DATA MATTERS

Changes in Primary Care Health Services During the COVID-19 Pandemic: A Longitudinal Analysis of Data From Ontario

Changements dans les soins de santé primaires pendant la pandémie de COVID-19 : une analyse longitudinale des données de l'Ontario

ONLAK RUANGSOMBOON, MD, MSC
Research Coordinator
Upstream Lab
MAP Centre for Urban Health Solutions
Li Ka Shing Knowledge Institute
Unity Health Toronto
Toronto, ON
Assistant Professor
Faculty of Medicine
Siriraj Hospital
Mahidol University
Bangkok, Thailand

ADRINA ZHONG, MD, MPH
Student
Dalla Lana School of Public Health
University of Toronto
Toronto, ON

ALEXANDER KOPP, BA
Senior Programmer/Analyst
ICES Central
Toronto, ON

BETH ELSTON, MSC
Senior Research Analyst
ICES Central
Toronto, ON

KIRSTEN ELDRIDGE, MPH
Quality and Innovation Program Research Officer
Department of Family and Community Medicine
Faculty of Medicine
University of Toronto
Toronto, ON

SAMANTHA LEE, MPH
Senior Epidemiologist
ICES Central
Toronto, ON

ERIN PLENERT, MPH
Quality and Innovation Program Manager
Department of Family and Community Medicine
Faculty of Medicine
University of Toronto
Toronto, ON

ANDREW D. PINTO, MD, MSC
Scientist, Upstream Lab
MAP Centre for Urban Health Solutions
Li Ka Shing Knowledge Institute
Unity Health Toronto
Associate Professor
Dalla Lana School of Public Health
University of Toronto
Toronto, ON

RICHARD H. GLAZIER, MD, MPH
Associate Professor
Dalla Lana School of Public Health
University of Toronto
Senior Scientist
ICES Central
Toronto, ON

TARA KIRAN, MD, MSC
Family Physician
St. Michael's Hospital
Associate Professor
Department of Family and Community Medicine
Faculty of Medicine and
Institute of Health Policy, Management and Evaluation
University of Toronto
Toronto, ON

Abstract

The COVID-19 pandemic significantly impacted primary care, but its effect on quality of care is not well understood. We used health administrative data to understand the changes in quality-of-care measures for primary care between October 2018 and April 2022. We examined the following domains: cancer screening, chronic disease (diabetes) management, high-risk prescribing, continuity of care and capacity of primary care services. Colorectal and breast cancer screenings declined after the pandemic and had not returned to baseline by study end. In patients living with diabetes, in-person visits and up-to-date retinopathy screening rates declined after the pandemic declaration and did not return to baseline by study end, while statin prescribing remained stable. High-risk opioid prescribing decreased over time and was not affected by the pandemic. Physician continuity remained stable, though new patient enrollments decreased over the pandemic but returned to baseline by study end. Existing disparities in colorectal cancer screening by income and recent registration widened during the pandemic. In summary, COVID-19 had a variable impact on primary care, with the strongest influence on preventive and chronic disease care that was dependent on in-person visits.

Résumé

La pandémie de COVID-19 a eu un impact significatif sur les soins primaires, mais son effet sur la qualité des soins n'est pas bien compris. Nous avons utilisé les données administratives sur la santé pour comprendre les changements dans les mesures de la qualité pour les soins primaires entre octobre 2018 et avril 2022. Nous avons examiné les domaines suivants : dépistage du cancer, gestion des maladies chroniques (diabète), prescription à risque élevé, continuité des soins et capacité des services de soins primaires. Le dépistage du cancer colorectal et du cancer du sein a diminué après la pandémie et n'est pas revenu au niveau de référence à la fin de l'étude. Chez les patients atteints de diabète, les visites en personne et les taux de dépistage de la rétinopathie à jour ont diminué après la déclaration de pandémie et ne sont pas revenus au niveau de référence à la fin de l'étude, tandis que la prescription de statines est demeurée stable. La prescription d'opioïdes à risque élevé a diminué au fil du temps et n'a pas été touchée par la pandémie. La continuité chez les médecins est demeurée stable, même si le nombre de nouveaux patients a diminué au cours de la pandémie, mais est

revenue au niveau de référence à la fin de l'étude. Les disparités en matière de dépistage du cancer colorectal en fonction du revenu et d'un enregistrement récent se sont accrues pendant la pandémie. En résumé, la COVID-19 a eu un impact variable sur les soins primaires, avec une plus forte influence sur les soins préventifs et les soins pour les maladies chroniques qui dépendent des visites en personne.

Introduction

Providing high-quality primary care is fundamental to establishing robust health systems as it is linked to better health, decreased mortality rates and enhanced health equity (Starfield 2009). The COVID-19 pandemic has had a profound impact on primary care service delivery with initial reduction in visit volumes and a pivot to virtual care (Glazier et al. 2021). Early in the pandemic, clinicians and patients were instructed to defer preventive care activities and routine chronic disease management (Walker et al. 2021). The pandemic disproportionately affected marginalized groups, and there is concern that existing inequities in preventive care and chronic disease management (Smith et al. 2019; Upshaw et al. 2021) widened over the pandemic. Despite these concerns, there is little published research providing a comprehensive look at changes in recommended care and related changes in care disparities. Previous evidence from Ontario (Kiran et al. 2022) only addressed the pandemic's impact on select indicators over a brief time frame, with limited focus on disparities. Therefore, we sought to use administrative data to understand the impact of COVID-19 on a comprehensive list of quality-of-care measures in Ontario and related changes in disparities in care over a four-year period encompassing both pre-pandemic and pandemic periods. Measures corresponded to four of six Institute of Medicine's quality dimensions (access, effectiveness, safety, and equity) (AHRQ 2022) and were informed by other measurement initiatives as advised by clinicians (Shuldiner et al. 2023).

Methods

We conducted a repeated cross-sectional study using health administrative data. We assessed quality-of-care measures in six-month increments between October 2018 and April 2022. We included patients living in Ontario and eligible for the Ontario Health Insurance Plan (OHIP) as of March 31 of the respective year. We excluded infants aged less than one year old and those in long-term and palliative care.

We leveraged data collected for audit and from feedback reports for academic practices affiliated with the University of Toronto, available on the CareCanvas dashboard (https://www.carecanvas.ca/clinic). Accordingly, we examined quality of care in the following domains: cancer screening, chronic disease management, high-risk prescribing, continuity of care and capacity of primary care services. A full list of indicators, definitions and data

sources is presented in Table 1. Datasets were linked using unique encoded identifiers and analyzed at ICES. ICES is an independent, non-profit research institute whose legal status under Ontario's health information privacy law allows it to collect and analyze healthcare and demographic data, without consent, for health system evaluation and improvement (https://www.ices.on.ca/).

TABLE 1. List of variables, data sources and definitions

Variable name	Data source	Definition
Colorectal cancer screening	PCPOP dataset	Percentage of patients aged 52 to 74 years at index date who had a fecal occult blood test within the past two years, other investigations (i.e., barium enema, sigmoidoscopy) within the past five years or a colonoscopy within the past 10 years
Breast cancer screening	PCPOP dataset	Percentage of female patients aged 52 to 69 years at index date who had a mammogram within the past two years
In-person visits by patients with diabetes	OHIP claims database	Percentage of diabetic patients aged 18 years and older who had an in-person visit to their physician for any reason within the last 12 months from index date
Retinopathy screening in patients with diabetes	OHIP claims database	Percentage of diabetic patients aged 18 years and older who had at least one retinal exam with an ophthalmologist or optometrist in the last 24 months from index date
Statin prescription in patients with diabetes	OHIP claims database	Percentage of elderly diabetic patients aged 66 years and older who had a statin medication dispended within the last 12 months from index date
Opioid prescription	NMS	Percentage of non-palliative patients dispensed an opioid prescription within the last six months (excluding opioid agonist therapy) from index date
New opioid prescription	NMS	Percentage of non-palliative patients newly dispensed an opioid prescription within the last six months (excluding opioid agonist therapy) from index date
Opioid prescription with benzodiazepine or z-drugs	NMS	Percentage of non-palliative patients dispensed an opioid prescription with a benzodiazepine (or z-drug) prescription within the last six months (excluding opioid agonist therapy) from index date
New patient enrollments	OHIP claims database	Percentage of all patients who are new enrollments, calculated from new patient enrollments among all rostered patients in the last six months prior to index date as captured through OHIP billing code Q200 for rostering
Visit to rostered physician	ICES physician database, OHIP claims database	Percentage of in-person visits to a patient's rostered physician, calculated from total number of in-person visits in the two years prior to index date to a patient's rostered physician among all non-focused, comprehensive general practitioner in-person outpatient visits in the two years prior to index date

NMS = Narcotics Monitoring; OHIP = Ontario Health Insurance Plan; PCPOP = primary care population; System.

We only focused on in-person visits for diabetes follow-up as we hypothesized that these were the most affected by the COVID-19 pandemic, and diabetes guidance during the pandemic recommended a minimum of one in-person visit per year to perform the needed physical exam manoeuvres (Kiran et al. 2020). We calculated the aggregate data for each quality-of-care indicator for each time point. We stratified two indicators – colorectal cancer screening and in-person follow-up for diabetes – by sex, age, neighbourhood income, recent registration for OHIP and rurality, as we hypothesized a priori that there could have been changes to these practices over the pandemic (Cauch-Dudek et al. 2013; Kiran et al. 2017). Patients' sex and postal code were derived from the registered person's database. Registration with OHIP in the past 10 years has been used as a proxy for immigration but is also influenced by interprovincial migration (Kiran et al. 2017; Ray et al. 2007). Patients' postal code was used to calculate rurality using the Rurality Index of Ontario (big city, small town and rural area) (Kralj 2000) and neighbourhood income quintile. We calculated the absolute difference between the group with the highest and the lowest quality of care at the start and end of the study.

The use of the data in this project to improve the quality of care was authorized under section 45 of Ontario's *Personal Health Information Protection Act*, 2004, and does not require review by a research ethics board.

Results

Cancer screening

The percentage of screen-eligible patients who were up to date on breast cancer screening was steady before the beginning of the COVID-19 pandemic, then decreased to a nadir by October 2021 and has been increasing since (Figure 1a). The same pattern was seen for colorectal cancer screening, with the percentage of patients with up-to-date screening significantly decreasing after the pandemic.

Chronic disease care

The percentage of patients with diabetes with an in-person visit within the past 12 months had a similar pattern as those of cancer screening but with a more prominent negative trend (Figure 1b). The percentage of patients with diabetes with retinopathy screening in the past 24 months showed a steady decrease over time since the pandemic, while the percentage of older diabetic patients with a statin prescription within the past 12 months remained stable overall regardless of the pandemic.

High-risk prescription

The percentage of patients dispensed an opioid, newly dispensed an opioid and dispensed an opioid with a benzodiazepine all showed an overall decreasing trend over time, including during the pandemic (Figure 1c).

FIGURE 1. Changes in primary care indicators between October 2018 and April 2022

Figure 1a: Cancer screening

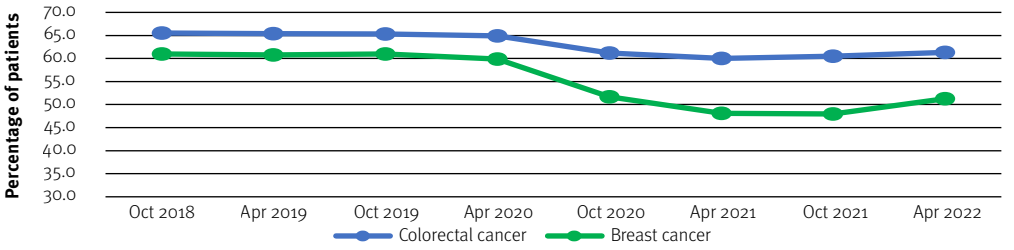


Figure 1b: Chronic disease (diabetes) management

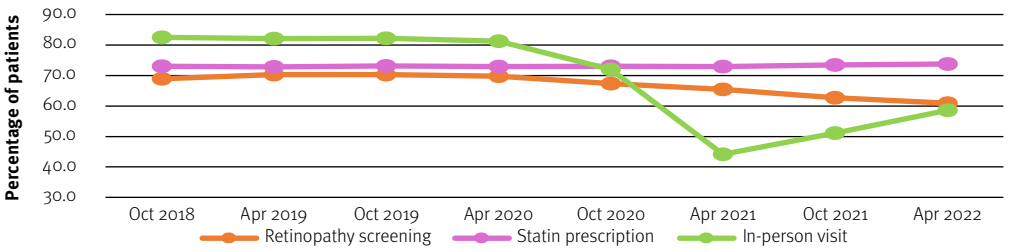


Figure 1c: High-risk prescription

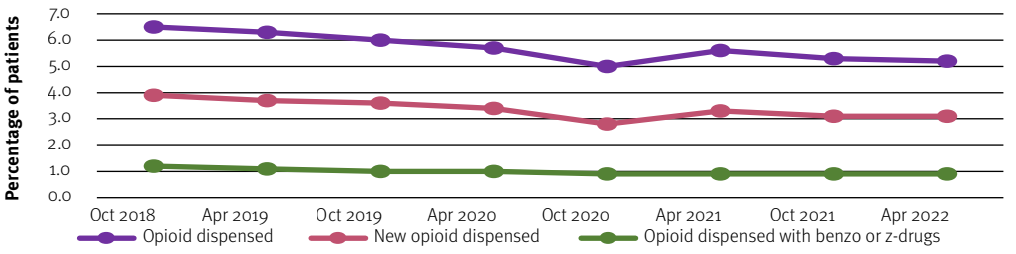


Figure 1d: New patient enrollment

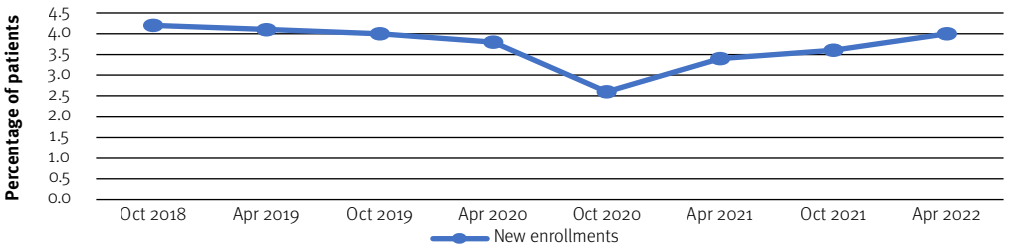
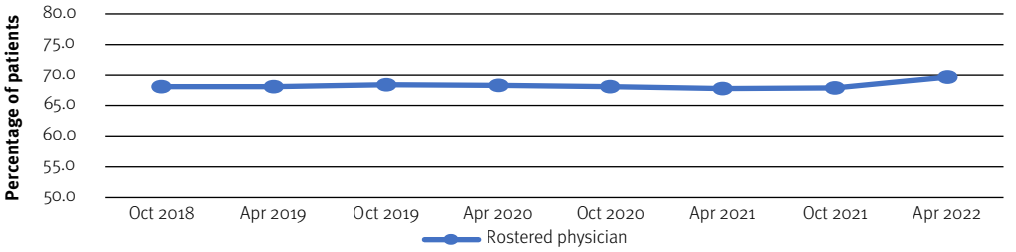


Figure 1e: Continuity of care



New patient enrollment and continuity of care

The percentage of newly enrolled patients was decreasing prior to the pandemic and then dropped significantly right after (Figure 1d). Regardless, it has been increasing back toward pre-pandemic measures. However, the percentage of in-person visits to a patient's rostered physician remained stable overall (Figure 1e).

Stratifications

The percentage of patients with up-to-date colorectal cancer screening and patients with diabetes with an in-person visit was higher among female than male patients (Figures 2a and 3a). Older patients had higher colorectal screening and in-person visit rates for diabetes than patients of younger age groups, with the highest rates among those aged at least 65 years for both variables (Figures 2b and 3b). When stratified by neighbourhood income quintile, the percentage of colorectal cancer screening showed a stepwise increase as income quintile increased (Figure 2c). Prior to the pandemic, the percentage of in-person visits for diabetes was also persistently lowest in patients from the lowest-income neighbourhoods; however, those from the highest-income neighbourhoods went from having the highest percentage before the pandemic to the lowest after the pandemic (Figure 3c). Patients in rural areas generally had lower colorectal cancer screening and in-person follow-up rates for diabetes than those in big cities and small towns (Figures 2d and 3d). Similarly, recent registrants had lower rates of both indicators compared with other Ontarians (Figures 2e and 3e).

The disparity between the highest and lowest groups for colorectal cancer screening across all stratifications widened over time except for age (Figures 2a to 2e). In contrast, the disparity for in-person visits for diabetes mostly followed the pattern of the indicators, and all decreased at study end compared to the start (Figures 3a to 3e).

Discussion

The COVID-19 pandemic disrupted overall primary care delivery in Ontario, resulting in missed and delayed care (Mangin et al. 2022). Our study documents and emphasizes the impact of the pandemic on a comprehensive range of quality-of-care measures in primary care. We also provided an equity lens to facilitate a deeper understanding of the shifts in quality of care associated with disparity. We found that preventive and chronic disease care that was dependent on in-person visits – namely, colorectal and breast cancer screening, retinopathy screening and in-person follow-up for people with diabetes – declined after the COVID-19 pandemic and still had not returned to the pre-pandemic baseline by study end. In contrast, physician continuity and statin prescribing among patients with diabetes remained the same as pre-pandemic baseline. High-risk prescribing decreased prior to the pandemic and that trajectory was maintained. The percentage of new patient enrollments decreased but returned to the pre-pandemic baseline by study end.

Our findings align with previous reports detailing the adverse impact of COVID-19 on diabetes care and cancer screening in Ontario shortly after its onset (Moin et al. 2022;

FIGURE 2. Stratifications for colorectal cancer screening

Figure 2a: Colorectal cancer screening by sex

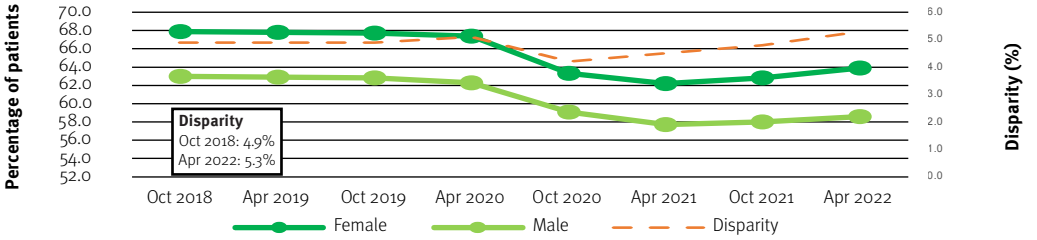


Figure 2b: Colorectal cancer screening by age

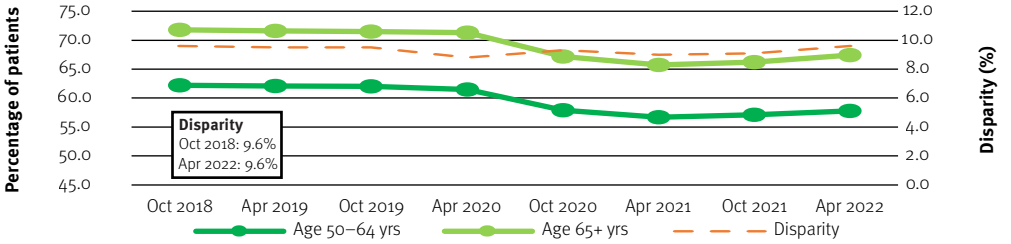
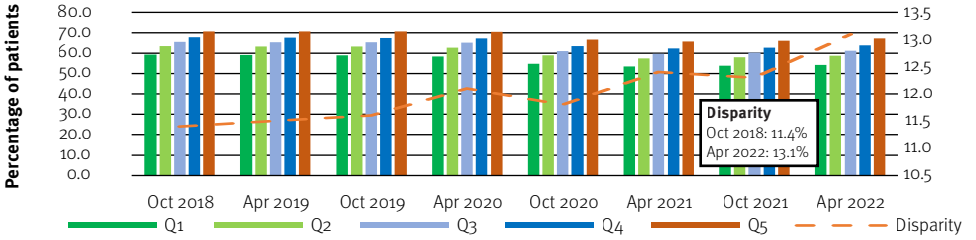


Figure 2c: Colorectal cancer screening by income quintile



Q = quarter.

Figure 2d: Colorectal cancer screening by rurality

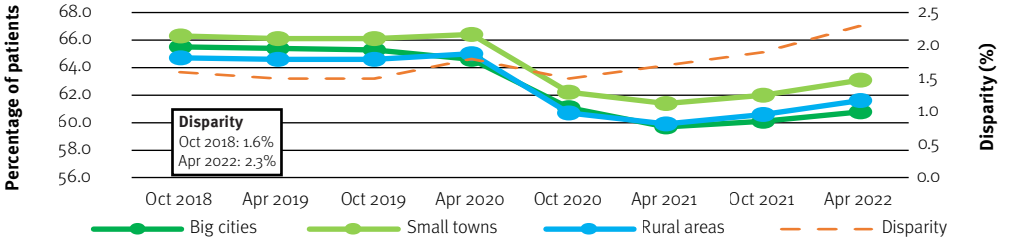


Figure 2e: Colorectal cancer screening by recent registration

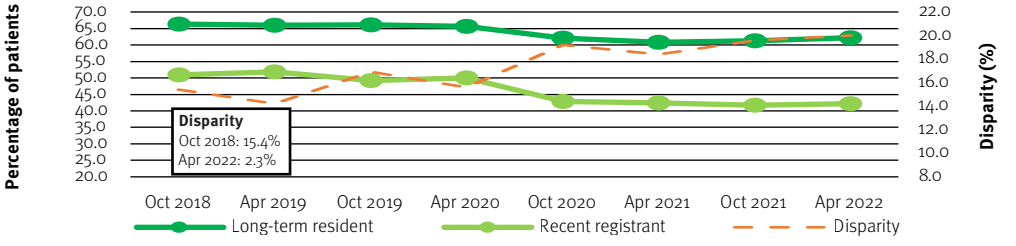


FIGURE 3. Stratifications for in-person visits for diabetes

Figure 3a: In-person follow up in diabetes patients by sex

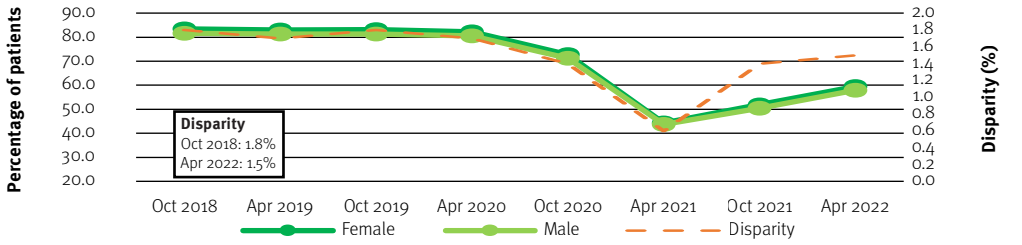


Figure 3b: In-person follow up in diabetes patients by age

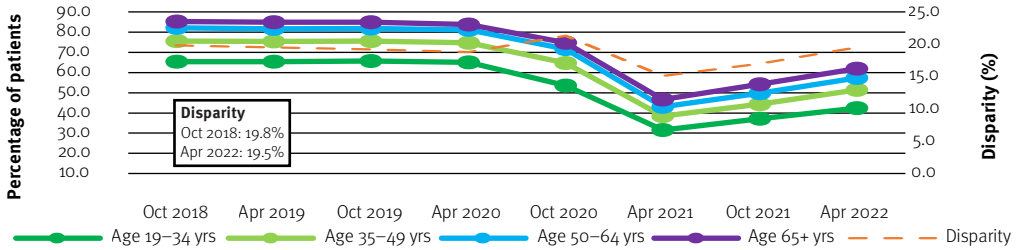
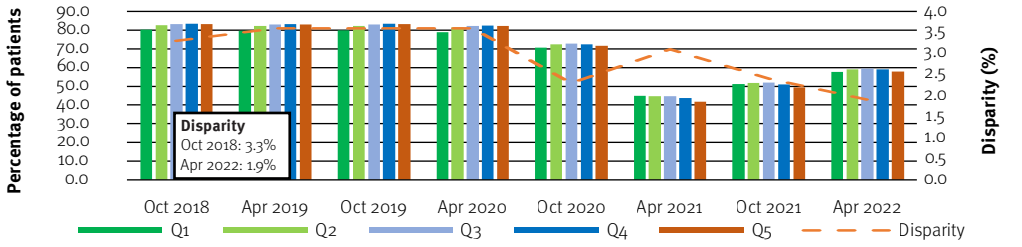


Figure 3c: In-person follow up in diabetes patients by income quintile



Q = quarter.

Figure 3d: In-person follow up in diabetes patients by rurality

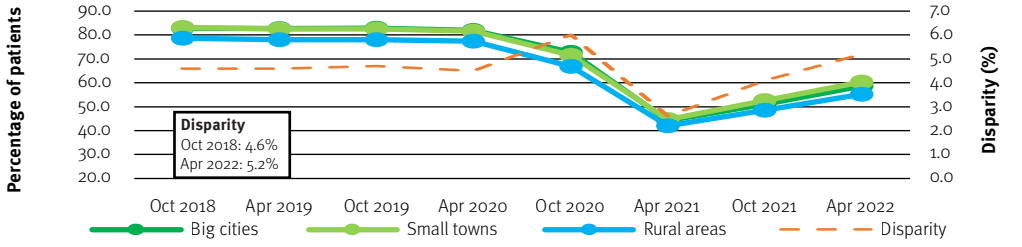
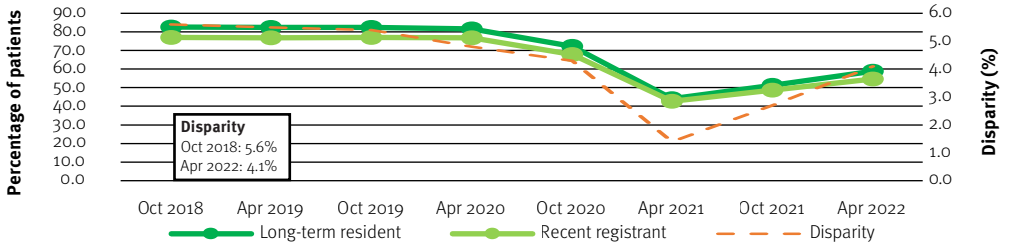


Figure 3e: In-person follow up in diabetes patients by recent registration



Walker et al. 2021). However, we could also demonstrate that such impacts have persisted for at least two years following the pandemic. Our findings also highlight the importance of targeted catch-up of preventive and chronic condition management that is contingent on in-person visits (Stephenson et al. 2021) in family practice and other outpatient settings, such as optometry offices. The total number of primary care visits rebounded to pre-pandemic levels by fall 2021, but 49% of the visits remained virtual (Kiran et al. 2023). The sustained drop in in-person visits is likely related to many factors, including provincial guidance, patient preferences for care given circulating COVID-19, availability of personal protective equipment and deferral of non-acute concerns (Glazier et al. 2021; Kiran et al. 2022).

It was reassuring that many aspects of care that did not require an in-person visit were maintained. For example, prescription patterns for opioids and statins remained stable and were not contingent on in-person visits. Colorectal cancer screening was an exception. Screening for colorectal cancer declined over the pandemic and most disparities widened despite a provincial screening program that distributes fecal immunochemical testing (FIT) via mail (Cancer Care Ontario n.d.); family physicians could assess the need for a FIT virtually and order a kit to be mailed to the patient's home. There were known disparities in colorectal cancer screening for new immigrants and people in low-income neighbourhoods even before the pandemic (Kiran et al. 2017). Reasons vary from competing priorities, histories of trauma, cultural norms to lack of access to primary care (Honein-AbouHaidar et al. 2016; Kiran et al. 2016; Lofters et al. 2020). The widening disparities underscore the importance of ensuring that catch-up efforts prioritize recent registrants, most of whom are new immigrants, and low-income neighbourhoods (Persaud et al. 2021; Vanden Bossche et al. 2023). Targeted approaches are also needed for males, those under 65 years of age, and people from rural areas given their relatively low screening rates. We found that the pandemic did not impact the elderly differently from younger patients, with minimal changes in disparities for both colorectal cancer screening and in-person visit for diabetes.

Data suggest that the number of people without a family doctor in Ontario has increased since the pandemic (Lavergne et al. 2023). Our study found that the percentage of new enrollments initially declined but went back to baseline. However, even the temporary decrease in new enrollments was likely enough to create a backlog of unattached patients. The pandemic may have also created more churn in the system, with more people moving, which may require an even higher proportion of new enrollments to keep people attached to primary care (Thomson Reuters 2022). In keeping with our study findings, recent data suggest that the number of patients without a regular family doctor in Ontario has increased substantially over the pandemic, from 1.8 million in 2020 to 2.3 million in 2023 (OCFP 2023). Research has also demonstrated that a lack of a regular family physician is a major determinant to receiving recommended preventive and chronic disease care and is worse for patients who have lower income or are new to Canada (Kiran et al. 2016). Improving attachment to primary care should be a key priority (Kiran 2022).

Limitations

This study had some limitations. We only had aggregate quality-of-care data available so were unable to do a patient-level analysis. We did not have sufficient time points to do a more rigorous statistical analysis for trend changes. We only assessed quality-of-care indicators that could be measured accurately using administrative data so were missing important aspects of care such as cervical cancer screening (some of which are processed in hospitals and not captured in administrative data), blood pressure readings and smoking counselling. We did not assess patient experience or outcomes or assess the specific impact of virtual visits on the quality of care. Finally, we did not have access to data from other provinces so could not assess whether people received care elsewhere – a possibility given out-of-province migration during the pandemic (Bruce 2022).

Conclusion

COVID-19 had a variable impact on primary care quality. Preventive and chronic disease care that was dependent on in-person visits declined but quality of care was maintained for aspects that were not dependent on in-person visits. An exception was colorectal cancer screening, which declined through the pandemic with worsening of existing disparities related to recent registration and income. Targeted catch-up efforts are needed to support marginalized groups in accessing recommended care and match unattached patients to a primary care clinician.

Funding and Acknowledgment

This study was supported by ICES, which is funded by an annual grant from the Ontario Ministry of Health (MOH) and the Ministry of Long-Term Care. This study also received funding from the Canadian Institutes of Health Research (CIHR) (Grant 201806SOP-417727). The open-access publication charge for this article was funded by a CIHR Grant WI3-179957. We thank IQVIA Solutions Canada Inc., for use of their drug information file. This document used data adapted from the Statistics Canada Postal CodeOM Conversion File, which is based on data licensed from Canada Post Corporation, and/or data adapted from the Ontario MOH Postal Code Conversion File, which contains data copied under licence from Canada Post Corporation and Statistics Canada. Parts of this material are based on data and information compiled and provided by the Ontario MOH, the Canadian Institute for Health Information and Ontario Health. The analyses, conclusions, opinions and statements expressed herein are solely those of the authors and do not reflect those of the funding or data sources; no endorsement is intended or should be inferred.

Correspondence may be directed to Tara Kiran by e-mail at tara.kiran@utoronto.ca.

References

Agency for Healthcare Research and Quality (AHRQ). 2022, December. Six Domains of Healthcare Quality. Retrieved July 15, 2024. <https://www.ahrq.gov/talkingquality/measures/six-domains.html>.

Bruce, G. 2022, October 26. A Visual Look at How Canadians Relocated During the Pandemic. *CBC News*. Retrieved July 15, 2024. <https://www.cbc.ca/news/canada/relocating-canada-pandemic-1.6630425>.

Cancer Care Ontario. n.d. Screening for Colorectal Cancer. Retrieved July 15, 2024. <https://www.cancercareontario.ca/en/types-of-cancer/colorectal/screening>.

Cauch-Dudek, K., J.C. Victor, M. Sigmond and B.R. Shah. 2013. Disparities in Attendance at Diabetes Self-Management Education Programs After Diagnosis in Ontario, Canada: A Cohort Study. *BMC Public Health* 13(1): 85. doi:10.1186/1471-2458-13-85.

Glazier, R.H., M.E. Green, F.C. Wu, E. Frymire, A. Kopp and T. Kiran. 2021. Shifts in Office and Virtual Primary Care During the Early COVID-19 Pandemic in Ontario, Canada. *CMAJ* 193(6): E200–10. doi:10.1503/cmaj.202303.

Honein-AbouHaidar, G.N., M. Kastner, V. Vuong, L. Perrier, C. Daly, L. Rabeneck et al. 2016. Systematic Review and Meta-Study Synthesis of Qualitative Studies Evaluating Facilitators and Barriers to Participation in Colorectal Cancer Screening. *Cancer Epidemiology, Biomarkers and Prevention* 25(6): 907–17. doi:10.1158/1055-9965.epi-15-0990.

Kiran, T. 2022. Keeping the Front Door Open: Ensuring Access to Primary Care for All in Canada. *CMAJ* 194(48): E1655–56. doi:10.1503/cmaj.221563.

Kiran, T., A. Eissa, D. Mangin, I. Bayoumi, N. Ivers, S. Newbery et al. 2022. Brief on Primary Care Part 1: The Roles of Primary Care Clinicians and Practices in the First Two Years of the COVID-19 Pandemic in Ontario. *Science Briefs of the Ontario COVID-19 Science Advisory Table* 3(67). doi:10.47326/ocsat.2022.03.67.1.0.

Kiran, T., R.H. Glazier, R. Moineddin, S. Gu, A.S. Wilton and L. Paszat. 2017. The Impact of a Population-Based Screening Program on Income- and Immigration-Related Disparities in Colorectal Cancer Screening. *Cancer Epidemiology, Biomarkers and Prevention* 26(9): 1401–10. doi:10.1158/1055-9965.epi-17-0301.

Kiran, T., M.E. Green, R. Strauss, C.F. Wu, M. Daneshvarfard, A. Kopp et al. 2023. Virtual Care and Emergency Department Use During the COVID-19 Pandemic Among Patients of Family Physicians in Ontario, Canada. *JAMA Network Open* 6(4): e239602. doi:10.1001/jamanetworkopen.2023.9602.

Kiran, T., A. Kopp and R.H. Glazier. 2016. Those Left Behind From Voluntary Medical Home Reforms in Ontario, Canada. *The Annals of Family Medicine* 14(6): 517–25. doi:10.1370/afm.2000.

Kiran, T., G. Moonen, O.K. Bhattacharyya, P. Agarwal, H.S. Bajaj, J. Kim et al. 2020. Managing Type 2 Diabetes in Primary Care During COVID-19. *Canadian Family Physician* 66(10): 745–47.

Kralj, B. 2000. Measuring "Rurality" for Purposes of Health Care Planning: An Empirical Measure for Ontario. *Ontario Medical Review* 67: 33–52.

Lavergne, M.R., A. Bodner, S. Allin, E. Christian, M. Hajizadeh, L. Hedden et al. 2023. Disparities in Access to Primary Care Are Growing Wider in Canada. *Healthcare Management Forum* 36(5): 272–79. doi:10.1177/08404704231183599.

Lofters, A.K., N.A. Baker, A. Schuler, A. Rau, A. Baxter, N.N. Baxter et al. 2020. A "Tea and Cookies" Approach: Co-Designing Cancer Screening Interventions With Patients Living With Low Income. *Journal of General Internal Medicine* 35(1): 255–60. doi:10.1007/s11606-019-05400-0.

Mangin, D., K. Premji, I. Bayoumi, N. Ivers, A. Eissa, S. Newbery et al. 2022. Brief on Primary Care Part 2: Factors Affecting Primary Care Capacity in Ontario for Pandemic Response and Recovery. *Science Briefs of the Ontario COVID-19 Science Advisory Table* 3(68). doi:10.47326/ocsat.2022.03.68.1.0.

Moin, J.S., N. Troke, L. Plumptre and G.M. Anderson. 2022. Impact of the COVID-19 Pandemic on Diabetes Care for Adults With Type 2 Diabetes in Ontario, Canada. *Canadian Journal of Diabetes* 46(7): 715–21. doi:10.1016/j.jcjd.2022.04.009.

Ontario College of Family Physicians (OCFP). 2023, November 7. More Than Four Million Ontarians Will Be Without a Family Doctor by 2026 [News]. Retrieved July 15, 2024. <https://Ontariofamilyphysicians.ca/News/More-than-Four-Million-Ontarians-Will-Be-without-a-Family-Doctor-by-2026/>.

Persaud, N., H. Woods, A. Workentin, I. Adekoya, J.R. Dunn, S.W. Hwang et al. 2021. Recommendations for Equitable COVID-19 Pandemic Recovery in Canada. *CMAJ* 193(49): E1878–88. doi:10.1503/cmaj.210904.

Personal Health Information Protection Act, S.O. 2004, c.3. Government of Ontario. Retrieved July 15, 2024. <https://www.ontario.ca/laws/statute/04p03>.

Ray, J.G., M.J. Vermeulen, M.J. Schull, G. Singh, R. Shah and D.A. Redelmeier. 2007. Results of the Recent Immigrant Pregnancy and Perinatal Long-Term Evaluation Study (RIPPLES). *CMAJ* 176(10): 1419–26. doi:10.1503/cmaj.061680.

Shuldiner, J., T. Kiran, P. Agarwal, M. Daneshvarfard, K. Eldridge, S. Kim et al. 2023. Developing an Audit and Feedback Dashboard for Family Physicians: User-Centered Design Process. *JMIR Human Factors* 10: e47718. doi:10.2196/47718.

Smith, G., H. Ouellette-Kuntz and M. Green. 2019. Comprehensive Preventive Care Assessments for Adults With Intellectual and Developmental Disabilities: Part 2: 2003 to 2014. *Canadian Family Physician* 65(Suppl_1): S53–58.

Starfield, B. 2009. Primary Care and Equity in Health: The Importance to Effectiveness and Equity of Responsiveness to Peoples' Needs. *Humanity and Society* 33(1–2): 56–73. doi:10.1177/016059760903300105.

Stephenson, E., D.A. Butt, J. Gronsbell, C. Ji, B. O'Neill, N. Crampton et al. 2021. Changes in the Top 25 Reasons for Primary Care Visits During the COVID-19 Pandemic in a High-COVID Region of Canada. *PLoS One* 16(8): e0255992. doi:10.1371/journal.pone.0255992.

Thomson Reuters. 2022, January 13. More People Leaving Toronto, Montreal for Smaller Pastures as Pandemic Hastens Urban Exodus. *CBC News*. Retrieved July 15, 2024. <https://www.cbc.ca/news/canada/urban-exodus-canada-toronto-montreal-covid-19-1.6313911>.

Upshaw, T.L., C. Brown, R. Smith, M. Perri, C. Ziegler and A.D. Pinto. 2021. Social Determinants of COVID-19 Incidence and Outcomes: A Rapid Review. *PLoS One* 16(3): e0248336. doi:10.1371/journal.pone.0248336.

Vanden Bossche, D., Q.J. Zhao, S. Ares-Blanco, M.P.A. Peña, P. Decat, N. Kondo et al. 2023. Addressing Health Inequity During the COVID-19 Pandemic Through Primary Health Care and Public Health Collaboration: A Multiple Case Study Analysis in Eight High-Income Countries. *International Journal for Equity in Health* 22(1): 171. doi:10.1186/s12939-023-01968-6.

Walker, M.J., O. Meggetto, J. Gao, G. Espino-Hernández, N. Jembere, C.A. Bravo et al. 2021. Measuring the Impact of the COVID-19 Pandemic on Organized Cancer Screening and Diagnostic Follow-Up Care in Ontario, Canada: A Provincial, Population-Based Study. *Preventive Medicine* 151: 106586. doi:10.1016/j.ypmed.2021.106586.