). https://doi.org/10.47326/ocsat.2021.02.07.1.0

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CIHI – New contribution

Building on previously published models, the additional survey data was used to characterize the association between COVID-19 outbreak incidence and severity with:

- Staffing mix
- Staff shortages
- Access to paid sick time
- IPAC and medical leadership

- Hospital affiliations
- Access to personal protective equipment
- Isolation procedures

In addition, CIHI's long-term care data (Continuing Care Reporting System) was used to characterize the association between COVID-19 outbreak incidence and severity with:

- Home-level resident clinical profiles (e.g., cognitive impairment, health instability)
- Home-level quality of care (interRAI risk-adjusted quality indicators)

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Survey of Ontario Long-Term Care Homes
January to February 2021

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Considerations about the survey

- **The survey was designed to enable long-term care homes to provide objective and accurate information to inform recommendations for systemic changes within homes**

- **The survey covered the following types of information:**
  - Outcomes (outbreaks, cases, mortality)
  - Health workforce
  - Physical infrastructure
  - Infection prevention and control measures
  - Governance and partnerships

- **Questions focussed on factors that are under the control or influence of the long-term care homes' administration**

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Responses received for the survey

- **573 out of 623 homes responded to the survey (92%)**

- **Each LHIN was represented, although coverage varied between LHINs (81-97%)**

- **Overall, homes that responded (573) were representative of all homes across the province**

	Overall (n = 623)	Homes that responded (n = 573)	Homes that did not respond (n = 50)
Facility Size *			
Small	3.5% (22)	3.5% (20)	3.9% (2)
Medium	37.7% (235)	36.2% (207)	54.9% (28)
Large	58.8% (366)	60.3% (345)	41.2% (21)
Old Design Standard	37.4% (235)	38.0% (216)	37.3% (19)
Private Ownership	83.6% (521)	83.2% (476)	88.2% (45)
For-profit	57.5% (358)	57.5% (329)	47.1% (24)
Accredited *	81.1% (505)	82.0% (469)	68.6% (35)

* Significant difference (p<0.05)

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Data strengths and limitations

Strengths

- **Representative data across LHINs**

- **Very high survey response rate**

- **Confidence in quality of survey data provided**

- **Building on evidence base with data not available elsewhere**

Limitations

- **Difficult to attribute causation or sequence of events (i.e., timing of staffing shortages relative to resident infections)**

- **Only certain types of information can be captured in surveys**

- **Pandemic is ongoing, factors continue to evolve**
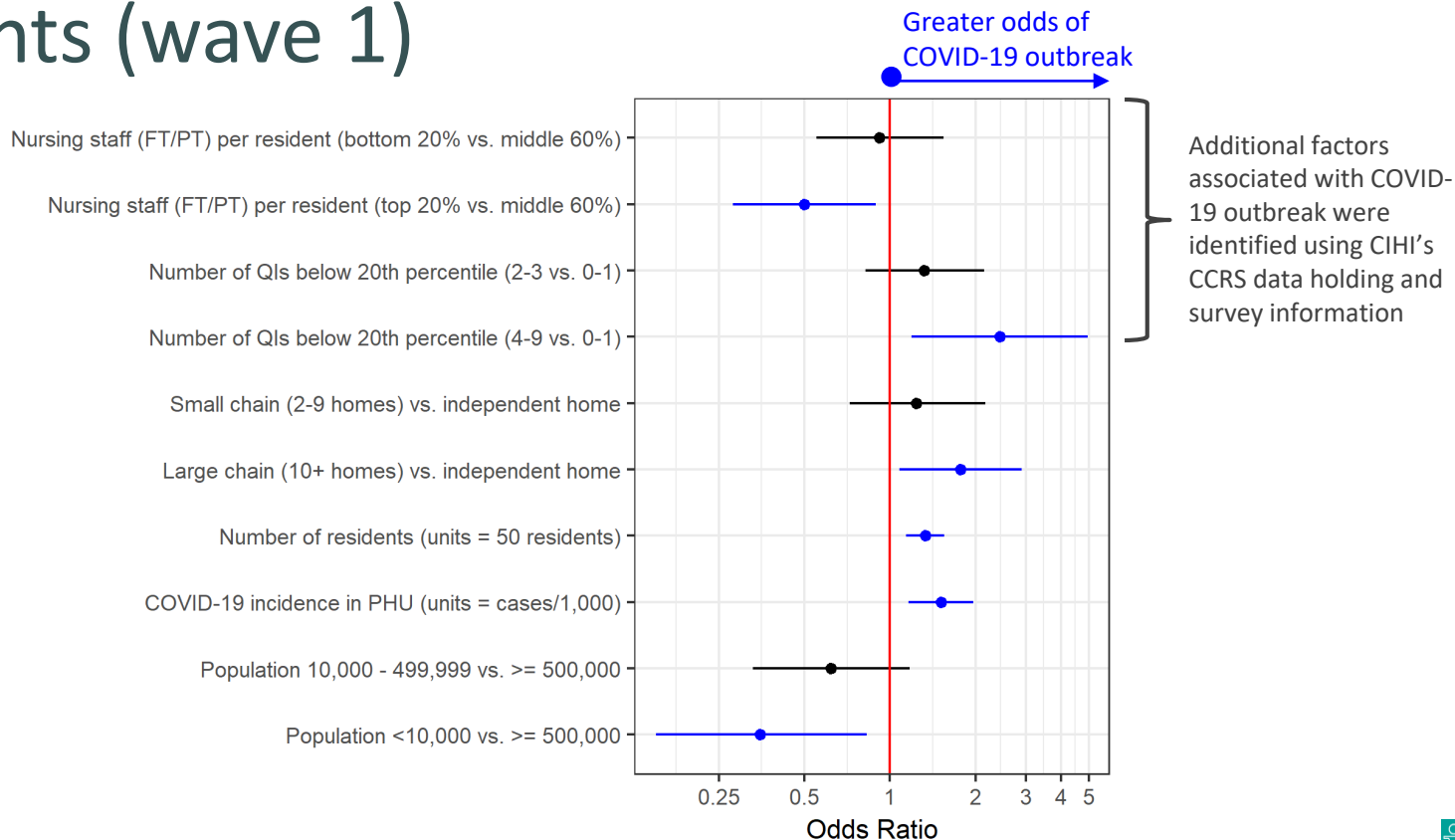
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Predicting outcomes – outbreaks, cases and mortality in wave 1

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Wave 1 statistics

- **179 or 31% of homes reported a COVID-19 outbreak among 1 or more residents before July 1, 2020**

- **Of these homes:**

  - A median of 4.6% of residents per home were infected with COVID-19

  - 66 or 37% of homes had 20% or more of residents infected with COVID-19

  - 102 or 57% reported at least one resident death

  - 26 or 15% experienced a very severe outbreak where 20% or more residents in the home died

- **Of the 573 homes that responded, 26 homes or 5% of all homes account for:**

  - Almost half or 46% of all resident cases of COVID-19

  - Just over half or 54% of all resident deaths due to COVID-19

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Likelihood of COVID-19 outbreak among residents

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Likelihood of COVID-19 outbreak among residents (wave 1)

Greater odds of COVID-19 outbreak

Nursing staff (FT/PT) per resident (bottom 20% vs. middle 60%)

Nursing staff (FT/PT) per resident (top 20% vs. middle 60%)

Number of QIs below 20th percentile (2-3 vs. 0-1)

Number of QIs below 20th percentile (4-9 vs. 0-1)

Small chain (2-9 homes) vs. independent home

Large chain (10+ homes) vs. independent home

Number of residents (units = 50 residents)

COVID-19 incidence in PHU (units = cases/1,000)

Population 10,000 - 499,999 vs. >= 500,000

Population <10,000 vs. >= 500,000

Odds Ratio

0.25   0.5   1   2   3   4   5

Additional factors associated with COVID-19 outbreak were identified using CIHI's CCRS data holding and survey information

Statistically significant

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Likelihood of COVID-19 outbreak among residents (wave 1)

- **Higher odds of COVID-19 outbreak:**
  - Large chains (10+ homes)
  - Greater number of residents
  - Located in public health units with more COVID-19
  - Poor performance by homes on CIHI publicly reported quality indicators
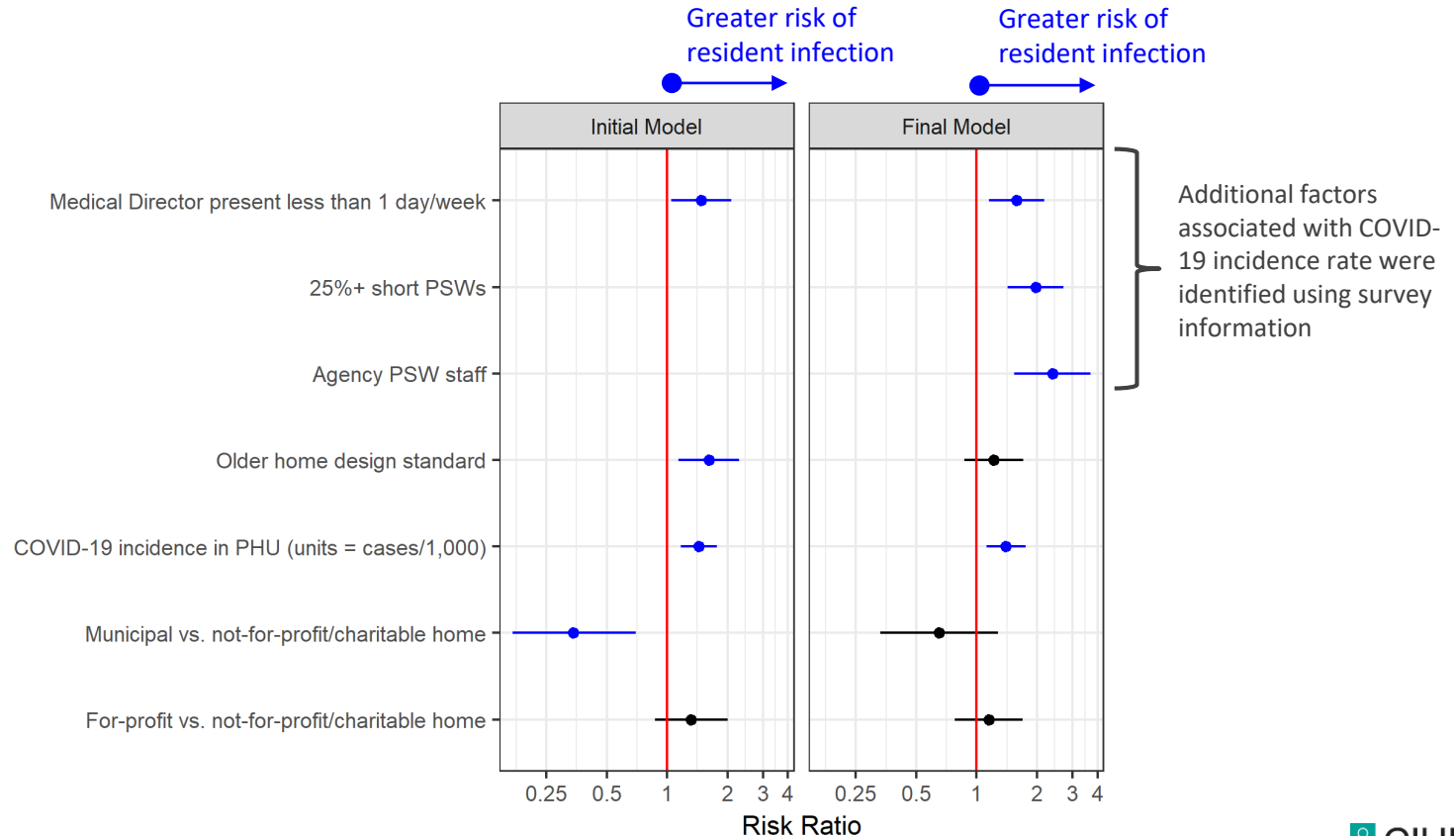
- **Lower odds of COVID-19 outbreak:**
  - Located in sparsely populated areas (less than 10,000 population)
  - More nursing staff to residents

- <u>**No association**</u> was observed for:
  - Access to paid sick time by staff
  - Access to a certified infection control professional
  - Infection prevention and control staff training
  - Intensity of resident needs

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Severity of COVID-19 outbreak

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Severity of COVID-19 outbreak among residents (wave 1)

Greater risk of resident infection → (Initial Model)

Greater risk of resident infection → (Final Model)

| Initial Model | Final Model |

Factors (top to bottom):
- Medical Director present less than 1 day/week
- 25%+ short PSWs
- Agency PSW staff
- Older home design standard
- COVID-19 incidence in PHU (units = cases/1,000)
- Municipal vs. not-for-profit/charitable home
- For-profit vs. not-for-profit/charitable home

Risk Ratio axis: 0.25 0.5 1 2 3 4

Additional factors associated with COVID-19 incidence rate were identified using survey information

— Statistically significant

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Severity of COVID-19 outbreak among residents (wave 1)

- **Higher risk of COVID-19 infection:**
  - Medical Director present less than one day per week
  - Critical PSW shortage
  - Regular use of agency PSWs
  - Homes in public health units with higher rates of COVID-19

- **Lower risk of COVID-19 infection:**
  - N/A

- **No association was observed for:**
  - Availability of an IPAC professional
  - PPE training and rationing
  - Quality of medical and supportive care (quality indicators)
  - Chain ownership

- **In the final model, no association was observed for:**
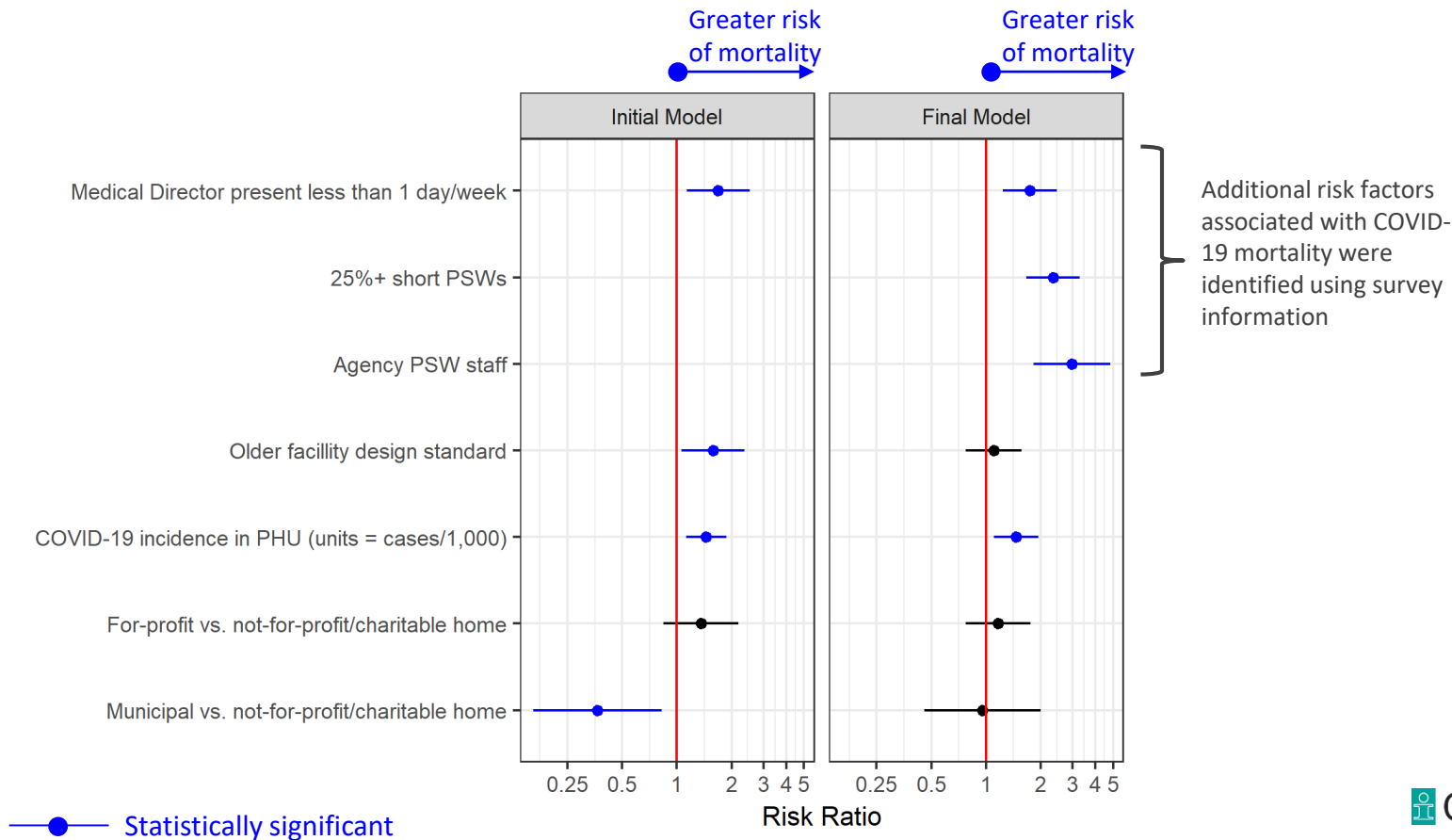 - Facility design standards
  - Municipal home status

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Resident mortality rate due to COVID-19

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Resident outbreak severity and mortality rate

- **Outbreak severity (incidence rate) was directly related to the mortality rate in the data**

- **Risk factors for outbreak severity were also found to affect the mortality rate**

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Resident mortality rate due to COVID-19 (wave 1)

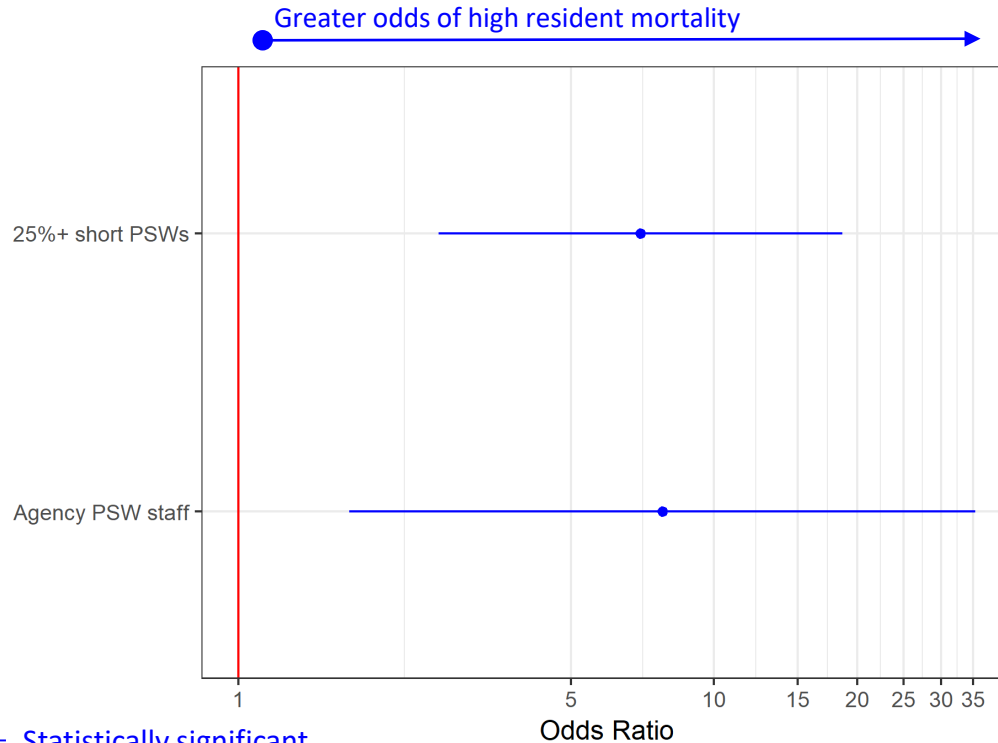# Resident mortality rate due to COVID-19 (wave 1)

- **Higher risk of mortality due to COVID-19:**
  - Medical Director present less than one day per week
  - Shortages of PSWs
  - Regular use of agency PSWs

- **Lower risk of mortality due to COVID-19:**
  - N/A

- **No association** was observed for:
  - Intensity of resident needs
  - Advanced care planning (e.g., resident preference to not be hospitalized)
  - Quality of medical and supportive care (quality indicators)

- **In the final model, no association was observed for:**
  - Facility design standards
  - Municipal home status

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High resident mortality due to COVID-19

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High resident mortality due to COVID-19 (wave 1)
20% or more of residents

High resident mortality due to COVID-19 (wave 1)

- **Higher odds of COVID-19 death among 20% of residents or more:**
  - Shortages of PSWs
  - Regular use of agency PSWs

- **Lower odds of COVID-19 death among 20% of residents or more:**
  - N/A

- **<u>No association</u> was observed for:**
  - Intensity of resident needs
  - Quality of medical and supportive care (quality indicators)

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Summary and conclusions

Summary of findings by research question (wave 1)

Likelihood of outbreak

Higher

- Large chains (10+ homes)
- Greater number of residents
- Located in public health units with more COVID-19
- Poor performance by homes on CIHI publicly reported quality indicators

Lower

- Located in sparsely populated areas (fewer than 10,000 people vs. 500,000 people or more)
- More nursing staff to residents

Severity of outbreak and Resident mortality rate

Higher

- PSW shortage
- PSWs provided by an agency
- Located in public health units with more COVID-19
- Medical Director present less than one day per week

High resident mortality (20% or more)

Higher

- PSW shortage
- PSWs provided by an agency

Key takeaways

- **The health workforce is vital for pandemic response, including the ability to scale-up safely**

- **Leadership, including the consistent presence of a Medical Director is needed to prevent poor outcomes**

- **Staffing may be the strongest infection prevention and control practice within homes**

- **Using the publicly reported quality indicators, homes at higher risk at the onset of a crisis could be targeted for immediate support**

Next steps:

- The information provided today addresses specifically the four research questions. More analysis could be completed with the survey data including analysis on wave 2 data points

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