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ORIGINAL ARTICLE

Impact of the COVID-19 pandemic on diagnosis of sleep apnea: an observational study of a hybrid virtual care clinical pathway

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Abstract

Since the onset of the coronavirus disease 2019 (COVID-19) pandemic, there has been a reduction in patient uptake of in-person care, likely in part, due to patients' fear of contracting COVID infection. We aimed to examine changes in the proportion of patients assessed in a sleep clinic who subsequently underwent in-lab polysomnography before and during the pandemic. A retrospective study was conducted, comparing the periods September 2018–April 2019 (pre-pandemic) and September 2020–April 2021 (pandemic). Among the patients who were referred to an ambulatory sleep clinic in Toronto, Ontario for assessment of possible sleep apnea, the number of patients who underwent diagnostic PSG within 90 days from the first consultation with a physician was analyzed. Significantly lower number of patients underwent PSG in the pandemic than the pre-pandemic period [122/229 patients (53.3%) vs. 169/208 patients (81.3%), $p < 0.001$]. Older age and having a consultation in the months of full-blown pandemic, which was defined as month with its average of newly confirmed COVID-19 positive cases in Ontario > 1000 cases/day, were associated with declining PSG in the pandemic period. Among patients who underwent PSG, sleep apnea was found in 114/169 (67.5%) and 85/122 (69.7%) patients in the pre-pandemic and the pandemic period, respectively ($p = 0.69$). During the pandemic, there was a dramatic reduction in uptake of in-lab PSG. It is very likely that a significant proportion of patients in this cohort had sleep apnea that went undiagnosed with significant implications for health outcomes.

Keywords COVID-19 · Pandemic · Sleep apnea · Diagnosis · In-person care

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has led to rapid changes to the delivery of ambulatory healthcare services with a transition from conventional in-person office-based visits to predominantly virtual care, by telephone or video, to reduce the risk of transmission of COVID-19 [1, 2]. However, the nature of some investigations still requires in-person care. Since the outbreak of the pandemic, there have been reports of decreased healthcare utilization, likely due to patients' fear of close contact with others and decreased accessibility to in-person care [3–5]. Sleep medicine is no exception to this trend, in particular as close contact between healthcare professionals and patients is inevitable when undergoing an overnight sleep study/polysomnography (PSG), the standard diagnostic method for sleep apnea. Based on the single-payer (government) funding model in Ontario, Canada, the cost of continuous positive airway pressure (CPAP) therapy, mainstay of treatment of sleep apnea, is reimbursed by the government, with the provision that the diagnosis is made by in-lab attended polysomnography. This requirement for an in-lab study persisted through the pandemic.

Some previous studies have shown that during the pandemic, many facilities had to close their sleep laboratories or reduce their service drastically [6–9]. However, these studies were based on questionnaires to health care providers, and it has not yet been verified how many patients would decline to proceed to in-laboratory PSG for the diagnosis of sleep apnea during the pandemic. We hypothesized that the pandemic led to a decrease in the uptake of in-lab diagnostic

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PSG by patients. In this retrospective study, we aimed to assess the trends in sleep medicine clinic visits and uptake of PSG. Another aim was to assess factors that may have influenced patient's behavior in this regard.

Methods

Design, settings, and participants

This is a retrospective observational study conducted at Women's College Hospital (WCH), which is an independent, ambulatory care hospital affiliated with the University of Toronto. Ethics approval was received from the Research Ethics Board at WCH (approval #: 2021-0095-E). Obtaining informed consents from the participants was waived because of the study's retrospective nature.

Our sleep laboratory closed at the start of the pandemic (March 2020), and subsequently resumed service from July 2020 with decreased test slots. To evaluate the trend of uptake of PSG, we screened medical records of all patients seen in an outpatient sleep clinic at WCH over two 8-month periods: September 1st, 2018–April 30th, 2019 (pre-pandemic period) and September 1st, 2020–April 30th, 2021 (pandemic period).

The inclusion criteria were (1) 18–80 years old and (2) patients who had an initial consultation in the WCH sleep clinic for assessment of possible sleep apnea. Exclusion criteria were (1) patients who previously had a diagnostic PSG and (2) patients with sleep apnea already on treatment with CPAP or oral appliance. The flowcharts illustrating the administrative steps in clinical practice from the receipt of referral to PSG in the pre-pandemic and pandemic period are shown in Fig. 1. All sleep consultations have been performed remotely using phone or video calls after onset of the pandemic, while all patients visited the clinic in person in the pre-pandemic period. In the screened periods, a single sleep physician evaluated all patients. The physician recommended all patients to undergo in-lab PSG to diagnose or rule out sleep apnea.

Baseline characteristics

For enrolled patients, the following baseline characteristics were collected: age, gender, body mass index (BMI), clinical history, and medications. Since we could not directly measure weight and height at the initial telephone consultation in the pandemic period, self-reported BMI, defined as BMI calculated with self-reported height and weight, was analyzed in the cohorts of both two periods. Comorbidities were determined according to the medical history and medication as detailed in the patient's medical file. Further, we extracted the date of referral receipt, the WCH sleep clinic visit date, the visit modality (in person, virtual care including telephone and video calls), subsequent date of scheduled PSG, and patient's subsequent attendance/absence at the sleep lab on date of scheduled PSG. Given that the distance between the sleep lab and the patient's home may affect the patient's decision, we also categorized the patients according to whether they were living in the city of Toronto, where our sleep laboratory is located.

To facilitate analysis of the impact of COVID-19 case numbers on PSG uptake, we calculated the average of new COVID-19 cases per day in every month, as an indicator of

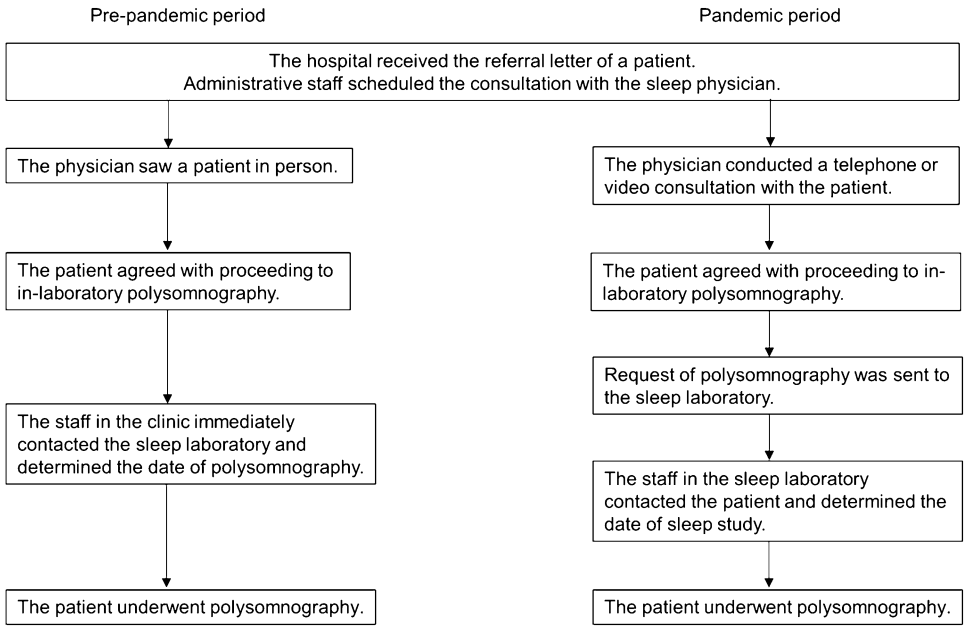

Fig. 1 Flowchart of administrative and clinical procedure for diagnosis of sleep apnea in the pre-pandemic and the pandemic period. *COVID-19* Coronavirus disease 2019

pandemic status, based on data from the provincial government [10]. If this monthly average was > 1000 cases/day, that month was defined as a "full-blown pandemic" month.

Polysomnography and CPAP prescription

Overnight attended PSG was performed in the sleep laboratory by standard techniques using a sleep recording system (Sandman; Nellcor Puritan Bennett, Ottawa, ON, Canada). Thoracoabdominal motion was monitored by respiratory inductance plethysmography, and nasal airflow was monitored by nasal pressure cannula (Binaps model 5500; Salter Labs, Arvin, CA). Arterial oxyhemoglobin saturation (SpO_2) was monitored by oximetry. Sleep stages and respiratory events were scored according to the American Academy of Sleep Medicine Manual for Scoring of Sleep and Associated Events, Version 2.4 [11]. Apnea was defined as the complete cessation of airflow and hypopnea as a clear decrease in airflow of ≥ 30% lasting more than 10 s and followed by either a decrease in SpO_2 of at least 3% or electroencephalogram arousal. The apnea–hypopnea index (AHI) was calculated as the numbers of apneas and hypopneas per hour of sleep. The severity of sleep apnea was defined by the AHI as follows: normal, < 5; mild, 5 to < 15; moderate, 15 to < 30; severe ≥ 30 events/h. When the patients underwent PSG, BMI was calculated based on measured weight and height in the sleep laboratory. In addition, the patients completed the Epworth Sleepiness Scale [12].

In Ontario, patients with AHI > 5 are eligible for a governmental subsidy to purchase CPAP when a sleep physician determines that CPAP is indicated. Based on this requirement, the attending physician prescribed CPAP after the discussion with each patient. Typically, patients with moderate to severe OSA are prescribed CPAP therapy, while patients with mild OSA are only prescribed CPAP if the sleep physician makes a clinical judgment that the degree of daytime sleepiness warrants treatment.

Outcomes

Our primary outcome was the change, from pre-pandemic to pandemic period, in the percentage of patients who underwent their scheduled PSG within 90 days of their initial sleep clinic visit. The outcomes were categorized as follows: (1) the patient underwent PSG; (2) the patient declined to proceed with recommended PSG at the initial consultation visit with the physician; (3) the patient declined to proceed PSG when the administrative staff in the clinic or the sleep laboratory contacted the patient to schedule PSG; (4) the patient canceled their scheduled PSG appointment or did not attend their PSG appointment without notice; (5) due to administrative error, a PSG requisition/order was not received in the sleep lab. The patients who met the outcomes of 2–4 were defined as those who declined PSG.

In addition, as a secondary outcome, we analyzed the number of patients who got the prescription of CPAP.

Statistical analysis

Comparisons between groups were performed using the chi-squared test or Fisher's exact test for categorical variables and the Student's t test or Mann–Whitney test for continuous variables as appropriate. Multivariate logistic regression analysis was performed to analyze factors potentially associated with declining PSG. The variables entered into this multivariate analysis were those yielding a p value less than 0.10 in the comparison of patients who underwent PSG and those who declined PSG. A two-tailed p value of < 0.05 was defined statistically significant. All statistical analyses were conducted using JMP Pro 16 software (SAS Institute Inc., NC, USA).

Results

Study participants and clinic visits

In the pre-pandemic and pandemic period, 208 (men 88, age 50 ± 14 years) and 229 patients (men 113, age 51 ± 16 years) fulfilled the criteria and were included in the analysis, respectively (Fig. 2). Their clinical backgrounds are shown in Table 1. Except for that period from referral receipt to the first consultation was shorter in the pandemic than the pre-pandemic period [56 (46–63) vs. 98 (80–116) days, $p < 0.001$], no significant difference was found between the two cohorts. All months from November 2020 to April 2021 were categorized as months of full-blown pandemic and 158/229 (69.0%) patients in the pandemic period had the initial consultation in that period.

Sleep lab attendance

The number of patients who underwent PSG within 90 days and breakdown of the reasons for not undergoing PSG are shown in Fig. 2. A larger number of patients declined PSG at the consultation with the physician in the pandemic than the pre-pandemic period (51/229 (22.3%) vs. 22/208 (10.6%), $p < 0.001$). Second, 17/208 (8.2%) and 44/229 (19.2%) patients canceled PSG in the pre-pandemic and pandemic period, respectively ($p < 0.001$), even though they agreed to proceed to PSG at the first consultation. There was an administrative error or delay in requesting the PSG in 12/229 (5.2%) patients in the pandemic period. Overall, the percentage of patients who underwent PSG were significantly lower in the pandemic than the pre-pandemic period (122/229

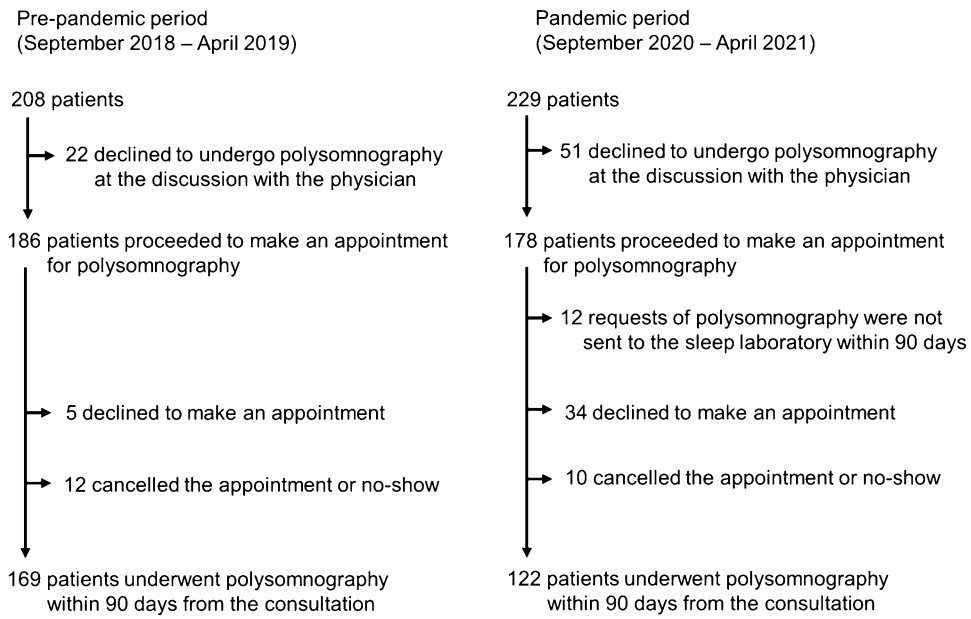

Fig. 2 Diagram showing the number of patients who declined polysomnography at each clinical or administrative step

Table 1 Baseline characteristics of analyzed patients in the pre-pandemic and the pandemic period

	Pre-pandemic	Pandemic	*p*
n	208	229	
Male, *n* (%)	88 (42.3)	113 (49.3)	0.14
Age, years	50 ± 14	51 ± 16	0.40
Age ≥ 60 years, *n* (%)	64 (30.8)	78 (34.1)	0.48
Self-reported body mass index, kg/m^2[a]	31.0 ± 7.5	30.0 ± 6.3	0.13
Self-reported body mass index ≥ 30 kg/m^2, *n* (%)[b]	96 (46.2)	102 (44.5)	0.74
Patient referral			
From other department in the same hospital, %	52.4	49.8	0.58
From other hospital and clinic, %	47.6	50.2	
Number of days from referral receipt to the first consultation of the sleep physician	98 (80–116)	56 (46–63)	< 0.001
Visit modality			
In person, *n* (%)	208 (100)	0 (0)	< 0.001
Phone, *n* (%)	0 (0)	226 (98.7)	
Video, *n* (%)	0 (0)	3 (1.3)	
Comorbidity			
Hypertension, *n* (%)	89 (42.8)	106 (46.3)	0.46
Diabetes, *n* (%)	30 (14.4)	28 (12.2)	0.50
Dyslipidemia, *n* (%)	45 (21.6)	59 (25.8)	0.31
Coronary artery diseases, *n* (%)	12 (5.8)	9 (3.9)	0.37
Stroke, *n* (%)	2 (1.0)	3 (1.3)	0.78
Atrial fibrillation, *n* (%)	14 (6.7)	19 (8.3)	0.54
COPD/asthma, *n* (%)	32 (15.4)	24 (10.5)	0.13
Residency in the city of Toronto, *n* (%)	162 (77.9)	190 (83.0)	0.18
Consultation in months of full-blown pandemic, *n* (%)		158 (69.0)	

Values are presented as mean ± standard deviation or median (1st–3rd quantile) unless otherwise indicated

COPD chronic obstructive pulmonary disease

[a]Information of self-reported body mass index could not be retrieved in five and seven patients in the pre-pandemic and the pandemic period, respectively

[b]The patients whose self-reported body mass index could not be retrieved were categorized as self-reported body mass index < 30 kg/m^2

(53.3%) vs. 169/208 (81.3%), $p < 0.001$). This statistically significant difference remained even if it was assumed that all 12 people whose PSG requests were not processed had undergone PSG.

Factors associated with attendance in sleep lab for PSG

The comparisons of patients who underwent PSG and those who declined are shown in Table 2. In the pandemic period, age and the percentages of patients with hypertension and dyslipidemia were significantly higher in patients who declined PSG. On the other hand, there was not significant difference in these factors in the pre-pandemic cohort. Further, in the pandemic period, larger number of patients who declined PSG had the consultation in the months of full-blown pandemic than those who underwent PSG (75.8 vs. 61.5%, $p = 0.02$). We plotted the percentage of patients who declined PSG in every month on the graph of the daily new COVID-19 case numbers in Ontario (Fig. 3). While there was significant variance found in the monthly rates of patients declining PSG in both pre-pandemic and pandemic periods, the highest rate in the pre-pandemic period (31.6% in September 2018) was lower than the lowest rate in the pandemic period (31.8% in October 2020) and markedly lower than the highest rate during the pandemic (50.0% in December 2020 and January 2021). Furthermore, as illustrated in Fig. 3, there was a clear trend of increasing PSG decline rates in months with increasing COVID-19 case counts during the pandemic.

The multivariate analysis examining the possible factors correlated with declining PSG showed that ≥ 60 years old and consultation in the months of full-blown pandemic were correlated with declining PSG [odds ratio and 95% confidence interval: ≥ 60 years old, 2.19 (1.13–4.24), $p = 0.02$, consultation in months of full-blown pandemic, 2.24 (1.20–4.21), $p = 0.01$] (Table 3).

Table 2 Comparison between patients who declined polysomnography and those who underwent polysomnography

	Pre-pandemic			Pandemic		
	Patients who refused PSG	Patients who underwent PSG	P	Patients who refused PSG	Patients who underwent PSG	p
n	39	169		95	122	
Male, *n* (%)	16 (41.0)	72 (42.6)	0.86	46 (48.4)	60 (49.2)	0.91
Age, years	50 ± 17	49 ± 14	0.67	55 ± 16	47 ± 14	< 0.001
Age ≥ 60 years, *n* (%)	13 (33.3)	51 (30.2)	0.70	44 (46.3)	29 (23.8)	< 0.001
Self-reported body mass index, kg/m^2[a]	30.6 ± 6.8	31.1 ± 7.6	0.69	29.8 ± 6.4	30.1 ± 6.4	0.75
Self-reported body mass index ≥ 30 kg/m^2, *n* (%)[b]	15 (38.5)	81 (47.9)	0.28	42 (44.2)	56 (45.9)	0.80
Patient referral source						
Other department in the same hospital, %	61.5	50.3	0.20	50.5	47.5	0.66
Other hospital and clinic, %	38.5	49.7		49.5	52.5	
Number of days from referral receipt to the first consultation of the sleep physician	101 (84–119)	93 (80–115)	0.51	56 (47–60)	56 (46–65)	0.40
Clinical history						
Hypertension, *n* (%)	20 (51.3)	69 (40.8)	0.24	51 (53.7)	48 (39.3)	0.04
Diabetes, *n* (%)	6 (15.4)	24 (14.2)	0.85	16 (16.8)	12 (9.8)	0.13
Dyslipidemia, *n* (%)	9 (23.1)	36 (21.3)	0.81	33 (34.7)	22 (18.0)	0.005
Coronary artery diseases, *n* (%)	2 (5.1)	10 (5.9)	1.00	5 (5.3)	3 (2.5)	0.30
Stroke, *n* (%)	0 (0.0)	2 (1.2)	1.00	1 (1.1)	2 (1.6)	1.00
Atrial fibrillation, *n* (%)	4 (10.3)	10 (5.9)	0.30	7 (7.4)	9 (7.4)	1.00
COPD/asthma, *n* (%)	8 (20.5)	24 (14.2)	0.34	13 (13.7)	9 (7.4)	0.13
Residency in Toronto city, *n* (%)	34 (87.2)	128 (75.7)	0.10	77 (81.1)	103 (84.4)	0.51
Consultation in months of full-blown pandemic, *n* (%)				72 (75.8)	75 (61.5)	0.02

Values are presented mean ± standard deviation or median (1st–3rd quantile) unless otherwise indicated

COPD chronic obstructive pulmonary disease, *PSG* polysomnography

[a]Information of self-reported body mass index was not retrieved in five and seven patients in the pre-pandemic and the post-pandemic period, respectively

[b]The patients whose self-reported body mass index was not retrieved were categorized as self-reported body mass index < 30 kg/m^2

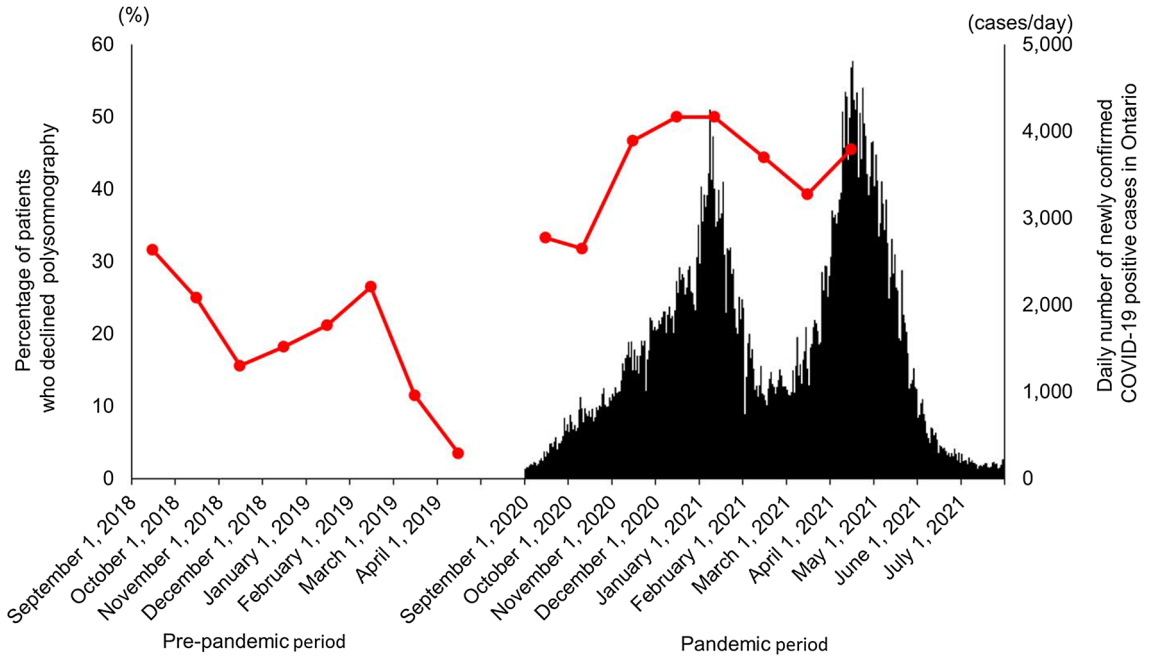

Fig. 3 Daily number of newly confirmed COVID-19 positive cases in Ontario and percentage of patients who declined polysomnography. The columns represent the daily number of newly confirmed COVID-19 positive cases in Ontario. The red lines represent percentages of patients who declined polysomnography in the groups categorized by the month of the consultation. *COVID-19* coronavirus disease 2019

Table 3 Multivariate logistic regression analysis for evaluating factors associated with declining polysomnography in the pandemic period

($n=217$)	Odds ratio (95% CI)	p
Age ≥ 60 years	2.19 (1.13–4.24)	0.02
Clinical history		
Hypertension	1.39 (0.75–2.59)	0.29
Dyslipidemia	1.58 (0.74–3.37)	0.24
Consultation in months of full-blown pandemic	2.24 (1.20–4.21)	0.01

Among 229 patients in the pandemic period, the 12 patients whose request of the polysomnography was not processed appropriately were excluded from the analysis

CI confidence interval

CPAP prescription

The comparison of patients who underwent PSG between the pre-pandemic and the pandemic period is shown in Table 4. The number of days from the consultation to PSG was significantly longer in the pandemic than the pre-pandemic period (25 (13–35) vs. 14 (7–27) days, $p<0.001$).

Of the patients who underwent PSG, 114/169 (67.5%) had mild-to-severe sleep apnea in the pre-pandemic period and 85/122 (69.7%) in the pandemic period ($p=0.69$). Further, among them, 69/114 (60.5%) and 40/85 (47.1%) patients got the prescription of CPAP in the pre-pandemic and the pandemic period, respectively ($p=0.06$).

Discussion

In this study, our main finding was that the proportion of patients that did not proceed to in-lab PSG dramatically increased from pre-pandemic to pandemic period. Furthermore, we found high rates of patients declining in-lab PSG in those months considered to be "full-blown pandemic". It appeared that this decline correlated with the average daily COVID-19 case rate, suggesting that the degree to which COVID-19 was circulating in the community itself may have influenced patients' decision not to procced with the in-lab study. This is further supported by our finding in a multivariate analysis showed that age ≥ 60 years correlated with declining PSG in the pandemic period. Given that this finding was not seen in the pre-pandemic cohort, it suggests that the older patients felt more reluctant than younger patients to undergo PSG, which is very plausible given the known higher mortality from COVID-19 in older patients [13–15]. On the other hand, we saw no such reduction in the number of initial consultation visits during the pandemic, which were actually higher in the pandemic period compared to the comparative pre-pandemic period. This suggests that it was the in-person aspect of the in-lab PSG which led to higher declining rates. In addition, although the difference did not

Table 4 Comparison of patients who underwent polysomnography between in the pre-pandemic and the pandemic period

	Pre-pandemic	Pandemic	*p*
n	169	122	
Age, years	49 ± 14	47 ± 14	0.18
Male, *n* (%)	72 (42.6)	60 (49.2)	0.27
Self-reported body mass index, kg/m^2[a]	31.1 ± 7.6	30.1 ± 6.4[a]	0.24
Measured body mass index, kg/m^2	31.1 ± 7.6	30.1 ± 6.4	0.21
Medication			
Anti-hypertensive, *n* (%)	65 (38.6)	44 (36.1)	0.68
Anti-diabetic, *n* (%)	18 (10.7)	11 (9.0)	0.64
Lipid-lowering, *n* (%)	30 (17.8)	22 (16.4)	0.76
Anti-coagulation, *n* (%)	8 (4.7)	6 (4.9)	0.94
Anti-platelet, *n* (%)	13 (7.7)	6 (4.9)	0.34
Epworth sleepiness scale score[b]	7.6 ± 4.4[b]	7.8 ± 4.9	0.79
Apnea hypopnea index, /h	10.1 (3.6–25.9)	9.0 (3.3–20.7)	0.43
Severity of sleep apnea			0.47
No sleep apnea, *n* (%)	55 (32.5)	37 (30.3)	
Mild, *n* (%)	50 (29.6)	44 (36.1)	
Moderate, *n* (%)	29 (17.2)	23 (18.9)	
Severe, *n* (%)	35 (20.7)	18 (14.8)	
Days from the consultation to polysomnography	14 (7–27)	25 (15–35)	< 0.001

Values are presented mean ± standard deviation or median (1st–3rd quantile) unless otherwise indicated

[a]Information of self-reported body mass index was not retrieved in four patients in the pandemic cohort

[b]Epworth sleepiness scale score could not be retrieved in three patients of the pre-pandemic cohort

reach to the statistical significance, among the patients with mild-to-severe sleep apnea, percentage of those who proceeded to the CPAP treatment decreased from the pre-pandemic to the pandemic period. While various confounding factors probably contributed to this finding, the patients possibly hesitated to start CPAP, because it required in-person contacts with a CPAP vendor.

Considering the overall decrease in in-person visits after the onset of the pandemic [16], the present findings were not surprising. However, to our knowledge, this is the first study to show the impact of the pandemic on proceeding to in-person PSG for diagnosis of sleep apnea based on the data of real clinical practice. In addition, we clarified the characteristics of the patients who did not proceed with the sleep test in the pandemic. This has significant implications for timely diagnosis and management of sleep apnea. Given that age itself is a risk factor for sleep apnea [17, 18], it is very likely that the prevalence of sleep apnea in the cohort who declined PSG was at least as high if not higher than in the cohort that underwent PSG in whom the prevalence of sleep apnea was greater than 60%. This suggests that many patients had sleep apnea that went undiagnosed. We would argue that to maintain an appropriate clinical pathway for the diagnosis of sleep apnea, a transition from relying solely on in-lab PSG to home sleep studies is needed to allow for a complete virtual pathway as opposed to the hybrid part virtual/part in-person model currently in place. A change in the current government funding model in Ontario would be necessary to facilitate this, given that currently home sleep studies are not reimbursed and furthermore government funding/re-imbursement for the purchase of a CPAP machine requires the diagnosis of sleep apnea to have been made in an in-lab PSG.

It is worth considering other potential factors that may have contributed to our main finding. First, in the pandemic period, the consultation has been conducted completely remotely. Explanation of PSG over the phone could have made the patients feel more unsecure than in-person discussion**.** We could not rule out the possibility that the change of the approach to the patients (phone vs. in-person) had impact on the patient's uptake of PSG. Second, there was a longer duration from the first clinical consultation to the scheduling of the PSG in the pandemic than the pre-pandemic period; this may be partly because of decreased available time slots for PSG due to new laboratory protocols in the pandemic. It could be argued that longer waiting periods possibly made the patients less motivated to proceed to PSG. In addition, change in administrative process of making the appointment of PSG may be one of the reasons of decrease in the number of patients who underwent PSG in the pandemic period. However, given that larger number of patients declined PSG at the consultation with the physician in the full-blown pandemic months in the pandemic period, these possible confounding factors could not explain all reasons

of higher rate of declining PSG in the pandemic than the pre-pandemic period.

Given the retrospective nature, the present study has some inherent limitations. First, we did not ascertain the reasons of declining PSG in a standardized way. It is possible that some patients declined PSG for reasons completely unrelated to the pandemic. Second, we were unable to measure patients' BMI at the initial virtual consultation. While self-reported BMI and measured BMI were similar in the patients who underwent PSG in the present study (Table 4), the accuracy of self-reported BMI is controversial [19–21]. The prevalence of obesity, a major risk for sleep apnea, might be different between the cohorts. In addition, we did not systematically assess sleep apnea-related symptoms such as daytime sleepiness at the consultation for all patients, although the ESS scores of patients who underwent PSG did not differ between the two periods. Furthermore, we did not collect the information of comorbidity in a systemic way such as using a questionnaire. Therefore, we could not exclude the possibility that there was significant difference in risk for sleep apnea between the two cohorts that may have influenced our findings. Finally, this study was based on a single-physician practice, and while this minimized the results being influenced by differing practice between physicians, further studies are needed to assess whether the findings are generalizable to other sleep practices/laboratories.

In conclusion, in this retrospective study of a single practitioner sleep practice, we showed that there was a dramatic increase in the rate of patients declining in-lab PSG in the pandemic which appeared to be correlated with cases of COVID-19 infection in the community at the time of consultation, suggesting that the in-person nature of PSG was a concern for patients. While virtual visits including telephone and video visits allowed for maintenance of clinical consultations, clearly, these results support the need to pivot to a comprehensive virtual pathway, which would allow for patients to undergo home sleep studies, once clinically appropriate, if needed. This is very important given the health implications of undiagnosed and untreated sleep apnea at an individual and public health level.

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Declarations

Conflict of interest The authors do not have any conflict of interest to disclose.

Ethical committee permission Ethics approval was received from the Research Ethics Board at Women's College Hospital (approval #: 2021–0095-E).

Research involving human participants and/or animals The present research involved patients who visited a sleep clinic.

Informed consent Obtaining informed consents from the participants was waived because of the study's retrospective nature.

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