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Virtual and in-person visits by Ontario physicians in the COVID-19 era

Rui Fu[1,2,3], **Rinku Sutradhar**[1,2], **Qing Li**[1], **and Antoine Eskander**[1,2,3]

Abstract

Introduction: We examined the coronavirus disease 2019 (COVID-19) pandemic impact on weekly trends in the billing of virtual and in-person physician visits in Ontario, Canada.

Methods: In this retrospective cohort study, physician billing records from Ontario were aggregated on a weekly basis for in-person and virtual visits from 3 January 2016 to 27 March 2021. For each type of visit, a segmented negative binomial regression analysis was performed to estimate the weekly pre-pandemic trend in billing volume per thousand adults (3 January 2016 to 14 March 2020), the immediate change in mean volume at the start of the pandemic, and additional change in weekly volume in the pandemic era (15 March 2020 to 27 March 2021).

Results: Before the start of the pandemic, the weekly volume of virtual visits per thousand adults was low with a 0.5% increase per week (rate ratio [RR]: 1.0053, 95% confidence interval [CI]: 1.0050–1.0056). A dramatic 65% reduction in in-person visits (RR: 0.35, 95% CI: 0.32–0.39) occurred at the start of the pandemic while virtual visits grew by 21-fold (RR: 21.3, 95% CI: 19.6–23.0). In the pandemic era, in-person visits rose by 1.4% per week (RR: 1.014, 95% CI: 1.011–1.017) but no change was observed for virtual visits (p-value = 0.31). Overall, we noted a 57.6% increase in total weekly physician visits volume after the start of the pandemic.

Discussion: These results are meaningful for virtual care reimbursement models. Future study needs to assess the quality of care and whether the increase in virtual care volume is cost-effective to society.

Keywords

telehealth, virtual care, Telemedicine, office visits, COVID-19, delivery of health care, physicians

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic has brought unprecedented changes to physician practice, particularly by shifting the mode of care from in-person to virtual. Most literature on virtual care provision has been focused on the US during the initial 3 months of the pandemic (i.e. between March and June 2020). In a preliminary report, the US Centers for Disease Control and Prevention showed a 154% rise in virtual visits in the last week of March 2020.[1] Several single-center studies subsequently recorded between 3- and 6-fold growth in virtual visits from early March to mid-April 2020.[2–4] As of June 2020, dramatic increases in the use of virtual visits were documented among different commercially insured populations.[5–7] Specific care services, including primary care and psychiatric care visits, were found to follow a similar shift from in-person to virtual in the first 3 months of COVID-19.[8,9]

Owing to its universal healthcare system, studies based in Canada are able to comprehensively assess the transformation of care patterns in the entire publicly insured population. Most pertaining Canadian studies are based in Ontario, which has been promoting virtual care long before the pandemic.[10–14] Over a decade ago, the Ontario Telemedicine Association (OTN) introduced incentive

[1]ICES, Toronto, Ontario, Canada
[2]Institute of Health Policy, Management and Evaluation, University of Toronto, Toronto, Ontario, Canada
[3]Department of Otolaryngology – Head and Neck Surgery, Michael Garron Hospital and Sunnybrook Health Sciences Centre, University of Toronto, Toronto, Ontario, Canada

Corresponding author:
Antoine Eskander, 2075 Bayview Ave., M1-102, Toronto, ON, M4N 3M5, Canada.
Email: antoine.eskander@mail.utoronto.ca

codes for physicians for conducting video visits using the OTN videoconferencing platform ($35 premium for initiating an encounter with patient and $15 premium for each subsequent visit).[15] These codes were canceled on 1 April 2020, two weeks after Ontario hospitals were advised to halt elective surgeries and non-emergent procedures with the arrival of COVID-19.[16] To ensure physicians can provide services at a distance, the Ministry of Health launched a set of temporary billing codes for physicians to claim phone visits and video visits conducted on a non-OTN platform which are set to expire in September 2022.[17] Preliminary evidence demonstrates high uptake of these phone codes, as over 90% of total virtual visits conducted in 2020 were delivered by phone.[11,14] However, the pattern of virtual care provision beyond 2020, particularly when in-person visits rise amid the ease of COVID-19 restrictions, remains uninvestigated.[18]

In this work, we aim to address this gap in knowledge by assessing the impact of the pandemic on the trends in billing in-person visits and virtual visits (comprising phone/video, OTN, and e-assessments visits) in Ontario from January 2016 to March 2021. The findings of this study have important implications for virtual care reimbursement policies as telemedicine is likely to become a permanent and routine mode of care delivery post-pandemic.

Methods

Study design and population

This retrospective population-based analysis was conducted in Ontario, Canada (population 14.6 million) where all medically necessary physician services are covered for residents under the Ontario Health Insurance Plan (OHIP). Physician visits claim data were aggregated on a weekly basis from 3 January 2016 to 27 March 2021 (273 weeks) where visit codes were classified into either an in-person visit or virtual visit using well-defined procedural codes guidelines.[19] The study protocol was reviewed and approved by ICES' Privacy and Legal Office. All databases were linked using unique encoded identifiers and analyzed at ICES. The use of secondary de-identified administrative data provided by ICES was authorized under section 45 of Ontario's Personal Health Information Protection Act, which does not require review by a Research Ethics Board. As such, an ethical review of these de-identified datasets was not required by a Research Ethics Board even though individual written consent was not obtained.

Outcome

We assessed the weekly billing volume of in-person and virtual visits per thousand OHIP-eligible adults (aged 18 years or older). Virtual visits initially included videoconferencing visits physicians delivered on the Ontario Telemedicine Network (OTN)'s platform (henceforth OTN visits) and e-assessments. To be eligible to submit claims for OTN visits through OHIP, physicians must first submit a registration form to the Ontario Virtual Care Program to become a licensed virtual care provider. All video visits need to be conducted exclusively using an OTN-approved platform (i.e. physicians can either travel to a videoconferencing studio that is part of OTN or use an OTN software).[20] An e-assessment is when a specialist returns a written opinion electronically (such as via a secure messaging server) to a primary care physician or nurse practitioner upon receiving a request from them on the management of a specific patient.[19] Since 14 March 2020, virtual visits also included phone or video visits using a non-OTN platform as temporary OHIP fee codes (i.e. "phone codes") were launched for physicians to claim under an emergency order.[17] On 14 March 2021, additional new fee codes for phone- or video-based palliative care consultations were launched[21]; we did not consider these codes in the present analysis as our study window ended on 27 March 2021. The rate of remuneration for each virtual visit (delivered by phone or on an OTN or non-OTN video platform) is equivalent to that of an in-person visit of the same nature (see Table 1 for example fee codes and rates). These virtual care codes are set to expire on 30 September 2022.[22]

Statistical analysis

We used 15 March 2020, when the Ontario Ministry of Health advised all hospitals to halt non-emergent and elective procedures, to represent the start of the COVID-19 pandemic.[16] A pre-pandemic period (3 January 2016 to 14 March 2020) and a pandemic period (15 March 2020 to 27 March 2021) were created accordingly.[23,24] For in-person and virtual visits, separate segmented negative binomial regression models were fitted to estimate the weekly billing volume per thousand OHIP-eligible adults. These models comprised three estimates: the weekly pre-pandemic trend in billing volume per thousand adults (slope); the immediate change in mean billing volume at the start of the pandemic (relative change in intercept); and the subsequent change in slope during the pandemic era. In a sensitivity analysis, we repeated the modeling procedures separately on OTN visits and e-assessments. All regression analyses were 2-sided using a p-value <0.05 to indicate statistical significance. All analyses were performed using SAS Enterprise Guide 7.15 (SAS Institute).

Results

During the pre-pandemic period, 133,9129,606 in-person visits and 3,869,297 virtual visits have taken place in Ontario, Canada (Table 2). Since the start of the pandemic on 15 March 2020, 17,952,559 in-person visits and

Table 1. Ontario physician visits by the modality of delivery.

Types of visits	Example OHIP fee codes and rate[a]
In-person visits	A001 – Minor assessment ($23.75) A007 – Intermediate assessment >10 min ($36.85) A005 – Consultation >50 min ($84.45) A003 – General assessment, one per patient per physician per year ($84.45) K005 – Primary mental health care ($67.75 for each 30 min increment) A945 – Special palliative care consultation >50 min ($159.20) K023 – Palliative care support ($72.15 for each 30 min increment) A095 – Cardiac surgery consultation ($90.30)
OTN visits	Until 31 March 2020, on top of receiving the same rate for an equivalent OHIP in-person service, physicians can bill the B-codes to receive a $35 premium for establishing a new patient encounter and a $15 premium for each subsequent encounter (B100A, B101A, B102A, B200A, B201A, B202A, and B099A). These codes were discontinued on 1 April 2020.[b]
E-assessments	U025 – Initial e-assessment by a dermatologist ($44.45) U235 – Initial e-assessment by an ophthalmologist ($45.85) K480 – Physician to allied professional telephone consultation ($31.35)
Phone or video visits[c]	K080 – Minor assessment ($23.75) K081 – Intermediate assessment including psychotherapy >10 min ($36.85) K082 – Psychotherapy, psychiatric, or mental health counseling ($67.75 for each 30 min increment) K083 – Specialist consultation ($5.00 per increment) K092 (phone) or K093 (video) – Palliative care consultation >50 min ($159.20) K094 (phone) or K095 (video) – Palliative care support ($72.15 for each 30 min increment)

OHIP: Ontario Health insurance Plan; OTN, Ontario Telemedicine Network.

[a]All information is based on the most recently released Ontario Schedule of Benefits (effective 1 October 2021).

[b]Physicians hosting OTN visits with rural patients continued to receive a $15 premium for each visit until 31 March 2021.

[c]These fee codes were introduced on 14 March 2020 (except for palliative care codes that were launched on 14 March 2021) and are set to expire on 30 September 2022. We did not consider virtual palliative care codes (K092–K095) in this analysis.

35,580,999 virtual visits occurred over the pandemic era (i.e. until 27 March 2021). Hence, on a weekly basis, there was an increase of 57.6% in total physician visit volume after the start of COVID-19.

The results of the segmented regression analysis on billing volume per thousand OHIP-eligible adults are presented in Table 2 and Figure 1. Before the start of the pandemic, the number of in-person visits per thousand adults was stable (p-value = 0.09) whereas virtual visits remained at a very low level with a 0.5% increase (rate ratio [RR]: 1.0053, 95% confidence interval [CI]: 1.0050–1.0056) in each subsequent week. A dramatic 65% decline (RR: 0.35, 95% CI: 0.32–0.39) in mean in-person visits volume occurred at the start of the pandemic, accompanied by a 21-fold rise (RR: 21.3, 95% CI: 19.6–23.0) in mean virtual visits volume. Afterward, in-person visits slowly recovered towards pre-pandemic levels with a weekly rise of 1.4% (RR: 1.014, 95% CI 1.011–1.017) although no significant change was observed for virtual visits (p-value = 0.31).

We repeated the modeling procedures on OTN visits and e-assessments, respectively, in a sensitivity analysis (Table 3 and Figure 2). Prior to the start of the pandemic, the weekly billing volume of OTN visits per thousand OHIP-eligible adults was growing at 0.5% per week (RR: 1.005, 95% CI: 1.004–1.005). After experiencing a 2.6-fold rise (RR: 2.61, 95% CI: 1.72–3.98) in mean volume as the pandemic arrived, OTN visits started to drop dramatically by 59% each week (RR: 0.41, 95% CI: 0.37–0.46) in the COVID-19 era. E-assessments remained low-volume throughout the study periods as we only observed 54,257 billings of such visits over 5 years.

Discussion

In this Ontario-based study, we revealed the billing of virtual visits rose 21 folds in response to COVID-19 and the high volume did not recede even when in-person visits started to gradually rebound to pre-pandemic levels. Overall, a 57.6% rise in the total weekly billing volume of physician visits since the start of COVID-19 was observed. Due to the high capture of physician billing data in a universal healthcare system, Ontario serves as a unique setting to assess the impact of the temporary introduction of phone codes on physician visits and billing. In this case, we concluded that the surge in virtual visits was largely driven by the availability of phone codes under the temporary emergency order. These results imply Ontario physicians responded swiftly and positively to modifications in remuneration, which is also evident by the substantially declined billing of OTN-supported video visits when the associated incentives expired shortly after the arrival of COVID-19.

Our results are somewhat incongruent with the two early Ontario analyses using billing records in the first 4 to 5 months of the pandemic. Glazier et al.[12] found a 56-fold growth in virtual primary care visits between March and July 2020 relative to 2019, which is a much larger increase than our estimate (i.e. 21 folds). This discrepancy might be due to distinct behaviors of primary care physicians who shifted to virtual care provision faster and to a larger

Table 2. Results of the segmented regression analysis on a weekly number of OHIP billings per thousand adults in Ontario, Canada.

	In-person visits (pre-pandemic $N = 133,912,606$; pandemic $N = 17,952,559$)			Virtual visits[a] (pre-pandemic $N = 3,869,297$; pandemic $N = 35,580,999$)		
Parameters	RR	95% CI	*p*-value	RR	95% CI	*p*-value
Relative change in weekly volume (slope before the start of COVID-19[b])	1.0003	0.99995–1.0006	0.09	1.0053	1.0050–1.0056	<0.01
Relative change in mean volume at the start of COVID-19 (relative change in intercept)	0.35	0.32–0.39	<0.01	21.3	19.6–23.0	<0.01
Relative change in weekly volume (further change in slope after the start of COVID-19[c])	1.014	1.011–1.017	<0.01	1.0012	0.9989–1.0034	0.31

OHIP: Ontario Health insurance Plan; RR: rate ratio; CI: confidence intervals; COVID-19: coronavirus disease 2019.

[a]Virtual visits comprised OTN visits and e-assessments during pre-pandemic and later also included phone and video visits using a non-OTN platform once phone codes were launched under a temporary emergency order.

[b]Pre-pandemic period is from 3 January 2016 to 14 March 2020. We use 15 March 2020 to proxy the start of the COVID-19 pandemic in Ontario, Canada as hospitals services were halted.

[c]The pandemic period is from 15 March 2020 to 27 March 2021. The regression coefficients can be interpreted as followed: the volume of in-person visits per thousand adults was increasing at an insignificant rate of 0.03% for each week during pre-pandemic, followed by a drop in the mean volume of 65% at the start of the pandemic, then a weekly rise of 1.4% (i.e. the product of pre-pandemic slope, 1.0003, and the relative change in slope in pandemic vs. pre-pandemic era, 1.014) until 27 March 2021.

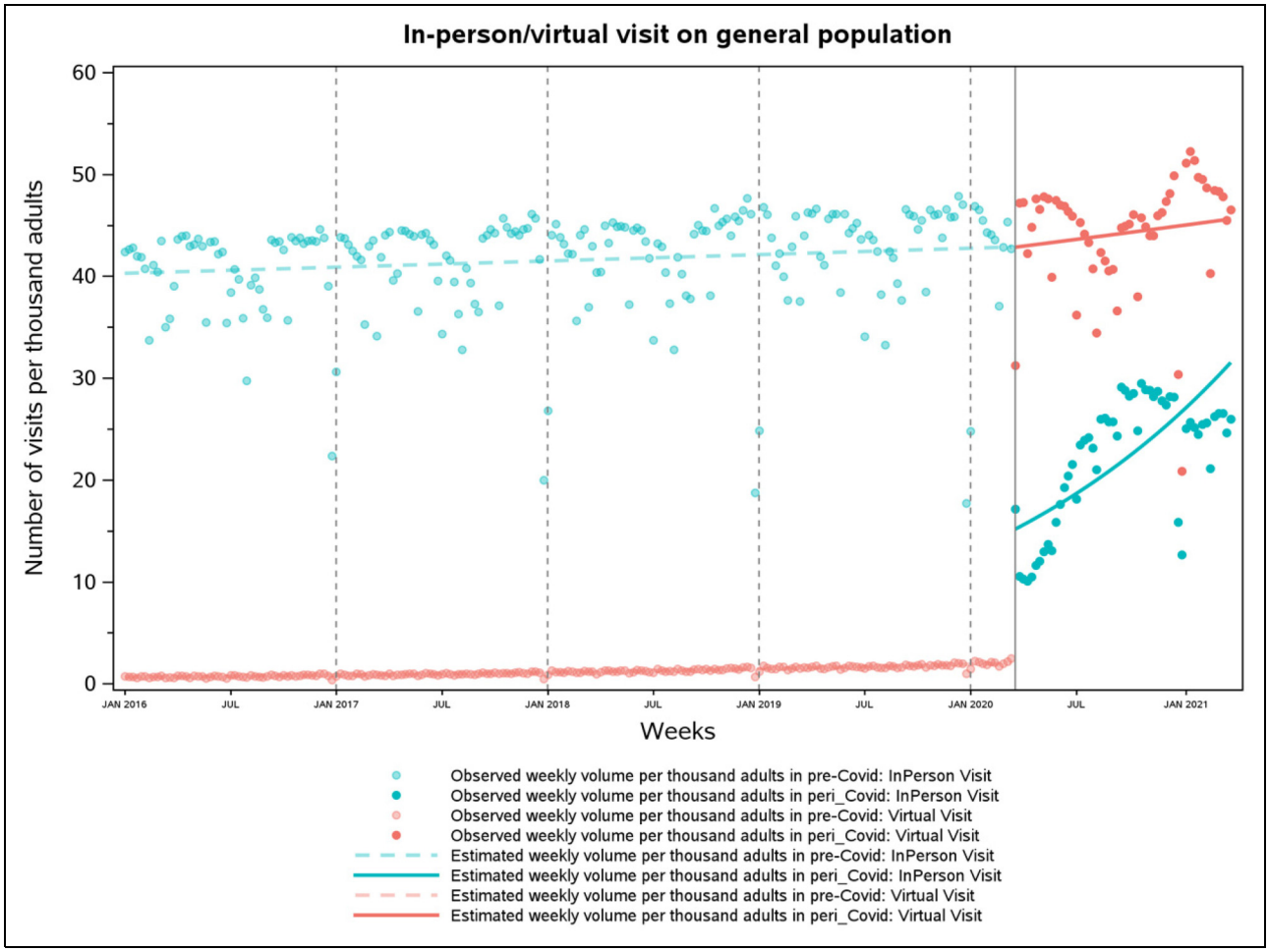

Figure 1. Weekly trends in physician billing of in-person and virtual visits per thousand adults between 3 January 2016 and 27 March 2021. Notes: Virtual visits comprised Ontario Telemedicine Network (OTN)-supported videoconferencing visits and e-assessments during the pre-pandemic era and later also included phone and video visits on a non-OTN platform once new "phone codes" were launched under a temporary emergency order.

Table 3. Results of the segmented regression analysis on a weekly number of OTN visits and e-assessments billing per thousand adults in Ontario, Canada.

	OTN visits (pre-pandemic $N=3{,}814{,}299$; pandemic $N=94{,}710$)			E-assessments (pre-pandemic $N=41{,}084$; pandemic $N=13{,}173$)		
Parameters	RR	95% CI	*p*-value	RR	95% CI	*p*-value
Relative change in weekly volume (slope before the start of COVID-19[a])	1.005	1.004–1.005	<0.01	1.002	1.001–1.003	<0.01
Relative change in mean volume at the start of COVID-19 (relative change in intercept)	2.61	1.72–3.98	<0.01	1.16	0.99–1.36	0.07
Relative change in weekly volume (further change in slope after the start of COVID-19[b])	0.41	0.37–0.46	<0.01	0.994	0.989–0.998	<0.01

OTN: Ontario Telemedicine Network; RR: rate ratio; CI: confidence intervals; COVID-19: coronavirus disease 2019.

[a]Pre-pandemic period is from 3 January 2016 to 14 March 2020. We use 15 March 2020 to proxy the start of the COVID-19 pandemic in Ontario, Canada as hospitals services were halted.

[b]The pandemic period is from 15 March 2020 to 27 March 2021. The regression coefficients can be interpreted as followed: the volume of OTN visits per thousand adults was increasing at 0.5% for each week during pre-pandemic, followed by a 2.61-fold increase in mean volume at the start of the pandemic, then a weekly decline of 59% (i.e. the product of pre-pandemic slope, 1.005, and the relative change in slope in pandemic vs. pre-pandemic era, 0.41) until 27 March 2021.

extent than other medical specialists.[9,11] A more recent analysis by Bhatia et al.[11] found phone visits that were enabled by the new temporary billing codes accounted for 91.5% of all virtual visits in Ontario between January and August 2020. According to our analysis, between 15 March 2020 and 27 March 2021, nearly 99.7% of virtual visits were delivered by phone or non-OTN video platform. This exceedingly high proportion of phone/video visits is likely a result of the rapidly decreasing uptake of OTN visits by physicians once the incentive codes expired and continuously high billing of phone codes.

Nearly all early literature concludes a net reduction in total physician visits during the first 3 months of the pandemic, despite a surge in virtual visits.[5–9,12,13] We extend this result by showing that 12 months after the arrival of COVID-19, the total weekly physician visits volume in Ontario has grown by 57.6% compared to pre-pandemic levels. It is possible that physicians, especially those who were unfamiliar with virtual care technology, needed to meet with the same patient repeatedly to achieve the same level of oversight. Furthermore, the increase in the volume of virtual visits might be attributed to an influx of patients requiring mental health counseling amid the provincial lockdown.[25] However, regardless, these findings raise concerns about increased healthcare spending on physician services. In light of the current fiscal constraints and given that virtual visits are reimbursed similarly to in-person visits in Ontario, there is a need to assess the quality of virtual care and to advance physician remuneration models to reward value over volume. This concern is especially relevant for phone visits which have become billable to most Ontario physicians for the first time under the emergency order.[17] While clinical guidelines exist on how best to use video visits even for activities that are thought to rely heavily on close and sustained physical contact between provider and patient (such as a physical examination),[26,27] it seems unlikely a phone call alone would be adequate under this circumstance. Still, phone visits might uniquely benefit certain patient populations during the pandemic, such as those who do not have the required video conferencing software installed and ready to use on their device and those who lack high-speed internet access.[28] We would be able to statistically assess these scenarios using the updated physician claims data after October 2021 as Ontario now mandates a tracking code to be billed to indicate if the virtual visit is a phone call or a video visit on Skype, Zoom, or FaceTime.[11,22]

For disadvantaged patient populations, virtual care represents an opportunity to promote access to care. While Ontario has canceled the OTN visits premium for most providers on 1 April 2020, those delivering OTN visits to rural patients continued to receive a bonus payment of $15 for each completed visit until 31 March 2021.[20] Our findings suggest these incentive codes had minimal impact on the total volume of OTN visits, as we observed the visit volume to decline by nearly 60% each week from 15 March 2020 to 27 March 2021. It is unclear to us if this is the result of low uptake of incentive codes or low levels of physician interactions with rural patients in general, which future study should clarify. Furthermore, on 1 May 2020, new temporary codes (K087, K088, and K089) were introduced so that physicians could be remunerated for providing in-person and virtual care to uninsured patients.[17] We did not assess these codes in the analysis as we only focused on physician visits delivered to an insured adult patient. Hence, future study needs to use the billing records of these codes to quantify the care use of uninsured patients during the pandemic, and to assess if providers tended to meet with

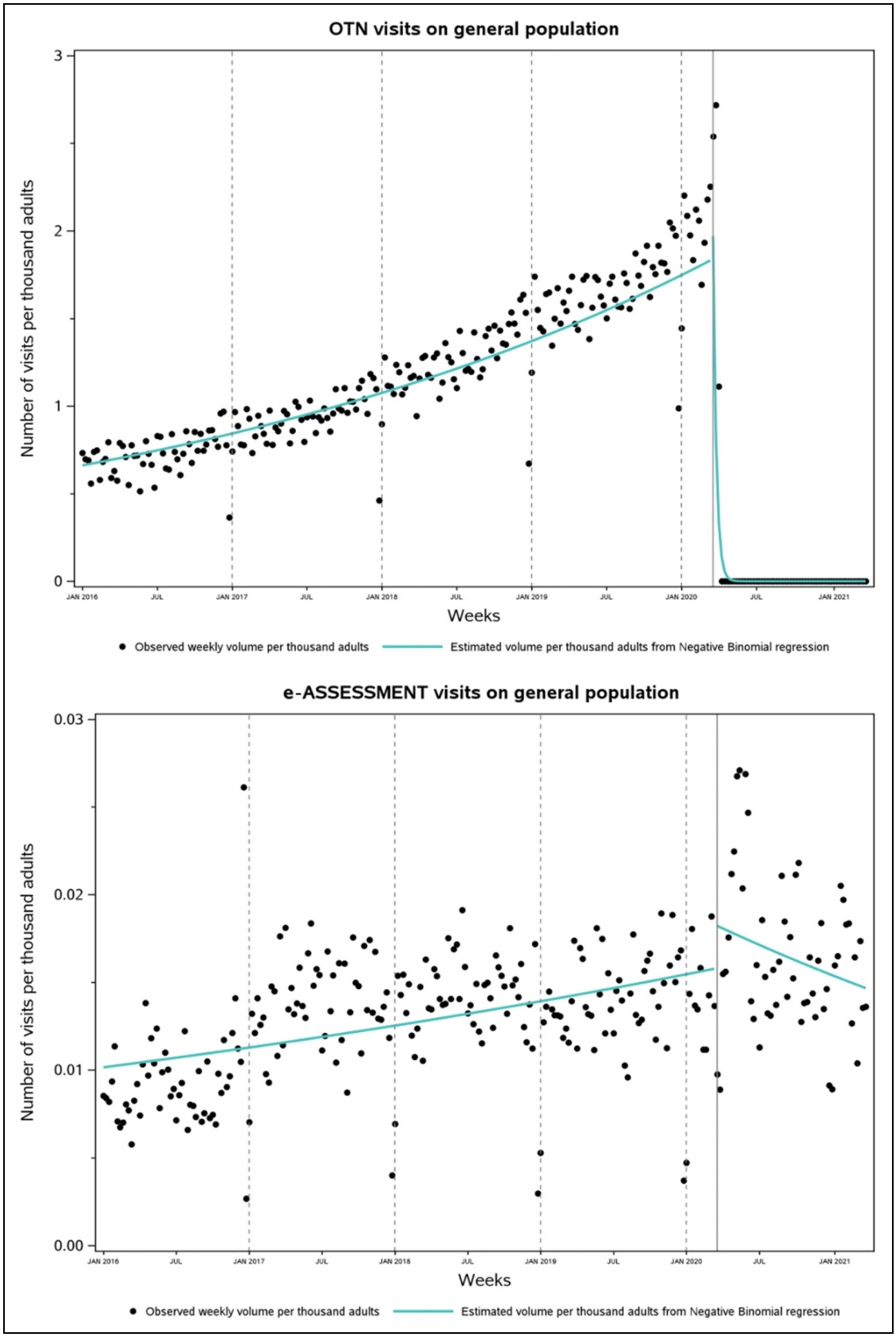

Figure 2. Weekly trends in physician billing of Ontario Telemedicine Network (OTN) visits (upper diagram) and e-assessments (lower diagram) per thousand adults between 3 January 2016 and 27 March 2021.

uninsured patients virtually or at the office. These results are potentially useful to guide the expansion of telemedicine in traditionally underserved populations.

This analysis has limitations. First, we did not assess the content of billing, especially whether the billing was related to COVID-19 (such as vaccine inquiry and mental health counseling). However, it is unlikely that a surge in COVID-19-related services could have accounted for the visit trends revealed by our analysis given the relatively low incidence of the disease during the study period. Furthermore, evidence from Ontario has demonstrated similar rates of virtual care use across individuals of different health conditions (including mental health conditions) and age groups.[11] Second, this analysis is limited by the lack of covariate adjustment and thus represents a descriptive trend analysis. Particularly, we did not consider the potential urban–rural disparities in the access of and satisfaction about virtual visits, as rural residents might experience obstacles due to inadequate digital infrastructure.[29] Third, this analysis did not account for the latest changes in virtual care reimbursement policy, most notably the launch of fee codes targeting palliative care physicians and psychotherapists in mid-March 2021.[21] Hence, future research needs to continue monitoring the uptake of virtual care codes to understand the impact of these programs. Similarly, we were unable to examine additional waves of the pandemic beyond its initial arrival in March 2020. Notably, the second round of hospital services ramping down was announced in January 2022 to curb the spread of cases associated with the Omicron variant in Ontario.[30] This policy might have caused another surge in virtual visits that is beyond the scope of our data. Finally, the single-province setting of this analysis does not permit us to generalize our findings to other Canadian provinces and territories or internationally.

The findings of this analysis have implications for future studies to understand the clinical value, quality, and cost-effectiveness of virtual care provision in the pandemic era and beyond. We demonstrate that Ontario physicians are increasingly blending virtual and in-person visits which have driven an increase in total weekly visits volume. Future study needs to assess the nature of these "excessive" virtual visits to ensure they do add a significant value to the standard of care. For example, chronically ill patients might benefit from having additional virtual physician check-ups to help build a self-care routine.[31] However, virtual visits are low-value and thus should be avoided if they are used to diagnose medical conditions that clearly require an in-person assessment (such as sudden loss of vision).[27] Regarding the quality of virtual visits, the study needs to incorporate both objective and subjective measures of patient outcomes to demonstrate the full spectrum of experiences. While administrative data can be used to establish hard outcomes such as the rate of hospitalization and disease progression, in-depth interview approaches are more suitable to capture patient perspectives on ease of use, levels of engagement, and perceived satisfaction.[32] These studies are particularly important for phone visits, as there is a lack of consensus on clinical situations where an audio-only visit is sufficient and how best to monitor and judge their quality.[26,27] The same analytical approach could be implemented to study the attitude of physicians toward transforming practice methods from in-person to virtual and if certain provider-level characteristics, such as payment model, age, and specialty, would impact the rate of telemedicine adoption.[33,34]

The financial consequence and cost-effectiveness of virtual care warrant close scrutiny. Telemedicine usually requires high upfront costs to have the digital infrastructure set up and medical personnel well trained.[35] In the case of phone visits, the health system likely faces a much smaller initial investment, but the high billing of phone codes revealed in our analysis means there would be a dramatic increase in the expenditures on physician services.[36] Hence, cost-effectiveness studies need to examine if phone visits, especially repeated phone visits delivered to the same patient without any face-to-face encounters in between, are economically worthwhile to the system and society.

In conclusion, using physician billing records from Ontario, Canada from 3 January 2016 to 27 March 2021, we found a 21-fold rise in the mean volume of virtual visits at the start of the pandemic when the mean volume of in-person visits dropped by 65%. More importantly, as in-person visits slowly returned to pre-pandemic levels by growing 1.4% per week, virtual visits, over 99% of which were phone or video visits reimbursed through the new temporary fee codes, were not correspondingly decreasing, which resulted in a 57.6% increase in total weekly physician visits in the pandemic era. These findings warrant careful scrutinization of the quality and sustainability of virtual visits to determine how best to monitor these visits in the post-pandemic era.

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Ethics approval

The use of secondary de-identified administrative data provided by ICES was authorized under section 45 of Ontario's Personal Health Information Protection Act, which does not require review by a Research Ethics Board. As such, a review of these de-identified datasets was not required by a Research Ethics Board even though individual written consent was not obtained.

Declaration of conflicting interests

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ORCID iD

Rui Fu https://orcid.org/0000-0002-0577-2830

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