

Methods. With institutional review board approval, we recruited ER nurses who were assigned to COVID-19 isolation zone with more than 6 months' ER work experience. After their demographic information were collected through a questionnaire, their nursing practices and practice time during their 1 shift (day or evening) were recorded by one researcher using a stopwatch and an observation form. For each observation shift, unit-related information was collected, including the numbers of hospitalized patients, admission, discharge, and transfer of patients. For each nursing practice, frequency and total time spent were analyzed using descriptive statistics with SPSS 26.0 program.

Results. From January 4 to February 22, 2021, a total 18 nurses (27.4 years old on average with 25.2 months of ER experience) were observed from 20 different shifts. During the observation period, the average number of nurses' working hours was 8.27 ± 0.39 hours. A total of 6,567 tasks were monitored with 337,703 seconds (93.81 hours) of the total time spent. Infection control practices were most frequent (33.88%) followed by nursing management (27.80%), assessment and observation (11.07%), medication (10.35%), pre and post examination care (4.86%), education (4.37%), communication (4.10%), safety care (1.10%), and others (0.03; Table 1). Nursing management (e.g., nursing recording) was most time-consuming (49.29%) followed by assessment and observation (15.03%), medication (12.94%), patient education (6.10%), infection control (5.30%), and safety care (1.64%).

Conclusion. This study showed that infection control practices were most frequent while time spent was relatively insignificant among ER nurses in charge of COVID-19 isolation zones. Further studies for more observations or with different study designs at other ER settings are necessary to understand nurse's burdens with COVID-19 emergency care.

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415. A Whole Genome Sequencing Analysis of a Multi-unit Long-term Care Facility COVID-19 Outbreak

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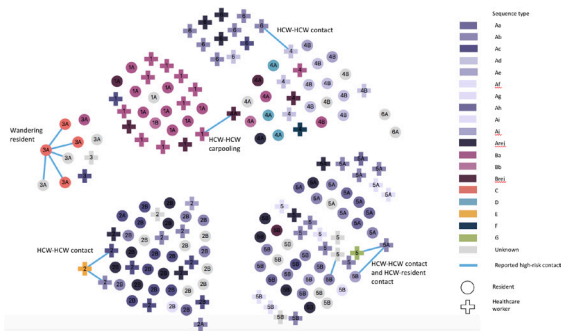
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Session: P-19. COVID-19 Infection Prevention

Background. The coronavirus disease (COVID-19) pandemic has affected residents in long-term care facilities (LTCF) significantly. Understanding transmission dynamics in this setting is crucial to control the spread of COVID-19 in this population. Using whole genome sequencing (WGS) of SARS-CoV-2, we aimed to delineate the points of introduction and transmission pathways in a large LTCF in Quebec, Canada.

Methods. Between 2020-10-28 and 2021-01-09, COVID-19 cases occurred in 102 residents and 111 HCW at a 387-bed LTCF; cases were distributed in 11 units on 6 floors. As part of outbreak analysis, SARS-CoV-2 isolates underwent WGS using the Oxford Nanopore Minion and the Artic V3 protocol. Lineage attribution and sequence types (ST, within 3 mutations) were assigned based on Pangolin classification and variant analysis. Epidemiologic data including date of positive PCR test, resident room number and HCW work location were collected. Self-reported high-risk exposures were collected by HCW questionnaire via phone interview after consent. Cases and their ST, geo-temporal relations and HCW-reported exposures were examined via network plots and geography-based epidemic curves to infer points of introduction and paths of transmission.

Results. Of 170 isolates available from 100/102 residents and 70/111 HCW, 130 (76.4%) were successfully sequenced. Phylogenetic analysis revealed 7 separate introductions to the LTCF. Grouping of ST by units was observed, with temporal appearance of ST supporting HCW introduction in 7/11 units. Proportion of phone interview completion was low at 35% (26/70). Few HCW recalled specific high-risk exposures. Recalled exposures supported by genetic linkage revealed potential between-unit introductions from HCW-to-HCW transmission at work and outside the workplace (e.g. carpooling). On one unit, a wandering resident was identified as a likely source of transmission to other residents (Figure 1).



Network plot of cases clustered by geographic unit, colour-coded by sequence type. Circles represent residents; addition signs represent healthcare workers. Blue lines represent identified high-risk exposures. Node labels represent floor and unit identifiers; 2 units per floor.

Conclusion. We demonstrate the complex genomic epidemiology of a multi-unit LTCF outbreak, putting into evidence the importance of a multi-faceted approach to limit transmission. This analysis highlights the utility of using WGS to uncover unsuspected transmission routes, such as HCW contact outside work, which can prompt new infection control measures.

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416. Diagnostic Yield of Serial COVID-19 Testing in Hospitalized Patients

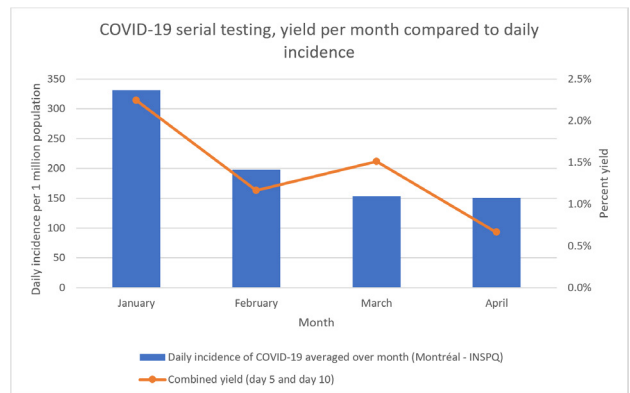
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Session: P-19. COVID-19 Infection Prevention

Background. Accurate and rapid diagnosis of SARS-CoV-2 infection is essential to prevent nosocomial transmission. Patients with negative COVID-19 tests at admission may still be in the incubation phase during hospitalisation. False negative results can occur when patients are tested too early. The incidence of COVID-19 infections in Montréal, Canada started to increase in December 2020. Because of this rise, on January 4th, 2021, the Infection Control Service of the McGill University Health Centre (MUHC) recommended serial COVID-19 testing for all admitted patients on days 5 and 10 after admission. The aim of this study is to examine the diagnostic yield of serial COVID-19 testing.

Methods. We retrospectively analyzed SARS-CoV-2 test results for patients admitted to the MUHC between January 4, 2021, and April 30, 2021. Nasopharyngeal swabs were collected from patients for SARS-CoV-2 PCR testing. Multiple testing platforms were used (Roche Cobas 6800, Thermo ScientificTM King Fisher and Cepheid GeneXpert) because of the high volume of samples. Tests were classified as admission, day 5, and day 10 tests if they were done on days 0 to 2, 3 to 7, and 8 to 12 respectively. Patients positive for SARS-CoV-2 on admission were excluded from the analyses. The diagnostic yield of serial testing for patients admitted during each month was calculated by dividing the number of patients testing positive on day 5 or day 10 by the total number of patients who underwent serial testing during that month.

Results. There were 2945 admissions of 5 days or more and 1777 admissions of 10 days or more. Of these, 1509 patients and 841 patients respectively were serially tested for SARS-CoV-2 as recommended for a compliance rate of 51% at day 5 and 47% at day 10. Ten (0.7%) and 12 (1.4%) patients tested positive on days 5 and 10 respectively. The diagnostic yield of serial testing was highest for patients admitted in January 2021 at 2.2%, when the average daily incidence of COVID-19 was highest in Montréal (see Figure).



The diagnostic yield of serial testing for each month, compared to the average daily COVID-19 incidence rate in Montréal, Québec, Canada.

Conclusion. The diagnostic yield of serial SARS-CoV-2 testing in hospitalized patients is low when the overall community incidence is low. However, diagnostic yield of serial testing increases when community incidence of COVID-19 is higher and should be considered in this situation.

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417. COVID-19 Aerostudy: Evaluation of SARS-CoV-2 Virus in the Air of Patients Hospitalized with COVID-19

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Background. At the onset of the COVID-19 pandemic, hospitals implemented infection control measures with limited data on predictors of nosocomial SARS-CoV-2 transmission. We aimed to quantify SARS-CoV-2 presence in an inpatient setting to understand nosocomial risk.

Table 1

Variable	N	Air Sample No Virus Detected [all locations] (N=36)	Air Sample SARS-CoV-2 detected [any location] (N=13)	p-value
Length of hospital stay in days		2 [3.5]	1 [2]	0.11
Time from symptom onset in days		8 [6]	6 [4]	0.24
Nasal swab				
Positive	27	17 (63)	10 (37)	0.1
Negative	22	19 (86)	3 (14)	
HEPA				
No HEPA	32	21 (66)	11 (34)	0.29
Yes HEPA	14	12 (86)	2 (14)	
Supplemental Oxygen				
Room Air	20	12 (60)	8 (40)	0.17
Nasal Cannula	17	13 (76)	4 (24)	
High Flow Nasal Cannula	11	10 (91)	1 (9)	
Non-rebreather Mask	1	1 (100)	0 (0)	

Data presented as N (%) or median [IQR]

Table 2:

	OR	95% CI	P	aOR	95% CI	P
Length of Stay	0.715	0.463 – 1.106	0.132	0.840	0.510 – 1.385	0.495
Nasal Swab Positive	3.519	0.832 – 14.885	0.087	2.246	0.443 – 11.397	0.329
HEPA	0.280	0.053 – 1.472	0.133	0.335	0.057 – 1.962	0.225
Room Air	3.333	0.897 – 12.383	0.072	2.095	0.485 – 9.058	0.322

Methods. Patients admitted with confirmed SARS-CoV-2 infection at an urban academic hospital were enrolled. Demographic/clinical characteristics, a PCR nasal swab(NS), and air samples on filter media in the near- (< 6ft) and far-field (>6ft) of each patient for 3.5 hours were collected. PCR was used to detect SARS-CoV-2 on filter media. Associations between clinical characteristics and presence of SARS-CoV-2 in air samples used Fisher’s exact and Wilcoxon rank sum tests.

Results. Of 52 subjects, 46% had no detectable virus by nasal swab on the day of sampling. Of 104 room air samples, 16% had detectable virus from 25% of rooms, including 10 near and 7 far field samples. Subjects with a positive room air sample had fewer days from symptom-onset compared with those with a negative air sample (median 6 vs. 8, p=0.24). Being on room air and having a nasal swab positive increased the odds of detecting virus in air samples but were not statistically significant.

Conclusion. A small number of air samples with detectable SARS-CoV-2 may suggest lower nosocomial risk than previously anticipated. Multiple subject and environmental factors may have contributed to this finding including patient source control masking, anti-viral therapies and HEPA filtration. The decreased association of virus in the air of those with more days of symptoms but with the need for supplemental oxygen may be related to what is now known about the COVID-19 inflammatory response after the infectious period.

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418. Low Frequency of Healthcare Worker Infections Following Occupational Exposures to COVID-19

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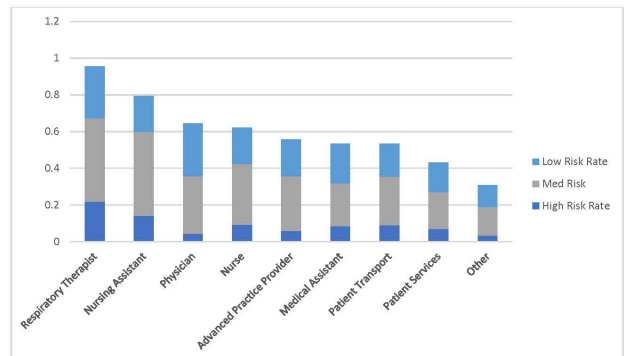
Session: P-19. COVID-19 Infection Prevention

Background. Data on occupational acquisition of COVID-19 in healthcare settings are limited. Contact tracing efforts are high resource investments.

Table 1: Exposure risk classifications (adapted from CDC Interim U.S. Guidance for Risk Assessment and Work Restrictions for Healthcare Personnel with Potential Exposure to SARS-CoV-2).

Type of Exposure	High Risk	Medium Risk	Low Risk
Household Exposure	Always high risk	--	--
Contact with unmasked COVID-19 positive patient, HCW, or visitor for > 15 min and < 6 ft while at work	Exposed healthcare worker NOT wearing a surgical facemask or respirator	Exposed healthcare worker wearing surgical facemask or respirator but no eye protection	Exposed healthcare worker wearing a surgical facemask and eye protection but no gown or gloves Healthcare worker wearing all recommended PPE
Contact with masked COVID-19 patient or HCW for > 15 min and < 6 ft at work	--	Exposed healthcare worker NOT wearing a surgical facemask or respirator, or no PPE at all	Exposed healthcare worker wearing surgical facemask or respirator but no eye protection Exposed healthcare worker wearing a surgical facemask and eye protection but no gown or gloves Exposed healthcare worker wearing all recommended PPE
Performed a high-risk aerosol-generating procedure on COVID-19 patient	Healthcare worker wearing gown, gloves, and surgical facemask but no eye protection	Healthcare worker wearing a gown, gloves, eye protection, surgical facemask	Healthcare worker wearing a gown, gloves, eye protection, N95 or PAPR

Figure 1. Number of reported exposures per number of healthcare workers in each job category, stratified by adjudicated exposure risk.



Methods. Duke Health developed robust COVID-19 contact tracing methods as part of a comprehensive prevention program. We prospectively collected data on HCW exposures and monitored for development of symptomatic (SYX) and asymptomatic (ASYX) COVID-19 infection after documented high-, medium, and low-risk exposures. HCWs were required to self-report exposures or were identified through contact tracing as potentially exposed to COVID-19 positive HCWs, patients or visitors. Contact tracers interviewed exposed HCWs and assessed the risk of exposure as high-, medium-, or low-risk based on CDC guidance (Table 1). Testing was recommended at 6 days after high- or medium-risk exposures and was provided upon HCW request following low-risk exposures. Our vaccination campaign began in 12/2020.

Table 2: Rate of HCW COVID-19 infections following different types of occupational exposures.

Exposure Risk Category	Exposures	Conversions	Asymptomatic Conversions	Conversion Rate
Exposure to HCW	3198	179	20	5.6%
High	548	97	9	17.7%
Medium	1383	76	10	5.5%
Low	1267	6	1	0.5%
Exposure to patient	3408	81	8	2.4%
High	315	11	1	3.5%
Medium	2014	67	7	3.3%
Low	1079	3	0	0.3%

Results. 12,916 HCWs registered in the contact tracing database. From March 2020-May 2021, we identified 6,606 occupational exposures (0.51 exposures/HCW). The highest incidence of workplace exposures per number of HCWs in each job category was among respiratory therapists (RT) (0.95 exposures/RT), nursing assistants (NA) (0.79 exposures/NA), and physicians (0.64 exposures/physician). The most common exposure risk level was medium (51.4%), followed by low (35.5%), and then high (13.1%). A total of 260 (2%) HCW had positive tests/conversions; 28 (10.8%) were ASYX at the time of testing. High-risk exposures had a significantly greater number of post-exposure infections compared to medium- and low-risk exposures