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Inspiring Minds

Clinical and demographic characteristics of patients admitted to Canadian hospitals with COVID-19: A report from the Canadian Immunization Research Network Serious Outcomes Surveillance Network

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Background

- The CIRN SOS Network has been conducting active surveillance for influenza since 2009
- Originally established to support Canada's pandemic preparedness
- Influenza surveillance studies burden of disease, outcomes, and Vaccine Effectiveness (VE)
- This established infrastructure was pivoted to perform COVID-19 surveillance to inform Canada's COVID-19 response



Methods

- Active surveillance for COVID-19 illness in adults (≥16 years of age) was conducted starting in March 2020; all 2020 enrollments are reported here
- NP swab obtained from all patients with an admitting diagnosis of COVID-19, CAP, exacerbation of COPD/asthma, unexplained sepsis, any respiratory diagnosis or symptom
- All NP swabs tested for SARS-CoV-2 using PCR
- Other clinical and demographic information was also collected, including information about comorbidities, medications, and frailty (Clinical Frailty Scale)
- Independent samples t-tests for comparisons of continuous variables and chi-squared tests of independents were used to compare groups on categorical variables.
- Separate logistic regressions were conducted for each predictor to assess associations with ICU admission, mechanical ventilation, and mortality, adjusted for age, sex, and frailty.

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Table 1: Clinical characteristics of COVID-19 cases enrolled in 2020

Results

Characteristics	Full sample N=2031	Age <65 N=651	Age >=65 N=1378	p value
Age	71.0 (17.4)	50.2 (11.6)	80.9 (8.9)	<.001
Sex, female	928 (45.7%)	280 (43.0%)	646 (46.9%)	.10
Caucasian ethnicity	1033 (79.8%)	302 (65.2%)	830 (86.9%)	< 0.001
Province:				
Alberta	130 (6.4%)	62 (9.5%)	68 (4.9%)	
Ontario	1003 (49.4%)	341 (52.4%)	661 (48.0%)	
Quebec	868 (42.7%)	230 (35.3%)	637 (46.2%)	
Nova Scotia	30 (1.5%)	18 (2.8%)	12 (0.9%)	
Housing:				< 0.001
Private dwelling	1072 (65.6%)	484 (86.6%)	588 (54.1%)	
Assisted Living Facility	381 (23.3%)	11 (2.0%)	369 (34.0%)	
Long Term Care Facility	131 (8.0%)	16 (2.9%)	115 (10.6%)	
Homeless/shelter	28 (1.7%)	One group <5		
Other	21 (1.3%)	9 (1.6%)	12 (1.1%)	
Healthcare worker	61 (4.7%)	56 (13.9%)	5 (0.5%)	< 0.001
Travel history	68 (4.6%)	26 (5.3%)	42 (4.3%)	.40
Known direct exposure	409 (50.5%)	157 (51.5%)	251 (49.8%)	.64
Obesity (BMI>=30 or on chart)	414 (28.8%)	194 (39.5%)	220 (23.3%)	<0.001
Comorbidities: None	267 (16.9)	179 (36.0)	88 (8.1)	<0.001
Cardiovascular	1195 (75.4%)	251 (50.4%)	943 (86.9%)	<.001
Respiratory	508 (32.1%)	134 (27.0%)	374 (34.5%)	<.01
Immunosuppressed	96 (6.1%)	36 (7.2%)	60 (5.5%)	.19
Immunocompromized	21 (1.3%)	One group <5		

Proportions are are among patients with known information for that variable, missing values were excluded

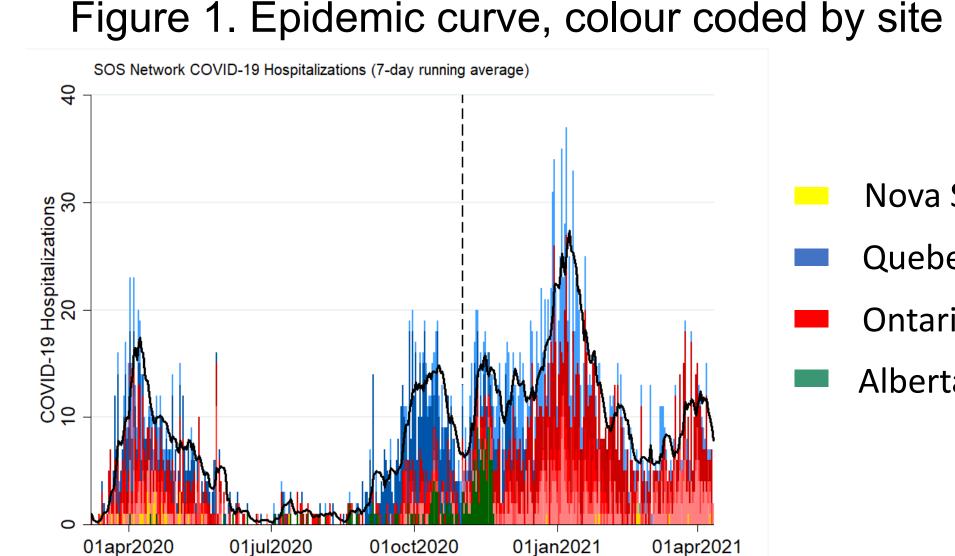
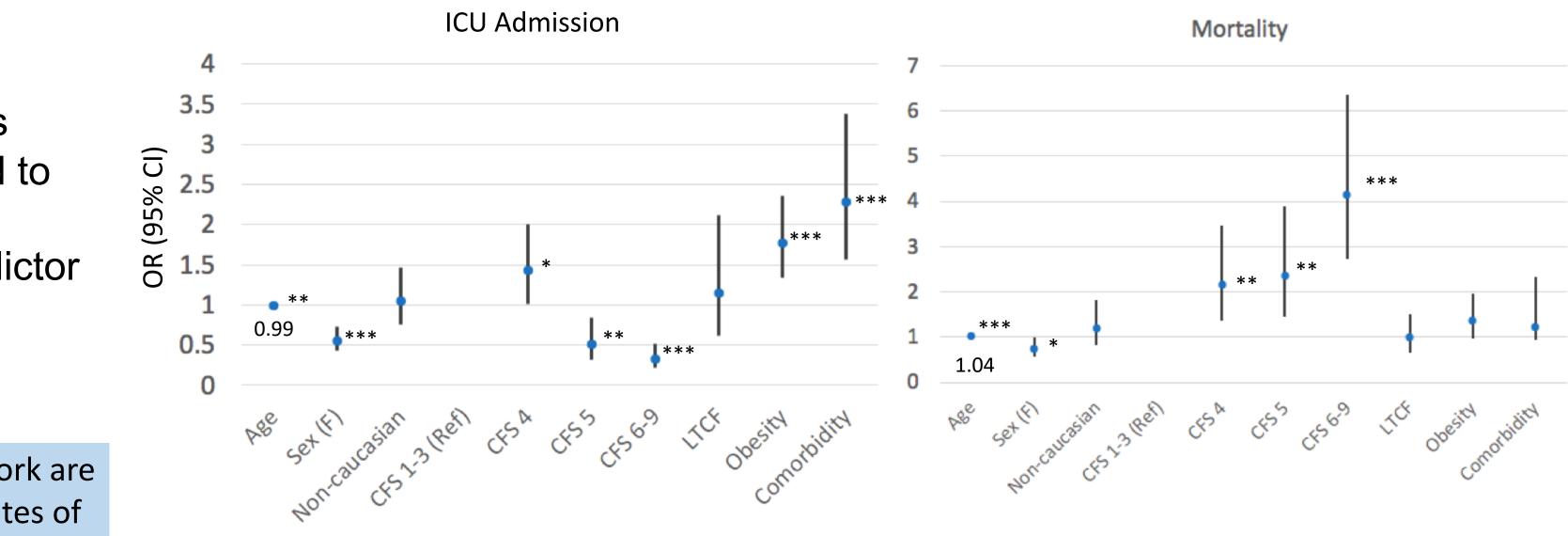


Figure 2. Associations with ICU admission and mortality, adjusted for age, sex and frailty



*p<.05, **p<.01, ***p<.001

- Nova Scotia
- Quebec
- Ontario
- Alberta

Clinical Frailty Scale 7 Severely Frail – Completely dependent for Very Fit - People who are robust, active, energetic personal care, from whatever cause (physical or nitive). Even so, they seem stable and not a and motivated. These people commonly exercise igh risk of dying (within ~ 6 months) regularly. They are among the fittest for their age 2 Well - People who have no active disease 3 Very Severely Frail – Completely dependent symptoms but are less fit than category 1. Often, they approaching the end of life. Typically, they could exercise or are very active occasionally, e.g. seasonally not recover even from a minor illness. Managing Well – People whose medical problem are well controlled, but are not regularly active Ferminally III - Approaching the end of life. This beyond routine walking category applies to people with a life expectancy 6 months, who are not otherwise evidently frail 4 Vulnerable – While not dependent on others for daily help, often symptoms limit activities. A commo omplaint is being "slowed up", and/or being tired ring frailty in people with dement on symptoms in mild dementia include forgetting the 5 Mildly Frail – These people often have mor details of a recent event, though still remembering the event itse evident slowing, and need help in high order IADI (finances, transportation, heavy housework, medica tions). Typically, mild frailty progressively impairs hough they seemingly can remember their past life events well shopping and walking outside alone, meal preparati and housework. n severe dementia, they cannot do personal care without he 6 Moderately Frail - People need help with all outside activities and with keeping house. Inside, they often have problems with stairs and need help with 2. K. Rockwood et al. A global clinical measure of fitness an frailty in elderly people. CMAJ 2005;173:489-495. bathing and might need minimal assistance (cuing,

Table 2: Outcomes of COVID-19 positive cases stratified by age

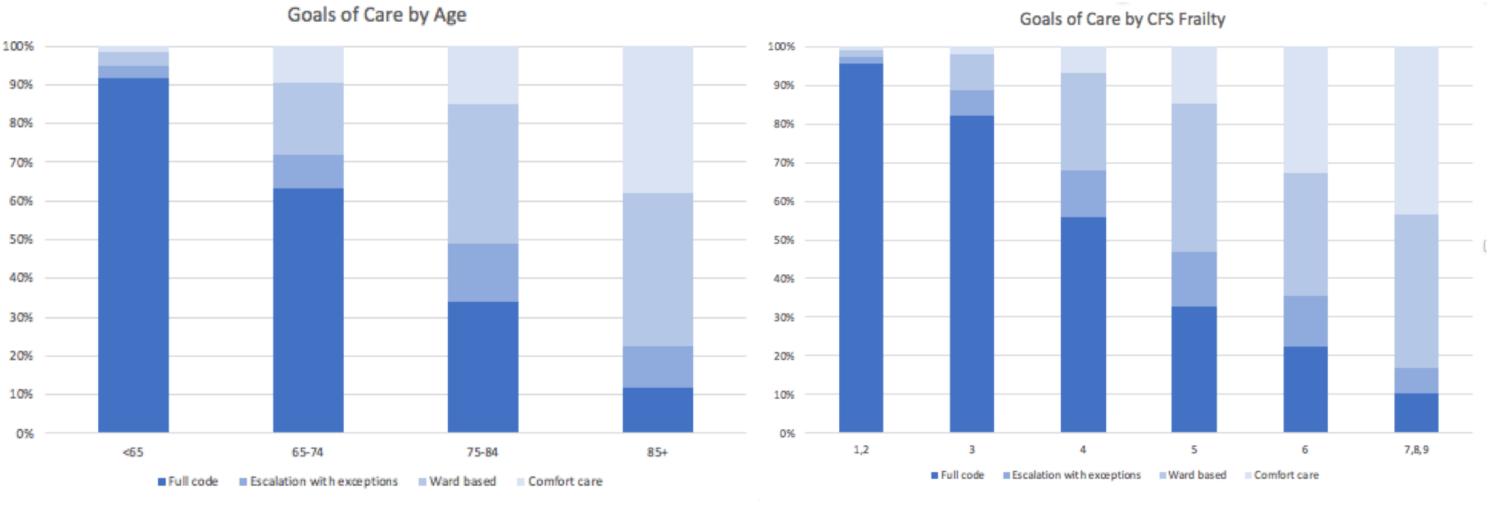
Outcome	Age <65 N=651	Age 65-74 N=377	Age 75-84 N=493	Age 85+ N=508	р
Length of stay, days (IQR)	7 (4-14)	12 (6-26)	12 (6.75-25.25)	20 (8-33.5)	<0.001
Admitted to ICU	169 (30.4%)	102 (32.6%)	69 (17.7%)	18 (4.6%)	<0.001
Mechanically Ventilated	94 (16.9%)	22 (21.1%)	30 (7.7%)	7 (1.8%)	<0.001
Died	29 (4.5%)	63 (16.7%)	100 (20.3%)	143 (28.1%)	<0.001

Table 3: Outcomes of COVID-19 positive cases by frailty

	CLINICAL FRAILTY SCALE SCORE						
Outcome	1-2 N=288	3 N=387	4 N=239	5 N=198	6 N=251	7-9 N=239	р
Length of stay, days (IQR)	6 (4–10)	8 (4–16)	13 (7-25)	17 (7.75–30)	18 (10–40)	20 (10–36)	< 0.001
Admitted to ICU	72 (25.1%)	125 (32.4%)	78 (32.6%)	27 (13.7%)	27 (10.8%)	14 (5.9%)	< 0.001
Mechanically Ventilated	41 (14.3%)	74 (19.2%)	45 (18.8%)	14 (7.1%)	9 (3.6%)	7 (3.0%)	<0.001
Died during this admission	10 (3.5%)	35 (9.0%)	46 (19.2%)	48 (24.2%)	73 (29.1%)	111 (46.4%)	<0.001

Figure 3. Goals of Care by age and frailty categories





Conclusions, Challenges and Future Directions

- Wide range in frailty, age and comorbidities among patients admitted with COVID-19
- Older age, male sex and frailty were independently associated with higher odds of mortality
- Older age, female sex, and frailty were associated with lower odds of ICU admission
- Comorbidities and obesity were independently associated with ICU admission but not with mortality • Notably, poor outcomes occurred across all ages and levels of frailty
- Conducting surveillance under pandemic condition, and the sheer volume of enrolments at some sites has been very challenging
- There are jurisdictional differences in policy (e.g. LTC residents being treated on site vs. admitted to hospital); these also evolve quickly
- Comparison of patient characteristics and outcomes in subsequent waves, including as SARS-CoV-2 variants of concern began to circulate, will be important
- Going forward, we will continue surveillance and add estimation of Vaccine Effectiveness
- Contribution to global surveillance efforts through the Global Influenza Hospital Surveillance Network is an important feature of our work

