

Quality Assurance and Prevention of COVID-19 Before Admission in Geriatric Rehabilitation Unit in Long-Term Care Facilities*



Marie-Jeanne Kergoat, MD, FRCPC^{1,2}, Bernard-Simon Leclerc, PhD^{1,3}, Aline Bolduc, MSc¹, Jia Liu¹, Agnès Cailhol, MD^{1,2}, Stéphanie Langevin, MD, FRCPC^{2,4}

¹Research Centre, Institut universitaire de gériatrie de Montréal (IUGM), Centre intégré universitaire de santé et de services sociaux (CIUSSS) du Centre-Sud-de-l'Île-de-Montréal; ²Faculty of Medicine, University of Montreal, Montreal; ³Department of Social and Preventive Medicine, University of Montreal School of Public Health, Montreal; ⁴Hôpital Notre-Dame, Service de microbiologie, Département de biologie médicale, CIUSSS du Centre-Sud-de-l'Île-de-Montréal, Montréal, QC

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ABSTRACT

Background

This quality assurance study was conducted during the COVID-19 pandemic to describe the profile of patients aged 65 years and older admitted to a transition unit in a long-term care (LTC) facility and to evaluate the impact of admission modalities, compliance with screening and hand hygiene practices, risk of COVID-19, and time to access a geriatric rehabilitation unit (GRU).

Methods

A prospective study was conducted using administrative and medical records from three Montreal public LTC facilities offering a rehabilitation program for 312 patients admitted between May 2020 and February 2021. The results are reported for the entire sample and compared according to the mode of admission.

Results

The incidence of COVID-19 during the transition unit stay was estimated to be 11 cases or 3.5% in 14 days. Assessment of screening compliance showed deficiencies for 41.3% of patients, and the frequency of hand hygiene audits was not strictly adhered to. More COVID-19 cases were recorded in patients admitted to the transition unit by bed availability than in the cohort mode. The time to access a rehabilitation unit was 7.2 days or 23.5% shorter for patients admitted by bed availability.

Conclusions

The study, conducted from a continuous practice improvement perspective, showed that the implementation of a transition unit in the LTC facilities helped control the transmission of COVID-19, but also revealed flaws in screening and hand hygiene practices.

Key words: COVID-19, time to care, geriatrics, mode of admission, rehabilitation, buffer zone, quality assurance, long-term care facility

INTRODUCTION

The elderly are more likely to die from COVID-19 or develop complications from the infection.⁽¹⁾ During the first wave of the pandemic in Quebec, which occurred from February 20 to July 11, 2020, people aged 70 years and older accounted for 91.0% of deaths from COVID-19,⁽²⁾ while this group accounted for only 13.3% of total infections.⁽³⁾ The atypical presentation of the disease and the transmission of the virus by asymptomatic persons^(4,5) made early diagnosis and control of transmission difficult. For a variety of now well-documented reasons, residents of long-term care (LTC) facilities have shown an increased risk of COVID-19 infection and excess mortality.^(6,7)

In Quebec, 37.2% of post-acute rehabilitation care beds are located in LTC facilities.⁽⁸⁾ At the time of the first waves of the pandemic, a vaccine was not yet available,

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knowledge of the transmission of the virus was limited and, in the midst of a crisis, the health-care network had to adjust quickly. Patients awaiting post-acute care and rehabilitation in acute-care hospitals needed to continue to be transferred to out-of-hospital settings.⁽⁹⁾ Among other things, the ministerial health authorities had to consider safe alternatives to accommodate these new admissions in LTC facilities, while protecting other patients and all the staff of the LTC facilities from contagion. This is why transition units were set up in LTC facilities. Admission to the transition unit with reinforced infection control measures became a mandatory step prior to access to geriatric rehabilitation units (GRU). Apart from the preliminary results reported by Zhao's team⁽¹⁰⁾ in China, there was no scientific literature that could support the modalities of operation and effectiveness of these transition units.

The present study was conducted during the first two waves of COVID-19 with a perspective of quality assurance, risk management, and optimization of care benefits. It aimed to describe the clinical and social profile of elderly patients admitted to transition units in three Montreal public LTC facilities. It also aimed to evaluate the impact in the transition unit of two different admission modalities, compliance with screening and hand hygiene practices, risk of COVID-19 infection, and time to access a GRU.

PATIENTS AND METHODS

Study Population, Context & Setting

A prospective descriptive study was conducted using information collected from administrative and medical records in three rehabilitation-oriented LTC facilities in a single administrative establishment. Data collection covered a total of 312 patients with consecutive admissions from May 28, 2020, to February 28, 2021. For reference, the first wave of COVID-19 was from February 25 to July 11, 2020, and the second wave was from August 23, 2020, to March 20, 2021.⁽¹¹⁾ The study population consisted of patients aged 65 years and older who were initially hospitalized for an acute medical condition in an hospital centre and required post-acute care or rehabilitative care prior to discharge to home or an alternative living setting. To be accepted in a transition unit, each patient had to be tested negative to a PCR test to SARS-CoV-2 carried out 48 hours before the transfer. Patients who stayed 48 hours or less in the transition unit were excluded from the study.

A transition unit is defined as a 9–12 bed transitional unit in the LTC facility where patients are confined to their rooms for 14 days to rule out contagion before being transferred to a GRU. Patients could be admitted on a bed availability basis, where beds were filled continuously as they became available, or on a cohort basis, where groups of three or four patients were admitted at the same time on the same day.

Ethical approval for the project was obtained from the Research Ethics Board of the Centre intégré universitaire de santé et de services sociaux (CIUSSS) du Centre-Sud-de-l'Île-de-Montréal.

Variables & Measurements

The incidence of COVID-19 infection during patients' stay in the transition unit was measured. Cases were proven by nucleic acid amplification test, in this case a polymerase chain reaction test with COBAS-SARS-CoV-2 platforms done on nasopharyngeal swab and commonly referred to as PCR test.

Compliance with screening practices in the transition unit was assessed according to compliance with the minimum number of PCR tests to be performed— one test three to five days post-admission and one test 24 to 72 hours before discharge. The time to access the GRU was calculated between the date of request from the hospital centre to the LTC facility and the date of discharge from the transition unit. The length of stay in the transition unit was calculated between the date of admission and the date of discharge.

Variables related to the clinical and social profile of the patients included gender, age, ethnicity, residence in collective households, smoking behaviour, weight and height, presence of hypertension or diabetes, cognitive status according to the Folstein mental status examination score (MMSE), or clinical judgment of the physician. A score of less than 20 points on MMSE was considered moderate or severe impairment in cognitive function. The presence of comorbidities was determined according to the Charlson Comorbidity Index based on 19 diseases.⁽¹²⁾ This index, ranging from 0 to 39 points with variable weighting according to the 19 diseases, quantified the risk of mortality at one year according to the following 4 categories: 12% (score 0); 26% (score 1 or 2); 52% (score 3 or 4); and 85% (score ≥ 5). Activities of daily living were assessed according to the six items of the Lawton scale (i.e., ability to go to the toilet, feeding, dressing, self-care, mobility, and bathing).⁽¹³⁾ The sum of the six Lawton scale items ranges from 0 (dependant) to 6 (independent). Other clinical variables were the number of different visitors received during the stay in the transition unit and the frequency of visits, and the number of hours of physical and occupational therapy intervention received in the transition unit reported in a standard length of stay (14 days).

The following administrative variables were to be provided biweekly by the managers of each transition unit: the results of a hand hygiene audit conducted during the three daily shifts, the number of transition unit staff who contracted COVID-19, and the nursing staff allocation (nurses, nursing assistants and orderlies during the three daily shifts). Nursing staff shortage, expressed in percentage, was the number of days that the number of staff present over 24 hours was less than expected relative to the total number of days where data were available.

Statistical Analysis

Variables are reported for the entire sample and compared by mode of admission. Values were calculated from valid data, with missing data not exceeding 5%. The chi-square or Fisher exact test was used for categorical variables, and the Student *t*-test was used for continuous variables using the IBM SPSS[®]

version 26 software package (IBM SPSS Statistics, Armonk, NY). The significance level was set at 0.05.

RESULTS

Patient characteristics, results of PCR screening test, incidence of COVID-19, length of stay in the transition unit, and time to access a GRU are reported in Tables 1 and 2.

Demographic & Clinical Characteristics of Patients

Patient characteristics are presented in Table 1. The sample was predominantly female (64.4%), Caucasian (94.2%), not living in collective households (70.0%), and with a mean age of 83 years. Many individuals were obese (21.2%) and had hypertension (70.4%) or diabetes (30.2%). The majority (56.7%) had a Charlson Comorbidity Index score of less than 2, reflecting a one-year mortality risk of 12% to 26%. Overall, 88.3% of patients had limitations in instrumental activities of daily living (Lawton scale score of 3 or less), and 30.5% had moderate to severe cognitive impairment. Many patients received no visits (51.8%) or at most one visitor (33.8%) during their stay in the transition unit, but visits were more common for half the sample (occasional and frequent categories combined = 36.3%). Patients received, on average, 19.7 absolute hours of rehabilitation intervention during their stay in the transition unit or 16.8 hours when expressed over a standard duration of 14 days. No difference appears between the modes of admission.

Patient characteristics in the two admission mode groups did not differ (Table 1), except for the number of visitors ($p \leq .001$) and the frequency of patient visits ($p \leq .001$). There was a greater number of visitors and a greater frequency of visits among patients admitted by bed availability.

Incidence of COVID-19 & Time to Access a Geriatric Rehabilitation Unit

In terms of the incidence of COVID-19 during the transition unit stay there were a total of 11 cases, 10 in the bed availability group and only one in the cohort admission group (Table 2). Only one transition unit staff member was diagnosed with COVID-19 during the study, and that was in the cohort admission group.

The time to access a GRU (from hospital request date for admission in a LTC facility to discharge from the transition unit) averaged 27.6 days. This time was 7.2 days longer (23.5% longer) for the cohort mode of admission (30.7 days) compared to the mode by bed availability (23.5 days) ($p \leq .001$) (Table 2). The length of stay in the transition unit was two days longer for patients admitted by cohort ($p \leq .001$).

Quality Control of Screening & Hand Hygiene Practices, Shortage of Nursing Staff

Compliance with the number and timing of PCR screening test during the transition unit stay compared with the prescribed schedule was achieved for 58.7% of patients. Compliance with screening practices was lower for patients admitted by

cohort (50.8%) compared with those admitted by bed availability (68.9%) ($p \leq .001$) (Table 2). Of the two screening tests required during the stay, the one required before discharge from the transition unit was less rigorously performed for the cohort admission group (56.5% compared with 77.8%) ($p \leq .001$). The prescribed biweekly frequency of hand hygiene audits was not met (detailed data not shown). Where available, results showed compliance rates ranging from 70% to 93% across LCT facilities, sometimes dropping to 53.4% during certain periods. There was a 24-hour caregiver staff shortage on 52.0% and 27.1% of days during the study, respectively, for admission mode by cohort and bed availability (detailed data not shown).

DISCUSSION

Quality assurance and quality control studies have received more attention in recent years. That said, LTC facilities were hit hard during the first wave of the pandemic in Quebec. The context of geriatric care lent itself well to a quality assurance approach. LTC facilities are both complex living and care environments. They were called upon to contribute to the exercise of shedding hospital beds. A report by the Québec Ombudsman pointed to many factors at the root of the crisis in LTC facilities, including the “hospitalocentric” conception at the heart of ministerial preparation and the lack of personnel, which was weakened by both the sudden increase in the number of clients requiring health care,⁽¹⁴⁾ and staff withdrawal from work because being themselves contaminated.

The quality assurance study conducted showed that the implementation of a transition unit in the LTC facilities allowed for relatively good control of COVID-19 transmission, despite the virulence of the pandemic and the absence of vaccine protection. A very low incidence of COVID-19, estimated at 3.5% in 14 days, was noted. Thus, the transition unit and preadmission screening appear to have been an effective strategy for controlling SARS-CoV-2 transmission in LTC facilities. The downside of the prevention measures implemented, however, was the time to access a GRU. As a result, only a few hours of rehabilitation care (1.2 hour on average per day) could be provided directly in the transitional unit in order to reduce contact and the risk of transmission. Of course, the rehab hours in the transition unit were limited to what can be done in a hospital room compared to what is usually done in the adapted spaces of a GRU.

The main strength of the study is that it filled a need for knowledge about organizational practices for care of geriatric patients in a pandemic situation. In a context of extreme uncertainty where the status quo was not an option, managers sought to secure patient admission. The research provided an in-depth look at infection prevention and control processes in practice settings. It revealed weaknesses in screening and hand hygiene practices. Therefore, audits must be maintained and enforced more rigorously, and corrective actions must be taken based on the results. The quality assurance study itself was an opportunity for reflection, evaluation, and discussion

TABLE 1.
Demographic and clinical characteristics of patients admitted in the transition unit, by mode of admission

Variables	Admission by Bed Availability (n = 135)	Admission by Cohort (n = 177)	Total (n = 312)
	n (%) or Mean ± SD		
Demographic Characteristics			
Women	94 (69.6)	107 (60.5)	201 (64.4)
Age			
All	82.9 ± 9.2	82.7 ± 8.2	82.8 ± 8.6
65-74	29 (21.5)	28 (15.8)	57 (18.3)
75-84	43 (31.9)	69 (39.0)	112 (35.9)
≥ 85	63 (46.7)	80 (45.2)	143 (45.8)
Caucasian	125 (92.6)	169 (95.5)	294 (94.2)
Collective household ^a	37 (28.9)	53 (30.8)	90 (30.0)
Clinical Characteristics			
Smoking in the past six months	17 (12.8)	16 (9.1)	33 (10.7)
Obesity ≥ 30 kg/m ²	30 (22.2)	35 (20.3)	65 (21.2)
Hypertension	91 (68.9)	125 (71.4)	216 (70.4)
Diabetes	37 (27.6)	57 (32.2)	94 (30.2)
Cognitive impairment, moderate to severe ^b	39 (29.6)	35 (31.8)	74 (30.5)
Charlson comorbidity index—one-year mortality risk^c			
All	2.5 ± 2.2	2.7 ± 2.2	2.6 ± 2.2
Score of 0	20 (14.8)	24 (13.6)	44 (14.1)
Score of 1-2	65 (48.1)	68 (38.4)	133 (42.6)
Score of 3-4	25 (18.5)	54 (30.5)	79 (25.3)
Score ≥ 5	25 (18.5)	31 (17.5)	56 (17.9)
Lawton's Instrumental Activities of Daily Living^d			
All	1.44 ± 1.43	1.41 ± 1.48	1.42 ± 1.16
Score of 0	41 (30.8)	51 (32.3)	92 (31.6)
Score of 1	41 (30.8)	51 (32.3)	92 (31.6)
Score of 2-3	36 (27.1)	37 (23.5)	73 (25.1)
Score of 4-6	15 (11.4)	19 (12.0)	34 (11.7)
Number of visitors			
No visitor	52 (38.5) ^e	109 (61.9)	161 (51.8)
One visitor	54 (40.0)	51 (29.0)	105 (33.8)
Two different visitors	29 (21.5)	16 (9.1)	45 (14.5)
Frequency of visitors			
None	52 (38.5) ^e	109 (61.9)	161 (51.8)
Rarely (only once during the stay)	16 (11.9)	21 (11.9)	37 (11.9)
Occasionally	37 (27.4)	32 (18.2)	69 (22.2)
Often (every day or so)	30 (22.2)	14 (8.0)	44 (14.1)
Number of hours of rehabilitation interventions	17.3 ± 7.8 ^e	21.5 ± 10.6	19.7 ± 9.7
Number of hours of rehabilitation interventions expressed over a standard duration of 14 days	16.0 ± 7.1	17.4 ± 8.0	16.8 ± 7.7

^aCollective household include boarding and rooming houses, as well as nursing homes and private residences for seniors.

^bCognitive function was assessed by Folstein mental status test score or physician clinical judgment; a score of less than 20 points was considered moderate or severe impairment in cognitive function.

^cRisk of mortality at one year in 4 categories: 12% (score 0); 26% (score 1 or 2); 52% (score 3 or 4); and 85% (score ≥ 5).

^dThe sum of the 6 activities of daily living items on the Lawton scale ranges from 0 (not independent) to 6 (fully independent).

^e $p \leq .001$

with a view to continuous improvement of practices. Examination of the data collected allowed managers and clinicians to consider improving their practices in various ways. For example, the data revealed a rather mixed compliance rate for the PCR screening test. Without being able to confirm it, the leaders of this study and the professionals believe that this poor result is mainly explained by the fact that the screening was contingent on the availability of dedicated mobile external teams who were responsible toward all LTC facilities of the territory ($n=17$) to carry out these tests. During the period under study, we did not have rapid tests that could be performed by the staff on site. COVID-19 testing might have been done a little earlier than foreseen because of weekends or holidays. In this case, possibly, the parameters of compliance weren't respected because of timing but mostly respected for the number of tests. Managers were therefore called upon to investigate the other factors explaining the situation and to find corrective measures. In addition, the study highlighted deficiencies in the availability of up-to-date data and in the computer tools used to collect and manage clinical-administrative data.

Two modes of admission to the transition unit were in effect in each of the LTC facilities and were applied in turn by the administrators of the settings. Throughout the study, the settings expressed a preference for the cohort admission mode, claiming to feel more in control. Nevertheless, the results showed that this mode significantly lengthened the time it took for patients to reach the GRU. Overall, more COVID-19-positive cases in the transitional unit were recorded in the admission by bed availability mode than in the admission by cohort mode, possibly due to the multiple origin of admissions or by the presence of more visitors. According to the data, the results correspond to a 7.4% and 0.6% risk of COVID-19 occurrence, respectively. Time to access a GRU for the cohort mode of admission was 30.7 days, compared with 23.5 days for the bed availability mode. This was 7.2 days, or 23.5% faster, and the number of hours of rehabilitation intervention in the transition unit was not significantly different. From our discussions with the rehabilitation professionals involved, we learned that it was probably easier to plan the amount of care time dedicated by these professionals for a cluster of patients than on a case-by-case basis.

TABLE 2.
Incidence of COVID-19, time to access of rehabilitation care, length of stay and PCR screening test practices in the transition unit, by mode of admission

Variables	Admission by Bed Availability ($n = 135$)	Admission by Cohort ($n = 177$)	Total ($n = 312$)
	<i>n (%) or Mean \pm SD</i>		
Incidence of COVID-19 & Delays of Care			
Incidence of COVID-19	10 (7.4)	1 (0.6)	11 (3.5)
Time to access a geriatric rehabilitation unit, days ^a	23.5 \pm 7.3 ^b	30.7 \pm 7.8	27.6 \pm 8.4
Length of stay, days ^c	15.3 \pm 3.4 ^b	17.3 \pm 3.4	16.4 \pm 3.5
PCR screening test practices^d			
Number completed (%)			
1	15 (11.1)	21 (11.9)	36 (11.5)
2	100 (74.1)	140 (79.1)	240 (76.9)
3 or 4	20 (14.8)	16 (9.0)	36 (11.5)
Compliance with number and timing (%)			
No	42 (31.1) ^b	87 (49.2)	129 (41.3)
Yes	93 (68.9)	90 (50.8)	183 (58.7)
Compliance with first test (%)			
No	16 (11.9)	22 (12.4)	38 (12.2)
Yes	119 (88.1)	155 (87.6)	274 (87.8)
Compliance with last test (%)			
No	30 (22.2) ^b	77 (43.5)	107 (34.3)
Yes	105 (77.8)	100 (56.5)	205 (65.7)

^aFrom hospital request date for admission in a LTC facility to discharge from the transition unit.

^b $p \leq .001$.

^cFrom date of admission to discharge from the transition unit.

^dPCR (polymerase chain reaction) test with COBAS-SARS-CoV-2 platforms done on nasopharyngeal swab; two screening PCR tests had to be performed during the transition unit stay: first test = three to five days post-admission and last test = 24-72 hours prior to discharge.

It should be remembered that this observational study was conducted in a natural environment without any intention on the part of the researchers to exercise any control over local practices. The data collected were contingent on existing organizational constraints. For example, during the period covered by our research, the rules about admission of visitors varied quite a bit following decisions made by the Ministry (MSSS) and local initiatives. Also, due to lack of space and personnel, it was not possible to use both modes of admission in parallel at the same site, which in a comparative research design would have allowed control of potential confounders. In doing so, we counted more COVID-19 cases occurring in patients admitted by bed availability, who at the same time were those who received more visitors. On the other hand, underestimation of the occurrence of cases in both exposure groups is another possible limitation since the advocated PCR test was not always performed. The error differentially affected the cohort intake group, as testing was less rigorously performed there. Given the small number of cases that occurred, no attempt was made to control for confounding factors using multivariate analysis, although the Firth logistic regression approach for rare events could possibly have been used.⁽¹⁵⁾ Currently, it is impossible to make conclusions about the origin of the observed differences. In fact, the occurrence of COVID-19 cases seems to be more associated with our recruitment procedure and the community epidemic situation than directly related to the mode of admission.

The information obtained by a quality assurance approach binds us to act responsibly to improve the care provided. The COVID-19 pandemic has been the occasion for many experiments and local initiatives around the world. The sharing of our study is a humble example of mobilization in the field and of the concern to offer safe and appropriate care to elderly patients in a context that has been as changing as it has been unpredictable.

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CONFLICT OF INTEREST DISCLOSURES

The authors declare that they have no conflicts of interest. We have read and understood the *Canadian Geriatrics Journal's* policy on disclosing conflicts of interest and declare that we have none.

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Correspondence to: Marie-Jeanne Kergoat, Research Centre of the Institut universitaire de gériatrie de Montréal, Centre intégré universitaire de santé et de services sociaux du Centre-Sud-de-l'Île-de-Montréal, 4565 Queen-Mary Road, Montreal, QC, Canada, H3W 1W5

E-mail: marie-jeanne.kergoat@umontreal.ca