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Health Services, Management and Policy Research
Services de santé, gestion et recherche de politique

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Healthcare Policy/Politiques de Santé seeks to bridge the worlds of research and decision making by presenting research, analysis and information that speak to both audiences. Accordingly, our manuscript review and editorial processes include researchers and decision-makers.

We publish original scholarly and research papers that support health policy development and decision making in spheres ranging from governance, organization and service delivery to financing, funding and resource allocation. The journal welcomes submissions from researchers across a broad spectrum of disciplines in health sciences, social sciences, management and the humanities and from interdisciplinary research teams. We encourage submissions from decision-makers or researcher–decision-maker collaborations that address knowledge application and exchange.

While *Healthcare Policy/Politiques de Santé* encourages submissions that are theoretically grounded and methodologically innovative, we emphasize applied research rather than theoretical work and methods development. The journal maintains a distinctly Canadian flavour by focusing on Canadian health services and policy issues. We also publish research and analysis involving international comparisons or set in other jurisdictions that are relevant to the Canadian context.

Politiques de Santé/Healthcare Policy cherche à rapprocher le monde de la recherche et celui des décideurs en présentant des travaux de recherche, des analyses et des renseignements qui s'adressent aux deux auditoires. Ainsi donc, nos processus rédactionnel et d'examen des manuscrits font intervenir à la fois des chercheurs et des décideurs.

Nous publions des articles savants et des rapports de recherche qui appuient l'élaboration de politiques et le processus décisionnel dans le domaine de la santé et qui abordent des aspects aussi variés que la gouvernance, l'organisation et la prestation des services, le financement et la répartition des ressources. La revue accueille favorablement les articles rédigés par des chercheurs provenant d'un large éventail de disciplines dans les sciences de la santé, les sciences sociales et la gestion, et par des équipes de recherche interdisciplinaires. Nous invitons également les décideurs ou les membres d'équipes formées de chercheurs et de décideurs à nous envoyer des articles qui traitent de l'échange et de l'application des connaissances.

Bien que *Politiques de Santé/Healthcare Policy* encourage l'envoi d'articles ayant un solide fondement théorique et innovateurs sur le plan méthodologique, nous privilégions la recherche appliquée plutôt que les travaux théoriques et l'élaboration de méthodes. La revue veut maintenir une saveur distinctement canadienne en mettant l'accent sur les questions liées aux services et aux politiques de santé au Canada. Nous publions aussi des travaux de recherche et des analyses présentant des comparaisons internationales qui sont pertinentes pour le contexte canadien.

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EDITORIAL

The Mounting Opportunity Cost of Pivoting to COVID-19–Related Health Systems and Services Research

In 2020, the COVID-19 pandemic unexpectedly upended everyone's life, from sudden mass unemployment to family separations. In spite of this upheaval, health systems and services research carried on. Often, these efforts supported public health efforts to slow the spread of the virus.

We can agree that it has been vital for health systems and services research to provide leading-edge input into the year-long battle against COVID-19 and support the bench sciences that can halt the virus. For instance, studying the outsized impact of the virus on older or congregate-living Canadians needs to be measured and understood.

Yet, there is an opportunity cost of skilled and seasoned researchers and experts moving into COVID-19–related health systems and services research. Researchers, teams and centres "pivoting" to COVID-19 will slow needed research in other important areas of health systems and services research. Put simply, at what point do marginal gains to society start slowing as researchers allocate more time and effort into COVID-19–related health systems and services research?

At a system level, the Canadian Institutes of Health Research (CIHR) plays an important role in signalling research priorities. Through its calls for research and dispersing of research funds, the CIHR attracts skilled teams to its priority areas. To date, CIHR and other provincial funding agencies have dispensed significant amounts of funds to invest in COVID-19–related health systems and services research, and teams have pivoted away from their research priorities.

While COVID-19–related funds have been flowing out, there are no agencies keeping track of which health systems and services research teams and centres have pivoted to this research and away from other valuable research. Consequently, there are no – not even far-fetched – cost-benefit analyses weighing how "far" the health system and services research industry should transition into COVID-19–related research and postpone or abandon their

current pursuits. For its part, the CIHR is providing little leadership to the health systems and services research industry regarding where to invest time.

The readers of *Healthcare Policy* are predominantly Canadian healthcare policy makers, health systems and services researchers, students and the broader health services industry including all levels of government. For healthcare policy makers, irrespective of their role in municipal, regional, provincial and federal healthcare, the year 2020 provided few choices. Their efforts were directed to the new and growing threat.

The Choices Are Complex

Researchers and the broader health systems and services industry, on the other hand, faced a much more complicated set of choices: Should our activities pivot to COVID-19–related research, or should we continue with our existing research? From my perspective, I have seen many teams and centres newly focus their expertise and efforts on COVID-19; these are now being seen as COVID-19–related research outputs.

Researchers' responses to the research and financial incentives will unfold over time. Their calculus is complex: balancing the sunk costs of their current program of research with pursuing new opportunities afforded by the massive disruption in provinces' health delivery networks and research funding being poured into COVID-19–related projects.

COVID-19 was wholly unexpected. However, someone or some agency should be concerned about the balance between the short-term and long-term priorities of health systems and services research; a number of chronic diseases, and cancer, are still responsible for far more deaths than COVID-19, and there is much valuable work to be done in other areas.

This issue of *Healthcare Policy* includes very little content that explores the direct effects of COVID-19 on Canadian healthcare. Thus, while future issues of *Healthcare Policy* may be overrun with submissions pertaining to COVID-19–related health systems and services research, we will strive to ensure that there is a balance of topics.

I invite comments from readers regarding all topics related to *Healthcare Policy*, including my editorials. I can be reached directly at jason.sutherland@ubc.ca.

This Issue of *Healthcare Policy*

This issue of *Healthcare Policy* is led by an article in the "Discussion and Debate" section discussing the gap in the provinces' provision, or insuring, of treatments for common mental disorders. Vasiliadis et al. (2021) make two points: first, psychological services are effective for treating mental disorders; and second, there is a body of research demonstrating that public spending in mental health services is cost-effective. The article concludes that, based on the current evidence, provinces should pursue options for funding unmet needs for mental health services.

In a rejoinder to this article, Lemire and Chomienne (2021) reaffirm the significant need for mental health services across Canada while providing insights into the role of

complementary healthcare services, such as pharmacotherapies. The authors conclude that: first, psychological therapies should be integrated within multidisciplinary teams; and, second, public funding should weigh the benefits of expanding to other services, such as dental and eye care.

This issue features a second "Discussion and Debate" article that challenges the current conversations regarding privately insured healthcare. In their article, Lee et al. (2021) present evidence that a higher rate of private insurance/financing of healthcare is associated with poorer equity, less accessibility and poorer quality of care. The article concludes that the debate regarding the role of privately insured healthcare, such as being held currently in Alberta, should be refocused to pursue reforms to the *Canada Health Act* (Government of Canada 2020).

A rejoinder to this article focuses on the primacy of engaging physicians to lead provincial healthcare reforms. Written by Quinn and Manns (2021), this article points to experimentation occurring in non-Canadian health systems that blends physician-focused reform – including leadership – with health system governance, funding and accountability reforms as a possible model for provinces to follow. The article concludes by emphasizing that significant health system reforms are needed, private healthcare is not disappearing and physician engagement is critical to improving value from public funding of healthcare.

Research Papers

In an empirical study based on Ontario, O'Neill et al. (2021) apply the High Resource User Population Risk Tool to model the likelihood of a resident becoming a future high-cost user of healthcare. Using data gathered by the Canadian Community Health Survey, the model is applied to measure how population health interventions aimed at specific groups impact the probability of a resident becoming a high-cost user (Statistics Canada 2018). This research provides a framework for estimating the population impact of public health interventions with specific applications to provincial government policy makers and Ontario Health Team leaders.

In their article, Allana and Pinto (2021) argue that paramedics represent an underutilized resource for resource-constrained provinces. The authors describe that trends in paramedicine now extend service to medical, social and environmental assessments in homes and other conjugate settings in the community without transport to a hospital. The authors present that, with changes to education, culture and governance of paramedicine, paramedics are well-placed to integrate the social determinants of health into their practice, and help bridge the chasm between healthcare and social care providers at the community level.

With a qualitative multiple-case study design in a sample of Ontario hospitals, Heenan and Mulvale (2021) identify factors associated with hospitals' secondary disclosure of critical incidents. The study found that a range of factors positively affect disclosure discussions, including multidisciplinary teams, offering choices of locations, timeliness, providing written documentation, providing support for clinicians and linkages with supportive external

partners. The study concludes that for hospital leaders, there are a number of concrete steps available to support critical incident disclosure.

The demand for life-saving and expensive chimeric antigen receptor (CAR) T-cell therapy is expected to grow substantially in provinces. Ellis et al. (2021) conducted a qualitative study among Canadian stakeholders to explore issues associated with the availability of CAR T-cell therapy. The authors report three challenges that need to be overcome: high cost, limited capacity to administer CAR T-cell therapy in hospitals and limited evidence of long-term efficacy. With these challenges in mind, the authors offer a number of recommendations for overcoming the barriers to long-term CAR T-cell therapy availability across Canada.

An article by Grierson and Vanstone (2021) explores factors associated with the allocation of medical school admissions based on student's province or territory of residence. The article presents evidence that based on population statistics, there are potentially undesirable disparities in access to medical school admissions between provinces. The article proposes that future research should explore whether medical school admissions policies align with health human resource goals of the provinces in which the medical schools operate.

The final article of this issue by Widdifield et al. (2021) is an Ontario-based study of the rheumatology workforce. The population-based results found that over time, rheumatologists were, on average, unequally distributed across Ontario, of increasing age and increasingly female. The article concludes that a multifactorial strategy is needed to address long wait times for rheumatology, including the expansion of multidisciplinary models of care and the geographic distribution of rheumatologists across the province.

JASON M. SUTHERLAND, PhD
Editor-in-Chief

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ÉDITORIAL

Augmentation des coûts de renonciation liés à un pivotement vers la recherche sur les systèmes et services de santé liée à la COVID-19

En 2020, la pandémie de COVID-19 a bouleversé de manière inattendue la vie de tous et toutes, du soudain chômage de masse aux séparations familiales. Malgré ce bouleversement, la recherche sur les systèmes et services de santé se poursuit. Souvent, ces travaux ont permis de soutenir les efforts de santé publique pour ralentir la propagation du virus.

On convient qu'il est vital pour la recherche sur les systèmes et services de santé de fournir une contribution de pointe dans la bataille contre la COVID-19 et de soutenir les travaux de laboratoire qui peuvent aider à freiner le virus. Par exemple, l'impact démesuré du virus sur les Canadiens plus âgés ou vivant en résidence doit être mesuré et compris.

Pourtant, il y a un coût de renonciation pour les chercheurs qualifiés qui se lancent dans la recherche sur les systèmes et services de santé liée à la COVID-19. Les chercheurs, équipes et centres qui « pivotent » vers la COVID-19 ralentiront les projets de recherche dans d'autres domaines importants. En termes simples, à quel moment les gains marginaux pour la société commenceront-ils à ralentir pendant que les chercheurs consacrent plus de temps et d'efforts à la recherche liée à la COVID-19?

Au niveau du système, les Instituts de recherche en santé du Canada (IRSC) jouent un rôle important dans la signalisation des priorités de recherche. Par leurs appels de propositions de recherche et grâce à l'octroi de fonds de recherche, les IRSC attirent des équipes qualifiées dans leurs domaines prioritaires. À ce jour, les IRSC et d'autres organismes provinciaux de financement ont consacré d'importantes sommes dans la recherche sur les systèmes et les services de santé liée à la COVID-19, et les équipes se sont ainsi éloignées de leurs priorités de recherche.

Alors que les fonds liés à la COVID-19 sont octroyés, aucune agence ne garde la trace des équipes ou centres de recherche qui se sont réorientés vers ce type de recherche en s'éloignant d'autres projets de recherche utiles. Par conséquent, il n'y a pas – ni même l'ombre – d'analyses coûts-avantages qui évaluent dans quelle mesure le secteur de la recherche sur

les systèmes et services de santé devrait s'orienter vers la recherche liée à la COVID-19 et reporter ou abandonner les activités en cours. Pour leur part, les IRSC ne font guère preuve de leadership dans l'industrie de la recherche sur les systèmes et services de santé en ce qui concerne les investissements en temps.

Le lectorat de *Politiques de Santé* est principalement constitué de décideurs canadiens en matière de politiques de santé, de chercheurs sur les systèmes et services de santé, d'étudiants et du secteur des services de santé en général, notamment tous les paliers de gouvernement. Pour les décideurs en matière de politiques de santé, quel que soit leur rôle dans les services de santé municipaux, régionaux, provinciaux ou fédéraux, l'année 2020 ne leur a guère donné de choix. Les efforts sont dirigés vers la menace nouvelle et croissante.

Des choix complexes

Pour leur part, les chercheurs ainsi que les systèmes et l'industrie de la santé ont été confrontés à des choix beaucoup plus complexes : les activités devraient-elles pivoter vers la recherche liée à la COVID-19 ou est-il préférable de poursuivre les projets de recherche en cours? Personnellement, j'ai récemment vu de nombreuses équipes et centres recentrer leur expertise et leurs efforts sur la COVID-19; le résultat de leur travail est désormais considéré comme de la recherche liée à la COVID-19.

La réponse des chercheurs aux incitatifs de recherche et financiers évolueront avec le temps. L'équation est complexe : équilibrer les coûts irrécupérables de leur programme de recherche actuel tout en s'intéressant aux nouvelles possibilités qui découlent d'une forte perturbation des réseaux provinciaux de prestation de soins ainsi que du financement accordé aux projets de recherche liés à la COVID-19.

La COVID-19 était certainement inattendue. Cependant, quelqu'un ou une agence devrait se préoccuper de l'équilibre entre les priorités de recherche à court terme et celles à plus long terme; un certain nombre de maladies chroniques, ainsi que le cancer, sont toujours responsables de bien plus de décès que la COVID-19 et il y a beaucoup de travail à accomplir dans d'autres domaines.

Ce numéro de *Politiques de Santé* présente peu de contenu qui explore les effets directs de la COVID-19 sur les soins de santé au Canada. Ainsi, bien que les numéros à venir risquent d'être submergés de soumissions relatives à la COVID-19, nous nous efforcerons de garantir un équilibre des sujets.

J'invite les lecteurs à commenter tous les sujets présentés dans *Politiques de Santé*, y compris mes éditoriaux. On peut me joindre directement à jason.sutherland@ubc.ca.

Dans le présent numéro de *Politique de Santé*

Ce numéro de *Politique de Santé* s'ouvre avec un article de la section « Discussions et débats » qui traite de l'écart dans la fourniture – ou l'assurance – par les provinces de traitements pour les troubles mentaux courants. Vasiliadis et coll. (2021) soulignent deux points :

premièrement, les services psychologiques sont efficaces pour traiter les troubles mentaux et, deuxièmement, un corpus de recherches démontre que les dépenses publiques dans les services de santé mentale sont rentables. L'article conclut que, sur la base des données actuelles, les provinces devraient rechercher des options pour financer les besoins non satisfaits en matière de services de santé mentale.

Dans une réplique à cet article, Lemire et Chomienne (2021) réaffirment le besoin important de services de santé mentale partout au Canada tout en donnant un aperçu du rôle des services de santé complémentaires, comme les pharmacothérapies. Les auteurs concluent, en premier lieu, que les thérapies psychologiques devraient être intégrées au sein d'équipes multidisciplinaires et, en deuxième lieu, que le financement public devrait soupeser les avantages d'une extension à d'autres services, tels que les soins dentaires et oculaires.

Le présent numéro contient un deuxième article dans la section « Discussions et débats », lequel remet en question le discours actuel concernant l'assurance par le secteur privé des services de santé. Dans leur article, Lee et coll. (2021) présentent des données indiquant qu'un taux plus élevé d'assurance ou de financement privé des services de santé est associé à une moindre équité, à une moindre accessibilité et à une qualité de soins plus médiocre. L'article conclut que le débat sur le rôle du secteur privé pour assurer les soins de santé, comme celui qui a lieu actuellement en Alberta, devrait se recentrer sur la poursuite des réformes prévues à la Loi canadienne sur la santé (Gouvernement du Canada 2020).

Une réplique à cet article met l'accent sur l'importance de l'engagement des médecins à diriger les réformes provinciales des soins de santé. Rédigé par Quinn et Manns (2021), cet article met en évidence l'expérimentation en cours dans des systèmes de santé non canadiens. Ces expériences allient une réforme axée sur les médecins – y notamment la question du leadership – avec des réformes de la gouvernance, du financement et de la responsabilisation des systèmes de santé. L'article conclut en soulignant que des réformes importantes sont nécessaires, que les soins de santé privés ne disparaîtront pas et que l'engagement des médecins est essentiel pour améliorer la valeur du financement public des soins de santé.

Rapports de recherche

Dans une étude empirique menée en Ontario, O'Neill et coll. (2021) appliquent l'outil d'évaluation de risque des grands utilisateurs de ressources pour modéliser la probabilité qu'un résident devienne un éventuel utilisateur de services de santé coûteux. À l'aide des données recueillies par l'Enquête sur la santé dans les collectivités canadiennes, le modèle sert à mesurer à quel point les interventions de santé visant des groupes spécifiques ont une incidence sur la probabilité qu'un résident devienne un utilisateur coûteux (Statistique Canada, 2018). Cette recherche fournit un cadre pour estimer l'impact sur la population des interventions de santé publique avec des applications spécifiques pour les décideurs des gouvernements provinciaux et pour les chefs des équipes Santé Ontario.

Dans leur article, Allana et Pinto (2021) soutiennent que les ambulanciers paramédicaux représentent une ressource sous-utilisée pour les provinces dont les ressources sont limitées.

Les auteurs décrivent que les tendances en paramédecine étendent désormais les services aux évaluations médicales, sociales et environnementales à domicile et dans d'autres contextes communautaire sans besoin de transport vers un hôpital. Les auteurs indiquent qu'avec les changements dans l'éducation, la culture et la gouvernance de la paramédecine, les ambulanciers paramédicaux sont bien placés pour intégrer les déterminants sociaux de la santé dans leur pratique et aider à combler l'écart entre les prestataires de soins de santé et les prestataires de services sociaux au niveau communautaire.

Grâce à une étude qualitative de cas multiples auprès d'un échantillon d'hôpitaux de l'Ontario, Heenan et Mulvale (2021) identifient les facteurs associés à la divulgation secondaire des incidents graves par les hôpitaux. L'étude révèle qu'une série de facteurs influent positivement sur les discussions liées à la divulgation, y compris dans les équipes multidisciplinaires, offrant des choix de lieux, un temps opportun, la fourniture de documentation, le soutien aux cliniciens et les partenaires externes de soutien. L'étude conclut qu'un certain nombre de mesures concrètes sont disponibles pour les dirigeants d'hôpitaux afin de soutenir la divulgation des incidents graves.

On s'attend à une augmentation considérable de la demande pour la thérapie par lymphocytes T à récepteur antigénique chimérique (thérapie CAR-T), qui permet de sauver des vies et coûte cher. Ellis et coll. (2021) ont mené une étude qualitative auprès d'intervenants canadiens pour explorer les enjeux liés à la disponibilité de la thérapie CAR-T. Les auteurs rapportent trois défis à surmonter : le coût élevé, la capacité limitée à administrer la thérapie CAR-T dans les hôpitaux et le peu de données quant à son efficacité à long terme. Avec ces défis à l'esprit, les auteurs proposent des recommandations pour surmonter les obstacles à la disponibilité à long terme de la thérapie CAR-T au Canada.

Un article de Grierson et Vanstone (2021) explore les facteurs associés à l'attribution des admissions aux facultés de médecine en fonction de la province ou du territoire de résidence de l'étudiant. L'article présente des données qui indiquent que, selon les statistiques démographiques, il y a des disparités potentiellement indésirables entre les provinces quant à l'accès aux facultés de médecine. L'article propose que les recherches futures examinent si les politiques d'admission dans les facultés de médecine s'alignent sur les objectifs de ressources humaines en santé des provinces dans lesquelles les facultés de médecine se trouvent.

Le dernier article de ce numéro, présenté par Widdifield et coll. (2021), est une étude ontarienne sur la main-d'œuvre en rhumatologie. Les résultats basés sur la population ont révélé qu'au fil du temps, les rhumatologues étaient, en moyenne, inégalement répartis en Ontario, d'âge croissant et de plus en plus composés de femmes. L'article conclut qu'une stratégie multifactorielle est nécessaire pour faire face aux longs délais d'attente pour la rhumatologie, y compris l'expansion des modèles de soins multidisciplinaires et la répartition géographique des rhumatologues à travers la province.

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Public Funding of Evidence-Based Psychotherapy for Common Mental Disorders: Increasing Calls for Action in Canadian Provinces

Financement public de la psychothérapie fondée sur les données probantes pour les troubles mentaux courants : appels à l'action croissants dans les provinces canadiennes

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Abstract

Canada's provinces are without a publicly funded psychotherapy program for common mental disorders despite evidence that psychological services help reduce the length and number of depressive episodes, symptoms of post-traumatic stress and associated negative outcomes (hospitalizations and suicide attempts). Studies also show that including psychological services as part of the service package offered under the public health plan for those without access pays for itself. We posit that a publicly funded psychotherapy program in Canada, including digitized self-guided psychotherapy platforms for common mental disorders, will lead to improved population health useful in the COVID-19 context and beyond.

Résumé

Les provinces canadiennes n'ont pas de programme de psychothérapie financé par l'État pour les troubles mentaux courants, et ce, malgré les données indiquant que les services psychologiques permettent de réduire la durée et le nombre d'épisodes dépressifs, les symptômes de stress post-traumatique ainsi que les résultats négatifs qui y sont associés (hospitalisations et tentatives de suicide). Des études montrent qu'il est rentable d'inclure les services psychologiques dans le régime public d'assurance maladie pour les personnes qui y ont un accès restreint. Nous argumentons qu'un programme de psychothérapie canadien financé par l'État, y compris des plateformes numériques de psychothérapie autogérée pour les troubles mentaux courants, entraînerait une amélioration de la santé de la population utile dans le présent contexte de la COVID-19 et au-delà.

Background

In a recent Commonwealth Fund study, Canada ranked second with 26% of adults "experiencing stress, anxiety, or great sadness that is difficult to cope with alone since the COVID-19 outbreak started" (Williams II et al. 2020). Among Canadians needing and wanting care, only 47% received help (Williams II et al. 2020). This has left close to 5.2 million Canadians in need of mental healthcare. Pandemic-related effects include significant increases in symptoms of post-traumatic stress, insomnia, depression and anxiety (Brooks et al. 2020; Ettman et al. 2020; Rossi et al. 2020). This can have devastating consequences on suffering, disability and suicide behaviours, leading to considerable health system and societal costs. Before the pandemic, up to 20% of Canadians lived with a mental or substance use disorder (MHCC 2017) and 17% reported a need for mental health care, of which one in four reported an unmet need for psychotherapy/counselling (Sunderland and Findlay 2013).

On May 6, 2020, the Québec government announced an investment of $31.1 million for the implementation of a mental health action plan designed to address the rising psychological distress due to the COVID-19 pandemic (Gouvernement du Québec 2020a, 2020b). This plan aimed to improve access to timely mental healthcare by hiring 300 psychologists from the private sector into the public sector, improve the 811 mental health lines and provide grief services (Gouvernement du Québec 2020a). On November 2, 2020, the Ministry

of Health and Social Services announced $25 million to buy mental health services from the private sector to improve waiting lists for psychological therapies for college and university students, and $10 million for those waiting for mental health services in the public sector (MSSS 2020a). These follow an announcement made by the government in December 2017 of a $35-million investment to launch the first public psychotherapy program in Québec (Association des psychothérapeutes du Québec 2017). Québec's *Institut national d'excellence en santé et en services sociaux* had published three reports on the effectiveness and costs of equitable access to psychotherapy services (Fansi and Jehanno 2015a; Fansi and Jehanno 2015b; Lapalme et al. 2017; Lapalme et al. 2018). In May 2018, a pilot phase of the new "Quebec Program for Mental Disorders: From Self-Care to Psychotherapy" got underway to test the guidelines for depression in children and adolescents, and generalized anxiety and panic disorder in adults. The program's launch was scheduled for the fall of 2019 (MSSS 2020b). In November 2017, the Ontario Health Technology Advisory Committee recommended in their economic evaluation (Health Quality Ontario 2017) that structured psychotherapy offered by nonphysicians be publicly funded for common mental disorders. The Ontario government had announced $72.6 million in funding over three years to support psychotherapy programs. In March 2020, the Ontario government announced an additional $20 million to increase access to mental health services (Anderssen 2020), one such being the Ontario Structured Psychotherapy program, providing short-term, face-to-face cognitive behavioural therapy (CBT) for adults (Health Quality Ontario 2017; Ontario 2020a). During the COVID-19 pandemic, Ontario and Manitoba also expanded access to virtual mental health therapies for their residents, such as the internet-based CBT programs *MindBeacon* and *AbilitiCBT* (Manitoba 2020; Ontario 2020b). In October 2020, Manitoba increased access to cover two virtual counselling sessions for their residents until the end of 2021 (Manitoba 2020).

Key Messages

Findings from the literature can be summarized into the following:

1) Studies show that for every dollar invested in covering psychological services in Canada, two dollars in savings for society over the longer term can be generated. Yet, Canada, unlike many other nations, does not have a publicly financed evidence-based psychotherapy program for common mental disorders in primary care.
2) In the context of the COVID-19 pandemic, one may argue that the return on investment of publicly funded psychological services for the healthcare system and the society would be greater than the amount invested by governments.
3) Digitized self-guided psychotherapy platforms for common mental disorders are effective treatment options and require less personnel time and public spending.
4) Population coverage of both medications and psychotherapy for the treatment of mental disorders under a public or private insurance plan will lead toward equitable access to mental health services for all Canadians.

Publicly Funded Psychotherapy Is Cost-Effective

Increased access to mental health treatment and psychological services is associated with reduced disability and negative outcomes due to mental illness and suicide behaviours, and improved health-related quality of life (Mavranezouli et al. 2020; Vasiliadis et al. 2015; Vasiliadis et al. 2017). This can translate to lower health system costs associated with reduced outpatient and in-patient visits, reduced loss of productivity due to absenteeism and presenteeism and short- and long-term disability. Funding psychological services in Canada can lead to societal savings over the long term (Vasiliadis et al. 2017). In other words, including psychological services, such as psychotherapy, as part of the treatment package offered under a province's public health plan for those without access pays for itself (Vasiliadis et al. 2017).

In the backdrop of the potential economic and social benefits, why is the increase in public financing of psychotherapy for common mental disorders a one-time response to COVID-19? Calculations show that the $35-million investment by the Québec government would cover 48,077 individuals – representing only 0.6% of the population – to receive, from psychologists and psychotherapists, an eight-session treatment plan of consultations at an average of $91 per session (CNESST 2021; SAAQ 2020).

Compared with Australia and the UK – countries with similar general practitioner (GP) gatekeeper systems – Canada has failed to implement policy responses to improve public access to psychotherapy for common mental disorders in primary care (Vasiliadis and Dezetter 2015). As of 2019, the Better Access program in Australia, whereby GPs are able to prescribe psychotherapy to patients, had registered 22,577 psychologists and allied health professionals (e.g., social workers, occupation therapists and nurses) to offer psychological services under the Medicare benefits schedule. The latest Australian annual report shows that 1.4 million individuals received close to 5.9 million mental health services under this program (AIHW 2020). At an average fee of $127 per consultation (Medicare Benefits Schedule: items 80010 – psychological therapy services and 80110 – focussed psychological strategies), this translates into an annual expenditure of $749 million in covering up to 5.5% of the Australian population. The cost-effectiveness and significant health improvements in the severity of psychological distress, depression and anxiety associated with Better Access have been previously reported (Pirkis et al. 2011). In the context of the ongoing COVID-19 pandemic, where many experience distress (Brooks et al. 2020; United Nations 2020; Williams II et al. 2020), one may argue the avoided healthcare costs and related disability to be greater than the amount invested by provincial governments (Dezetter et al. 2013; Vasiliadis et al. 2017).

The UK's Improving Access to Psychological Therapies (IAPT) has thus far trained close to 10,500 therapists to offer psychological treatments (Clark 2018; Community and Mental Health Team, HSCIC 2014). Recent reports from the National Health Services (NHS) in the UK show 57,814 referrals to IAPT in April 2020, with 86% of individuals

starting treatment within six weeks (NHS Digital 2020d). The average number of sessions was 6.7, which is similar to previous NHS reports. Among individuals who completed treatment in April 2020, 47% had recovered (NHS Digital 2020d) as compared to 51% (NHS Digital 2020b) and 48% (NHS Digital 2020c) in February and March 2020, respectively. Investments in IAPT aim to expand access by 25%, representing close to 1.5 million individuals each year by 2021 (Mental Health Taskforce 2016). To ensure access to and continuity of services during the imposed COVID-19 physical distancing measures, the NHS also published a guide for the offering of IAPT services remotely by telephone, video-conferencing, written support, digitally enabled programs, etc (NHS 2020a).

Internet-delivered psychotherapy for common mental disorders has been shown to produce similar effects as face-to-face therapy (Carlbring et al. 2018); yet, they require much less of the therapist's time (Andrews et al. 2018). Two online platforms providing digitized psychotherapy include BounceBack and This Way Up. BounceBack, a low-intensity intervention, is freely available for residents in British Columbia and Ontario and helps youth and adults manage moderate depression, anxiety, stress and worry (https://bouncebackbc.ca; https://bouncebackontario.ca/). Primary care staff including GPs can refer patients to BounceBack. The program includes videos and workbooks to encourage change in thinking patterns and coaching by trained psychologists (Lau and Davis 2019). Data collected over six years (2008–2014) show significant reductions in symptoms of depression and anxiety, with 3,794 program participants reporting no clinical symptoms post-treatment with a recovery rate of 69% (Lau and Davis 2019). This Way Up was created by Australian clinicians and funded by the Australian Government's Department of Health and Ageing to provide online learning programs and education on anxiety, depressive disorders and physical health (https://thiswayup.org.au/). As of 2015, over 9,700 patients participated in This Way Up courses, with a cost averaging $59 for six lessons. Clinicians can refer patients to This Way Up, and once signed up, patients have access to the courses, exercises and support of healthcare professionals. Through this program, healthcare professionals can monitor patients' symptoms and intervene, should it be necessary, based on pre-established clinical criteria via validated mental health scales. This Way Up reduced symptoms in patients compared to those on waiting lists, and results are comparable to those from psychological treatment offered in person (Ashford et al. 2016). These digitized programs may lead to timely access to evidence-based psychotherapy for people with common mental disorders by better matching service need with service intensity, leading to improved efficiency (Lau and Davis 2019).

Ensuring Equitable and Timely Access to Effective Publicly Funded Psychotherapy in Canada

This unprecedented crisis is forcing us all to better understand not only the importance of mental health in overcoming the devastating effects of the pandemic but also the flaws in our delivery of mental health services. In the backdrop of a system already bottlenecked, how

will we ensure timely access and who will be given priority? The following question remains: Why is there skepticism around publicly financing evidence-based psychotherapy for common mental disorders in primary care?

With Australia and the UK as examples, each Canadian province should publicly finance the currently unmet mental health service needs for psychotherapy/counselling of their residents annually, which on average is estimated to reach 4.3% of their total population. The workforce across provinces for the adequate provision of mental health services within primary care from GPs, psychologists and allied mental health professionals is reported in the *Mental Health In Your Pocket 2019* report (IHE 2019). The psychologist workforce in Canada is 49 per 100,000 population, ranging between 16 and 95 per 100,000 population in Manitoba and Québec. Latest available data show that for registered nurses working directly in mental healthcare, the average in Canada is 40 per 100,000 population, with a range between 20 and 70 per 100,000 population in Saskatchewan and Newfoundland and Labrador. The estimated workforce of social workers in Canada is 146 per 100,000 population, with the lowest in British Columbia and the highest in Newfoundland and Labrador at 87 and 286 per 100,000 population, respectively. Finally, a Canadian Institute for Health Information (2021) report shows that the lowest and highest rate of the GP workforce in provinces ranges between 110 and 137 per 100,000 population in Manitoba and New Brunswick. When comparing our GP workforce to other countries, the rates are 160 and 80 per 100,000 population in Australia and the UK, respectively (Papanicolas et al. 2019). Despite the presence of some differences between these countries, the latest figures show that each province has the overall trained workforce necessary to start planning for some initial coverage of publicly funded psychotherapy.

Conclusion and Recommendations

To ensure patient-centred care and the efficiency of the health system, psychotherapy should be offered as a mixture of face-to-face and virtual therapies that include self-guided treatments and those guided by health professionals online. In the COVID-19 context, we are given a unique opportunity to rethink and contribute to the ongoing discussion surrounding the *Canada Health Act* for the provision of mental health treatments, such as structured psychotherapy provided by nonphysicians, for example, psychologists and allied mental health professionals (Government of Canada n.d.).

Québec's universal drug insurance plan implemented in 1997 should be used as an example, where, by law, each resident is covered under either a private employer or insurer, or the public drug insurance plan (Régie de l'assurance maladie du Québec). In Québec, as in other Western countries, medications are the most economically viable treatment option for most, thereby ignoring patient treatment preferences (Clark 2018; Marcus and Olfson 2010; McManus et al. 2016). For example, close to 67% of Canadians hold private insurance allowing for additional drug and health service coverage (Papanicolas et al. 2019). This leaves

12.4 million Canadians without private or employer insurance giving access to psychological services, such as psychotherapy, suggesting significant limitations in equitable access to quality mental health services that can efficiently meet the health needs of Canadians while providing safe, effective and person-centred healthcare. A well-performing health system can only be achieved when every Canadian is covered for not only medical services but also mental health services, and this, within a responsive health system that ensures continuity and fluidity from primary to specialized care and back to primary care. Insuring Canadians for both medications and psychological services under a public or private insurance plan would help move provincial health systems forward in providing equitable access to mental health services.

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Commentary: Time to Improve Access to Psychotherapies – A Family Medicine Perspective

Commentaire : Le temps est venu d'améliorer l'accès aux psychothérapies – point de vue de la médecine familiale

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Abstract

The COVID pandemic – despite the dire economic and personal toll on all Canadians – is helping us move forward. It bears light on the most vulnerable. Indeed, it has aggravated the mental health of those with such disorders as anxiety or depression and revealed the precarity of our mental well-being. The health system, and most particularly our primary care system, is overwhelmed and its capacity to answer to the mental healthcare of Canadians is put to the test. It is, therefore, time for family physicians to be able to find support in various ways and means to answer the needs of their patients. This support may be through public coverage to psychotherapies, which has been proven effective in Australia and the UK since the last decade, or open access to various validated web-based tools offering cognitive behavioural therapies for the most common mental health disorders in both official languages.

Résumé

Malgré des conséquences économiques et personnelles désastreuses pour tous les Canadiens, la pandémie de COVID présente l'occasion d'aller de l'avant. Elle met au jour les plus vulnérables. En effet, la pandémie a aggravé la santé mentale de ceux qui souffrent de troubles tels

que l'anxiété ou la dépression et a révélé la précarité de notre bien-être mental. Le système de santé, et plus particulièrement le système de soins primaires, est débordé et sa capacité à répondre aux besoins en santé mentale des Canadiens est mise à rude épreuve. Il est temps que les médecins de famille soient en mesure de trouver du soutien sous divers formes et moyens afin de répondre aux besoins de leurs patients. Ce soutien peut prendre la forme d'une couverture publique des psychothérapies – laquelle s'est avérée efficace en Australie et au Royaume-Uni depuis une dizaine d'années – ou d'un accès libre à divers outils Web validés qui proposent des thérapies cognitivo-comportementales pour les troubles de santé mentale les plus courants, dans les deux langues officielles.

Introduction

The evidence submitted to inform this article (Vasiliadis et al. 2021) reminds us that the time has come to support public coverage of psychological therapies by qualified professionals, with appropriate parameters to frame such coverage. The COVID-19 pandemic has exacerbated gaps in mental healthcare for several populations, including additional needs for mental health support for healthcare providers and front-line workers.

Discussion

The burden of mental illness on all sectors of society has been very significant: (1) One in five Canadians will experience a mental illness in their lifetime (WHO 2019). (2) Five of the 10 leading causes of disability worldwide are mental disorders (Douglas Foundation 2021; Vigo et al. 2016). (3) Twenty-four percent of all deaths among those 15 to 24 years old are from suicide, which claims 4,000 lives in Canada every year. The World Health Organization estimated that depressive illnesses would become the second leading cause of disease burden worldwide and the leading cause in developed countries such as Canada (GBD 2017 Disease and Injury Incidence and Prevalence Collaborators 2018; WHO 2001). We also need to consider the impact of mental illness in one person on family members, friends and colleagues.

There is often a tendency to view mental health issues as a silo in our healthcare system. Although mental illness may arise as an isolated issue, the reality is that it may be associated with, and influenced by, other medical problems (e.g., chronic illnesses, such as diabetes, ischemic heart disease), as well as social determinants of health (e.g., poverty, homelessness) and of oppression (e.g., being an Indigenous person, an immigrant or a refugee). Consideration of the inclusion of public coverage of psychological therapies offers an opportunity to build the capacity of such care and better integrate it as part of community-based care (primary care/family practice). Recent evidence from innovative practices where such integration was facilitated demonstrated better access, more seamless communication among providers and a high level of satisfaction from patients and providers (Chomienne et al. 2011; College of Family Physicians of Canada, Canadian Psychiatric Association, and Canadian Psychological Association 2020; Grenier et al. 2008).

As per guidelines from various organizations (Canadian Network for Mood and Anxiety Treatments 2016; NICE 2009, 2019), recommended options for the treatment of common mental disorders include medication and psychological therapies, most commonly cognitive-behavioural therapy (CBT). As described by Vasiliadis et al. (2021), psychological therapies can be web based through self-treatment or provided with a qualified professional, either face to face or virtually. A hybrid model offering the above modalities, along with appropriate communication with the provider most responsible for ongoing care – either a family physician or a nurse practitioner – and one that respects a patient's preferences makes sense.

The authors suggest that the Quebec funding model for drug coverage introduced in 1997 should be considered for psychological therapies. Under such a model, each citizen who is currently unable to access such treatments through their employer could do so through public insurance. Various options are under consideration for a national pharmacare program, each with its advantages and disadvantages (Dinh et al. 2018). Similar options need to be considered for psychological therapies and weighted with the need for public coverage in other areas, such as pharmacare, dental care and eye care.

Conclusion

Notwithstanding the fiscal realities facing us as we emerge from the pandemic, we can do better regarding public coverage of psychological therapies. Facilitation of a collaborative approach between family physicians/nurse practitioners and other qualified professionals (psychologists, social workers, other family doctors who incorporate such care), as part of robust community-based care, is consistent with the objectives of the Quadruple Aim (Ontario 2019): better care, better patient experience, lower overall costs following initial investments and satisfied providers.

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DISCUSSION AND DEBATE

Increased Private Healthcare for Canada: Is That the Right Solution?

Accroître les services de santé privés au Canada : est-ce la bonne solution?

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Abstract

Medicare is a publicly funded healthcare system that is a source of national pride in Canada; however, Canadians are increasingly concerned about its performance and sustainability. One proposed solution is private financing (including both private for-profit insurance and private out-of-pocket financing) that would fundamentally change medicare. We investigate international experiences to determine if associations exist between the degree of private spending and two of the core values of medicare – universality and accessibility – as well as the values of equity and quality. We further investigate the impact of private spending on overall health system performance, health outcomes and health expenditure growth rates. Private financing (both private for-profit insurance and private out-of-pocket financing) was

found to negatively affect universality, equity, accessibility and quality of care. Increased private financing was not associated with improved health outcomes, nor did it reduce health expenditure growth. Therefore, increased private financing is not the panacea proposed for improving quality or sustainability. The debate over the future of medicare should not be rooted in the source of its funding but rather in the values Canadians deem essential for their healthcare system.

Résumé

L'assurance maladie, un système de santé financé par l'État, est source de fierté nationale au Canada. Cependant, les Canadiens sont de plus en plus préoccupés par son rendement et sa durabilité. Une solution proposée est le financement privé (notamment l'assurance privée à but lucratif et le financement direct privé), ce qui changerait fondamentalement le régime d'assurance maladie. Nous avons étudié la situation à l'étranger pour déterminer s'il existe une association entre le degré de dépenses privées et deux valeurs fondamentales de l'assurance maladie : l'universalité et l'accessibilité. Nous avons examiné plus en détail l'impact des dépenses privées sur la performance générale du système de santé, sur les résultats cliniques et sur le taux de croissance des dépenses de santé. Nous avons constaté que le financement privé (l'assurance privée à but lucratif et le financement privé direct) avait un effet négatif sur l'universalité, l'équité, l'accessibilité et la qualité des soins. L'augmentation du financement privé n'est pas associé à de meilleurs résultats cliniques, ni à un ralentissement de la croissance des dépenses de santé. Par conséquent, l'augmentation du financement privé n'est pas la panacée pour une amélioration en matière de qualité ou de durabilité. Le débat sur l'avenir de l'assurance maladie ne devrait pas s'enraciner dans la source de son financement, mais plutôt dans les valeurs que les Canadiens jugent essentielles pour leur système de santé.

Medicare's Challenges and the Call for Private Financing

Medicare – the publicly funded, single-payer network of healthcare systems – is a popular Canadian public program, which is a source of national identity and great pride (CIHI 2017; Martin et al. 2018; Simpson 2012). Since medicare's initial introduction covering in-hospital and diagnostic services in 1957, through to the enactment of the *Canada Health Act (CHA)* (Government of Canada 1985) in 1985, the principles have included universality, portability, comprehensiveness and public administration. The enactment of the *CHA* also added accessibility as the fifth principle of medicare. Operationally, this includes no direct cost to patients for medically necessary hospital and physician services. Despite these achievements, Canadians are increasingly concerned about the system's performance (Martin et al. 2018; Simpson 2012). For example, long wait times for elective surgical procedures such as joint replacements, cataract surgeries and cardiac procedures; overcrowded emergency departments; and lack of access to primary care providers have all become fodder for news highlights and calls for change (Maclean's 2013). Moreover, among the Organisation for Economic Co-operation and Development (OECD) countries, Canada ranks average on

healthcare performance despite spending more per capita than most other countries (CIHI 2017). The OECD rankings from 1960 to 2010 compare 17 high-income countries on five dimensions of health: health status, non-medical determinants of health, quality of care, patient safety and access to care. One commentator has described Canada's healthcare as "a Chevrolet system at Cadillac prices" (Simpson 2012). Even more worrisome is that Canada's healthcare performance ranking continues to slip in the Commonwealth Fund comparison of 11 high-income countries, starting at fourth place in 2004, slipping to fifth in 2006, sixth in 2010 and ninth in 2017. Closer examination reveals that Canada's mediocre rankings in the majority of international healthcare indices are predominantly a result of long wait times for elective care and inequitable access to services outside the core medicare coverage of hospital, physician and diagnostic services (Martin et al. 2018). Wait times plague the system, with 18% of Canadians waiting more than four months for elective non-urgent surgery and 30% waiting more than two months for specialist referrals (Martin et al. 2018).

There is no shortage of proposed solutions, from increasing funding to expanding scope of care for nonphysician healthcare providers. Some have called for increased private financing of Canada's healthcare system through either out-of-pocket payments or private health insurance. Still others have proposed diverting more services to for-profit clinics that, they argue, will lower overall surgical wait times by reducing the workload on publicly funded facilities. However, critics contend that this will only reduce wait times for those able to afford the private services – for everyone else, wait times may actually increase as healthcare providers may divide their time between publicly and privately financed services but spend less time in the publicly financed side.

A major constitutional challenge in British Columbia (BC) alleges that the restrictive *CHA* and provincial legislation infringe on patients' rights to life, liberty and security of the person under the *Canadian Charter of Rights and Freedoms* (Flood and Thomas 2018). The arguments before the BC Supreme Court asserted that patients should have the right to obtain medical services more quickly by paying privately, and physicians should be allowed to "extra bill" patients for these services in the public system while also being permitted to "dual practice," working both in the public and an exclusively privately funded system. Extra billing is defined as charging an additional amount for an insured service to an insured person above and beyond the rate paid by the insurance plan of the province. Advocates of private financing range from governments to citizens, based on differing motivations. Governments may welcome more private financing to reduce taxes or to allocate funds elsewhere, whereas some citizens may advocate for private financing in order to reduce their tax burdens and improve their own access to healthcare services, and some physicians may be motivated by personal financial gain. Others claim that increased private financing will free public funds to improve access for patients in the public system, but critics argue that it will instead reduce access by undermining support for public financing. Although the BC Supreme Court recently ruled to uphold the *BC Medicare Protection Act* (Government of British Columbia 1996), it is possible that the plaintiffs may move to have the case heard by the Supreme Court of Canada,

and the outcome may have the potential to impact healthcare delivery in Canada.

Canada's healthcare system is unique in that guaranteed access to core physician and hospital services is provided, while other important areas of healthcare are left open to ad hoc public coverage, which varies between provinces (CIHI 2018). Despite this, many Canadians perceive Canada's healthcare system as overwhelmingly publicly funded. In reality, Canada is considered "middle of the road" among OECD nations, with a 70%:30% public–private split of healthcare expenditures, slightly below the OECD average (73% public and 27% private; CIHI 2018). Even though US healthcare is often considered private, it is 48% publicly funded, 52% private, and the public share is rising (CMS 2018; WHO 2020). In contrast, Canadian public sector spending declined from 76% to 70% over the past 40 years (CIHI 2018). In some provinces, the decline was even steeper. For example, Ontario's public sector health share fell from 75% to 66% (CIHI 2018).

The framing of the healthcare financing debate in Canada is unfortunate because it equates sustainability and quality with public or private financing. A better alternative is to discuss healthcare financing in the context of the values that Canadians want to see in their healthcare system. In a free market equilibrium, demand and supply balance each other; however, healthcare is not a typical market good. In a free healthcare market, wealthier people would have the ability to access more and expedited healthcare, whereas poor people would make do with less and wait longer. During the Great Depression of the early 1930s (Struthers 2020), many people lacked the means to purchase even basic healthcare, and social conscience led Canada's leaders to make healthcare a public instead of a private good by introducing elements of universal health insurance and eventually creating the *CHA*. The *CHA* embodies the core values of universality, comprehensiveness, portability, public administration and accessibility (Health Canada 2015). A public good is one that is open for all to use, and consumption by one party does not deter another party's ability to use it; however, if demand outstrips supply, as is the case in healthcare, this can lead to market failure. Regulation or public policy can work to alleviate market failure. Canada's medicare relies on supply-side control where supply (e.g., physicians, surgical suites and hospital beds) is limited, while demand is not. Some contend that supply control without demand control is unsustainable, and when demand exceeds supply, implicit rationing results in long wait times and compromises access to and quality of care. All OECD countries, except Canada and the UK, use some form of copayment or user fees for physician and hospital care to control demand (Institute for Competitiveness & Prosperity 2014). Some countries also allow for the purchase of private insurance to cover the copayments – as is done in France. However, opponents are concerned that this disadvantages some groups (lower income groups, extremes of age, immigrants, etc.), instead, arguing that better efficiency and resource allocation should suffice (Ontario Ministry of Finance 2012). Others propose increased private financing to fill the supply "shortfall" (Kaczorowski 2010); critics argue that because only the wealthy can afford private healthcare, this will create a two-tiered healthcare system that compromises medicare's core values (Flood and Choudhry 2002) and could undermine

public support for medicare. Moreover, evidence suggests that access (e.g., wait times) will not improve if a two-tiered system is adopted (Duckett 2005). Here, we examine the experiences of other countries, via health indices, to explore how increased private financing may impact widely accepted values in our healthcare system, overall health system performance, health outcomes and growth in health expenditures. Our analysis of private financing includes both private for-profit insurance and private out-of-pocket financing. Discussion of private services refers to those provided in both private for-profit and private not-for-profit modalities.

The Impact of Privatization

Methods

We analyzed the potential impact of increased private financing in Canadian healthcare by searching for and examining published health indices for associations between private health-spending share in a country and the country's ranking for two core *CHA* principles (universality and accessibility) and two values expressed during the Romanow Commission (equity and quality; Romanow 2002), as well as overall health system performance and health outcomes. The remaining three principles of the *CHA* (public administration, portability and comprehensiveness) were not selected for analysis as they are not included in international health system rankings. Therefore, universality and accessibility were the two *CHA* principles included in the analysis. Health indices analyzed include the Institute for Health Metrics and Evaluation's (IHME) Health-Related Sustainable Development Goals (SDG) Universal Health Coverage Index, the Commonwealth Fund's (CWF) Health Care System Performance Rankings, Economist Intelligence Unit's (EIU) Global Access to Healthcare Index, IHME Healthcare Access and Quality Index (HAQ) and the Bloomberg Global Health Healthiest Country Index (BGH). Data for each nation's private sector health spending were principally drawn from the World Health Organization's (WHO) Key Country Indicators data set (WHO 2020). The impact of increased private financing on health expenditure growth (HEG) was assessed by analyzing HEG rates in a group of high-income countries representing a broad range of private financing within their health systems.

Results

UNIVERSALITY

The IHME measured 37 of 50 health-related SDG indicators over the period of 1990 to 2016 for 188 countries (Fullman et al. 2017). We used the IHME SDG Universal Health Coverage Index (that examines childhood vaccination, antenatal care, in-facility delivery rate, antiretroviral therapy and risk-standardized death rates from causes amenable to healthcare) to assess the impact of private financing on universality. Our analysis shows that health systems with more private services were significantly ($p < 0.01$) associated with lower universal health coverage rankings; however, large variations existed across nations.

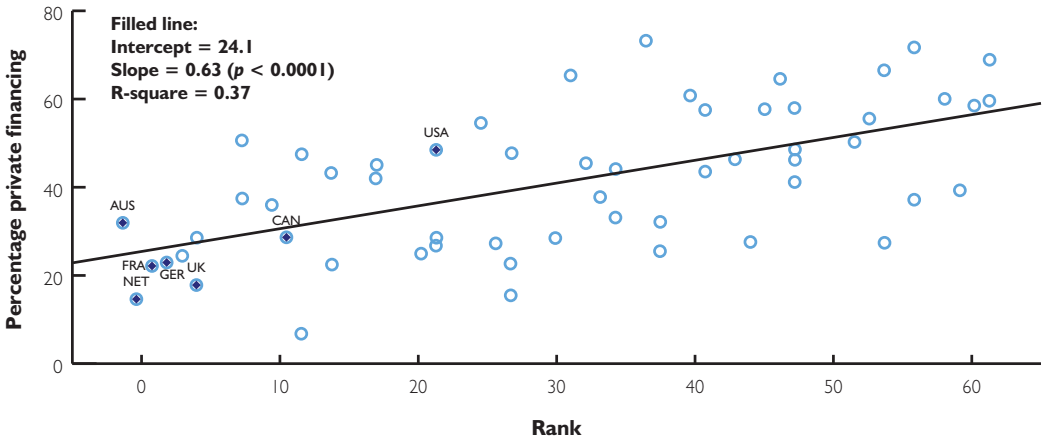
EQUITY

We used the CWF Equity sub-index (that examines timeliness, financial barriers to care and patient-centred care) and the EIU Equity of Access sub-index (that examines access to appropriate health services) to assess the effect of private financing on health equity (EIU 2018; Schneider et al. 2017). Of note is that the CWF Equity sub-index assessed equity overall, whereas the EIU Equity of Access sub-index specifically assessed equity of access. In both the EIU Equity of Access and CWF Equity sub-indices, health systems with more private services were significantly ($p < 0.05$) associated with poorer equity rankings.

ACCESS

We used the CWF Access sub-index (that evaluates affordability and timeliness) and the EIU Accessibility sub-index (that examines access to child and maternal health services, infectious diseases care, non-communicable diseases care, medicines and equity of access) to assess the impact of private financing on accessibility (EIU 2018; Schneider et al. 2017). In both the EIU Accessibility (Figure 1) and CWF Access sub-indices, health systems with more private services were significantly ($p < 0.05$) associated with poorer accessibility rankings.

FIGURE 1. Lower percentages of private financing are associated with improved accessibility ranking using the EIU Accessibility index



CWF-ranked countries are highlighted. AUS – Australia; CAN – Canada; FRA – France; GER – Germany; NET – Netherlands; NOR – Norway; NWZ – New Zealand; SWE – Sweden; SWI – Switzerland; UK – United Kingdom; USA – United States of America.

QUALITY

We used the IHME HAQ (that is based on risk-standardized mortality rates from causes that, in the presence of high-quality healthcare, should not result in death – also known as amenable mortality) to assess the impact of private financing on access and quality of the healthcare system (Barber et al. 2017). In the HAQ index, health systems with more private services were significantly ($p < 0.01$) associated with poorer access and quality rankings.

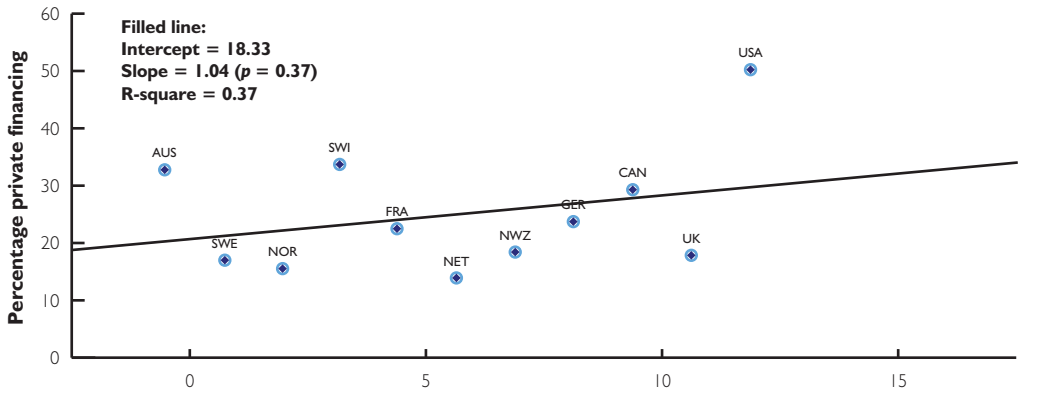
HEALTH SYSTEM PERFORMANCE

We used the CWF Health Care System Performance index (that examines care process performance, access, administrative efficiency, equity and healthcare outcomes) and the EIU Healthcare System sub-index (that examines measures enabling conditions to provide access to healthcare services, including population coverage, political will, healthcare infrastructure and efficiency and innovation mechanisms) to assess the impact of private financing on overall health system performance (EIU 2018; Schneider et al. 2017). In the EIU Healthcare System sub-index, health systems with more private services were significantly ($p < 0.01$) associated with poorer health system performance. In the CWF Health Care System Performance index, health systems with more private services were associated with poorer overall health system performance, but the relationship was not statistically significant.

HEALTH OUTCOMES

Finally, we used the CWF Health Care Outcomes sub-index (that examines population health factors, mortality amenable to healthcare and disease-specific outcomes) and the BGH (that examines life expectancy, causes of death and health risks) to assess the effect of private financing on health outcomes (Lu and Del Giudice 2017). Using both the BGH and the CWF Health Care Outcomes sub-index (Figure 2), health systems with more private services were not associated with improved health outcomes.

FIGURE 2. Percentage of private financing is not associated with overall health rankings using the CWF Health Care Outcomes sub-index



AUS – Australia; CAN – Canada; FRA – France; GER – Germany; NET – Netherlands; NOR – Norway; NWZ – New Zealand; SWE – Sweden; SWI – Switzerland; UK – United Kingdom; USA – United States of America.

HEALTH EXPENDITURE GROWTH

Our analysis shows that health systems with more private services were not significantly associated with health expenditure growth rates.

Discussion: The Implications of Privatization

Our findings provide further evidence that systems with higher rates of private financing are negatively associated with universality, equity, accessibility and quality of care, as has previously been found in international literature reviews (Alkhamis 2017; Bambra et al. 2014; Footman et al. 2014). We did not find an association between private financing and improved health outcomes. Health outcomes may be affected more by socio-economic determinants of health (Dutton et al. 2018) and health behaviours than by how healthcare is financed, or improved outcomes among those who can purchase care may be offset by worse outcomes among those who cannot.

Canada's unique health system lacks comprehensiveness because it covers unlimited demand to a narrow range of services (physicians and hospitals), leaving other important areas of healthcare (e.g., dental care, pharmaceuticals and allied health services) open to ad hoc public or private coverage. This is a concern because lack of comprehensiveness (e.g., physician services without access to outpatient prescription drugs) can diminish effectiveness in the healthcare system. In contrast, many other OECD nations publicly fund access to a broader range of basic healthcare services; however, they control demand by requiring top-up private insurance for added services (Schoen et al. 2010). In these countries, it is considered that universal healthcare does not imply "free at the point of delivery" healthcare, and proponents contend that carefully designed price signals can bring benefits of both cost efficiency and equity (Institute for Competitiveness & Prosperity 2014). It should be noted, however, that copays deter the poor and extremes of age from accessing care. Moreover, they represent no deterrent to the rich and may reduce both medically unnecessary and medically necessary care, meaning direct patient payment would require a thoughtful and deliberate policy setting (Evans et al. 1995).

If private financing was expanded in Canada, the resulting impact on health system values would depend on the design and regulation of the private system. If it is designed to provide enhanced access and services based on willingness to pay, it will certainly reduce equity. If, on the other hand, regulations that restrict a parallel system based on willingness to pay are introduced, then the core values of medicare may not be at risk, although there is a lack of precedents to provide evidence for this. For the readers' consideration, we have included an adapted summary of the health financing models in Box 1 (CMA Task Force on the Public–Private Interface 2006).

Private health insurance can take on different forms – it can duplicate, complement or supplement public health coverage.

BOX 1. An adapted summary of health financing models

Model	Description
Beveridge	Public health insurance funded by general government revenues (i.e., UK and Canada)
Bismarck	Healthcare funded through premiums or social insurance contributions (i.e., Germany and France)
Pluralistic	Multiple public and private payers (i.e., Italy, Japan and the US)

Duplicate private insurance competes with public health insurance and is common in systems with separation between publicly and privately funded providers. *Complementary* private insurance provides coverage for out-of-pocket payments that may be required by public systems. *Supplementary* private insurance covers services not covered by public plans (CMA Task Force on the Public–Private Interface 2006).

Supplementary insurance already exists in Canada, so any further changes to the private financing of healthcare in Canada may include expansion into complementary or duplicate insurance. Clearly, duplicate private insurance can easily lend itself to a "two-tier" system that goes against Canadians' values for medicare, whereas progressive tax policies can mitigate the impact of the cost of complementary or supplementary plans. Additional considerations are whether private insurance companies will be allowed to risk rate or cherry-pick and exclude enrollees, whether they are for-profit or non-profit and whether physicians will be mandated to work a specified number of hours in the public system before they are able to operate in the private system. Consequently, regulations and public policy governing private financing may temper the degree to which medicare values are impacted and will need careful consideration.

Sustainability, or the ability to maintain the healthcare system both fiscally and operationally, is crucial. An infusion of private funds and/or diverting patients to private services may provide temporary relief to wait times by allowing those with the ability to pay privately to "jump the queue" and allowing physicians to work additional hours beyond those already worked in the public system in the private sector; however, supply would eventually become saturated once again, as the number of physicians and physician-working hours are finite, whereas demand is not. The key to sustainability, however, is not private versus public funding models, but rather controlling the annual HEG, also known as health inflation. The reasons for HEG include population growth, aging, inefficiency, labour and drug price inflation and technological change, among others (CIHI 2011). A Canadian Institute for Health Information report indicates that demographic factors such as population growth and aging contribute only modestly to HEG, although that may change as the proportion of the seniors in the population rapidly grows (CIHI 2011). If HEG consistently exceeds the growth rate of the economy, the system is unsustainable irrespective of private or public financing as health costs will increasingly consume available resources and squeeze out other forms of consumption (Dodge and Dion 2011). Although some may argue that healthcare is only as sustainable as we wish it to be, one must acknowledge that we do not have limitless public resources to spend on healthcare, and if HEG continues to exceed the growth rate of the economy, it will either lead to a reduction in spending on other public domains, or continually increase tax burdens. Canada's HEG has exceeded economic growth by an average of 1.3% annually over the past 40 years (1976–2015; CIHI 2018). Other countries have similar experiences, including the US, where HEG has exceeded economic growth by an average of 2.1% over the same time frame (CMS 2018). In fact, health spending has grown

faster than the economy in all OECD countries over the past 20 years (OECD 2015). Our results show no relationship between HEG and private financing in a healthcare system; therefore, increased private financing neither improves nor worsens sustainability of the healthcare system.

A broad consensus among health economists holds that technological change is a primary driver of HEG (Smith et al. 2009). In a study of 23 OECD countries, Smith et al. (2009) reported that technological change accounts for 27% to 48% of HEG. Some advocate regulation of technology adoption, while others argue that productivity gains from technological innovation are not reflected in price adjustments (Di Matteo and Emery 2015: 87–112). For example, while technological innovation has dramatically reduced the time needed for cataract surgery, the service fee has not decreased proportionately, and the benefits have been captured by service providers instead of payers. Controlling HEG is central to addressing sustainability.

Limitations

All health indices and ranking systems are limited by the evaluation factors chosen; there is no consensus on international standards. Using the same evaluation factors for low- and high-income countries may be questioned. Availability and quality of data may vary among countries and bias the results, and there may be a lack of consensus within international rankings; for example, although many international indices rank the Canadian healthcare system as average, the IHME HAQ index ranks it as relatively high. Finally, these results reflect associations, not causation.

Conclusion

In conclusion, sustainability and quality cannot be equated with public or private financing, and the argument for an expanded role for private financing is a distraction from the key questions that Canadians need to address: What values and principles do Canadians wish to see in their healthcare system? How can national consensus for healthcare reform and sustainability be achieved? Difficult decisions regarding coverage and financing of services and pragmatic choices to sustain the system have to be made. Private financing on its own is not the answer. The responsibility for mobilizing public and political support for healthcare reform should belong to the government but need not rest solely with it and should not be appropriated by self-profiting special interest groups. In this era of social media, community groups can readily mobilize public interest, raise awareness and generate public discussion, leading to public pressure for change. While previous efforts have relied heavily on academic studies, think tank reports and government-commissioned recommendations (e.g., senate and parliamentary committees and royal commissions), engaging the community through town hall meetings and social media, or video streaming of TED-style talks and Munk-style debates, can broaden public engagement and amplify knowledge dissemination. Levers for

implementing reform can include changes to the *CHA*, a federal–provincial transfer system and provincial legislations. Real change that fully embraces the values that Canadians want in their healthcare system will only come when there is broad public support for politicians to make difficult policy choices. Canadians have a right to decide the future of medicare.

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Commentary: Improving the Sustainability of Healthcare in Canada through Physician-Engaged Delivery System Reforms

Commentaire : Favoriser la durabilité des soins de santé au Canada grâce à l'engagement des médecins dans la mise en œuvre des réformes du système

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Abstract

Increasing private healthcare financing has been suggested as a solution toward improving healthcare quality and access within the Canadian healthcare system. However, Lee et al. (2021) find no evidence that increasing private financing would address the challenges faced by Canadian healthcare. We suggest turning our focus away from reforms that solely increase private healthcare financing and toward evidence-based delivery-system reforms to address both quality and sustainability. We present examples and supporting evidence of the effectiveness of patient-, physician-, organization- and system-level strategies. Changes should engage physicians and be implemented across Canada to facilitate a cultural shift toward experimentation and high-value care delivery.

Résumé

L'accroissement du financement privé des services de santé est considéré comme une solution pour améliorer la qualité et l'accès aux soins dans le cadre du système de santé canadien. Toutefois, Lee et coll. (2021) n'ont décelé aucune donnée voulant que le financement privé

soit la solution pour répondre aux défis propres aux services de santé au Canada. Nous proposons de déplacer l'attention des réformes qui visent uniquement l'accroissement du financement privé, pour se tourner vers des réformes fondées sur les données probantes et qui visent la qualité et la durabilité des services de santé. Nous présentons des exemples ainsi que des données venant appuyer l'efficacité de stratégies axées sur les patients, les médecins, les organisations et le système. Les changements devraient mobiliser les médecins et être mis en œuvre partout au Canada pour favoriser un changement de culture qui vise la prestation et l'expérience de soins de haute qualité.

Realities of the Canadian Healthcare System

Canadian healthcare currently faces daunting challenges across the healthcare system. These include the availability of ICU and hospital beds for people with COVID-19; waiting times for surgeries and specialist visits; the affordability of pharmaceutical drugs; escalating costs of physician care accompanied by lack of physician accountability; concerns about the quality of care in some long-term care residences; health disparities resulting from social, political, and economic inequities; and the rising prevalence of chronic diseases. The growth in healthcare spending looms large. Solutions to these problems must take into account the principles of medicare (universality, portability, comprehensiveness, public administration and accessibility) and the reality of operating in a system with limited resources.

Expanding private healthcare has been proposed repeatedly as a potential solution to the problems identified in publicly funded care, including changes to private healthcare financing (i.e., payments from individuals and/or third-party non-government insurers) and private healthcare-service delivery (e.g., private radiology or surgical services). Proposals to expand private duplicative insurance (e.g., *Chauolli v Quebec* 2005) and overturn restrictions on patient fees within medicare and on physicians working in both publicly and privately funded systems (e.g., *Cambie Surgeries Corporation v British Columbia* 2020) have been hashed out in courts, while suggestions to deliver surgical procedures with long wait times in privately owned facilities (Babych 2019) have been debated in the court of public opinion. And the discussion continues. For instance, the United Conservative Party of Alberta recently passed a platform policy at its annual general meeting, recommending the establishment of private insurance and overturning of restrictions on patient fees and physician dual practice (Bench 2020).

More Private Financing Is Not a Solution, So What Is?

Could *more* privatization be a solution to medicare's problems? Lee et al. (2021) examine this question in their article "Increased Private Healthcare for Canada: Is That the Right Solution?" Using data from published health indices, they estimated the association between private financing – defined as private for-profit insurance and private out-of-pocket *financing* – and a series of outcomes that reflect universality, accessibility, equity, quality, overall

system performance, health outcomes and health spending growth. They found that health systems with more private financing were associated with significantly higher markers of lower universal coverage and poorer equity, accessibility, quality and overall performance. There was no association between countries with more private financing and improved health outcomes or healthcare spending growth.

After finding no signal suggesting that increasing private healthcare financing would help address the challenges faced by the Canadian healthcare system, Lee et al. (2021) raise a number of thoughtful questions to consider as we face these challenges: How can we make public healthcare in Canada more comprehensive? If we expand public financing, how can we control the demand for covered public health services in a way that does not reduce access to medically necessary services? If we expand private financing, how do we design and regulate that system to prevent insurance companies from not accepting sick patients, not offering comprehensive services, charging high copays and putting restrictive treatment limits in place?

Canadian healthcare reform does not have to focus on just one of the questions Lee et al. (2021) raise, and perhaps financing reform is not where we should focus at all. The *Patient Protection and Affordable Care Act* (Office of the Legislative Counsel 2010) in the US (also known as Obamacare) provides an example of a healthcare policy that simultaneously attempted to address many components of healthcare financing and delivery. Because of the fractured nature of healthcare financing in the US, Obamacare included changes to both public and private insurance, including the expansion of public insurance coverage and covered services, regulation of private insurance, subsidies to buy private insurance and elimination of patient copays for important services such as primary care visits and essential medications. While less publicized, Obamacare also launched delivery system reforms (Emanuel et al. 2020). These reforms focused on improving care coordination and reducing inefficiencies by changing the way physicians and hospitals are organized, paid and evaluated. Most importantly, these reforms fostered a culture of experimentation and instilled feelings of anticipation and acceptance for a shift away from fee-for-service payments.

Lee et al. (2021) also discuss another key question: regardless of who pays for it, how do we create a sustainable healthcare system that reflects our values? Spending on physicians is a substantial area of healthcare spending (15.1%) and is growing at a higher rate (3.5%) than spending on hospitals and drugs (CIHI 2019). Improving the value of physician services by improving the outcomes achieved relative to the dollars and resources invested is a key area to focus our efforts on so as to address healthcare sustainability. Reforming how Canadian physicians are organized, paid and evaluated could – as it did in the US – generate a cultural shift toward experimentation and away from fee-for-service payments. As physicians are powerful players in the Canadian healthcare system (Flood et al. 2018), implementing physician-focused reforms would require physician engagement and synchronous changes in governance, payment and accountability for such reforms to be successful (Marchildon and Sherar 2018).

Physician-Engaged Delivery System Reforms: Examples and Evidence

Before implementing any healthcare reform, it is important to examine the effectiveness of the strategies that might improve the value of the healthcare system (many of which require the engagement and partnership of physicians or would impact physicians). Such reforms to increase the use of high-value care and reduce the use of low-value care may be implemented at different levels of the healthcare system: patient- and clinician-level, organization-level and system-level. The evidence supporting these strategies is taken from a recent working paper that sought systematic reviews on each of these strategies (Table 1) (Farkas et al. 2020). Selected examples are highlighted in the following sections.

An example of reform at the patient level is shared care, meaning patients and physicians are partners in clinical decision making. Shared care is considered a key element of patient-centred care in several health systems. However, a recent systematic review identified 83 randomized controlled trials evaluating shared care (many with a high risk of bias) and found an uncertain effect of shared care on healthcare costs (Légaré et al. 2018). At the physician level, one of the central tools to support practice change is audit and feedback, which can facilitate performance measurement and improvement. A Cochrane review evaluating audit and feedback noted an overall improvement in outcome attainment of 4% (range: 0.5–16%) (Ivers et al. 2012). The range reflected the extent to which the intervention included the best practices known around audit and feedback. At the organization level, policies or interventions include prompts in electronic health records that encourage the use of high-value interventions or tests and discourage the use of low-value interventions and tests. A Cochrane review of electronic prompts and decision aids concluded that these interventions are effective in reducing costs (Stacey et al. 2017).

System-level reforms include changes to payment models, with the aim of moving away from fee-for-service models in areas where high-volume care is not warranted. Fee-for-service payment remains the dominant model of physician remuneration in Canada, despite concerns that it incentivises volume over value. Fee-for-service is associated with higher utilization (particularly for elective procedures) when compared to other payment models, but evidence of the impact on outcomes such as quality and cost is mixed (Gosden et al. 2000; Quinn et al. 2020). Accountable care organizations (ACOs) have been introduced in the US as a mechanism to improve care integration and the use of high-value care. There is limited evidence that ACOs have led to financial savings; however, evaluation has been challenging due to the widespread delivery-system changes occurring at the same time in the US. It remains to be seen whether the introduction of ACOs could benefit healthcare in Canada (and what their impact might be), though improving care integration is a laudable goal because it is associated with high-performing healthcare systems (Canadian Nurses Association et al. 2013; Curry and Ham 2010; Suter et al. 2009).

TABLE 1. Strategies for incentivising value in healthcare system delivery, by level of implementation

Healthcare system level	Strategy	Description	Evidence
System	Encourage/enforce use of evidence-based data	Clinical guideline development and health technology assessment; computerized care pathways (e.g., the "do-not-do" recommendations featured in "Choosing Wisely" campaigns)	Evidence suggests that these strategies can change practice behaviour and reduce costs (Goetz et al. 2015; Rotter et al. 2010)
	Medical staff by-laws or other regulations aimed at regulating physician practice	Ministerial directives; clinical rules	No systematic review evidence was identified for this strategy
	Compensation reform	Reimbursement for care coordination; implementation of payment models other than fee-for-service; monetary and non-monetary incentives	Evidence of effectiveness in changing utilization and compliance with desired practice for some non-fee-for-service payment models (Chaix-Couturier et al. 2000; Mendelson et al. 2017; Quinn et al. 2020; Witter et al. 2012)
	Constrain resources through regulation	Restrict use of certain tests and treatments	Inconclusive evidence (Flodgren et al. 2011a)
Organization	Leadership inclusion, endorsement and support	Promotion of cost-conscious care by clinical champions and senior leaders	Inconclusive evidence of improving compliance with desired practice (Flodgren et al. 2011b)
	Decision-support tools and electronic prompts	Point-of-care access to effectiveness, cost and quality information	Evidence on effectiveness in reducing costs (Stacey et al. 2017)
Physician	Education	Creating and facilitating easy access to education about care quality, value, and decision making	Evidence of effectiveness in improving compliance with desired practice (Forsetlund et al. 2009)
	Mentorship	Encouraging reflective practice and co-learning	Evidence of effectiveness in improving compliance with desired practice, delivering appropriate care and reducing costs, volume or unnecessary procedures (O'Brien et al. 2007; Stammen et al. 2015)
	Audit and feedback	Individual and group performance measurement and management, including clear accountabilities in response to information	Evidence of effectiveness in improving compliance with desired practice (Ivers et al. 2012)
Patient	Shared decision making	Involving patients as partners in clinical decision making; discussing options for treatment, including prices and value of treatment options	Uncertain effect on costs (Légaré et al. 2018)

Adapted from Farkas et al. 2020

Conclusion

At its core, healthcare is about a caring relationship between a patient and a provider. We agree with Lee et al. (2021) that increasing private financing as a solution toward improving universality, accessibility, equity, quality, overall system performance, health outcomes and health spending growth is not supported by the evidence. We suggest turning our focus away from financing reforms and toward evidence-based delivery-system reforms. Engaging physicians in these reforms and implementing structures to foster sustained physician engagement will be critical in order to successfully improve the quality and sustainability of the healthcare system.

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RESEARCH PAPER

Estimating Population Benefits of Prevention Approaches Using a Risk Tool: High Resource Users in Ontario, Canada

Estimation des avantages, pour la population, du recours à une trousse d'outils pour la prévention du risque : grands utilisateurs de ressources en Ontario, Canada

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Abstract

Background: Healthcare spending is concentrated, with a minority of the population accounting for the majority of healthcare costs.
Methods: The authors modelled the impact of high resource user (HRU) prevention strategies within five years using the validated High Resource User Population Risk Tool.
Results: The authors estimated 758,000 new HRUs in Ontario from 2013–2014 to 2018–2019, resulting in $16.20 billion in healthcare costs (Canadian dollars 2016). The prevention approach that had the largest reduction in HRUs was targeting health-risk behaviours.
Conclusions: This study demonstrates the use of a policy tool by decision makers to support prevention approaches that consider the impact on HRUs and estimated healthcare costs.

Résumé

Contexte : Les dépenses de santé sont concentrées, une minorité de la population représente la majorité des coûts de santé.
Méthode : Les auteurs ont modélisé l'impact des stratégies de prévention des grands utilisateurs de ressources (GUR) sur une période de cinq ans à l'aide de l'outil d'évaluation de risque des grands utilisateurs de ressources.
Résultats : Les auteurs estiment qu'il y a eu 758 000 nouveaux GRU en Ontario de 2013–2014 à 2018–2019, ce qui a entraîné des coûts de santé de 16,20 milliards de dollars (dollars canadiens, 2016). Le type de prévention qui a entraîné la plus forte réduction des GRU ciblait les comportements à risque pour la santé.
Conclusion : Cette étude fait état de l'utilisation d'un outil par les décideurs pour soutenir les démarches de prévention qui prennent en compte l'impact sur les GRU et les coûts de santé estimés.

Background

It is widely acknowledged that healthcare spending is overwhelmingly concentrated, with a minority of the population accounting for the majority of healthcare costs (Zook and Moore 1980). In Ontario's single-payer universal healthcare system, the top 5% of healthcare users account for almost 50% of healthcare spending (Rais et al. 2013; Wodchis et al. 2016). This pattern of healthcare use has been observed across several health systems, including Canada, the US and Australia (Berk and Monheit 2001; Billings et al. 2006; Calver et al. 2006; Ehrlich et al. 2010).

In light of this phenomenon, high resource users (HRUs) are common targets for health system improvement or interventions with the goal of reduction in healthcare spending and improved quality of care. This focus has led to clinical intervention programs that have largely concentrated on older adults, managing individuals with multiple comorbidities and improved coordination and delivery of care (Ali-Faisal et al. 2017; Bleich et al. 2015), groups that are overrepresented in HRU studies. To date, such programs have had favourable results in quality of care and health outcomes and mixed results in their ability to reduce health

system costs and outcomes (Blumenthal and Abrams 2016; Mondor et al. 2017). Existing interventions typically target patients who are already HRUs, with limited recognition of the role of upstream determinants, specifically those that are non-clinical in nature. The prevention of HRUs is an important component of population health management given that the healthcare system has historically failed patients with the most complex needs. In addition, prior work has also demonstrated stability in HRU status once the initial transition has occurred (Wodchis et al. 2016).

The inconclusive evidence and limited impact of most clinical interventions aimed at HRUs have compelled policy makers to revisit program strategies and to seek subgroups of the population that may benefit from certain interventions more than others (Figueroa et al. 2017). A proactive approach to address health system efficiency and sustainability includes targeting interventions toward individuals who are at the greatest risk of becoming a new HRU in the future. Research has shown that the impact and efficiency of intervention programs increase when they are targeted at groups that are most likely to benefit (Anderson et al. 2015; Blumenthal et al. 2016). Prediction models can inform such approaches by allowing for the modelling of future burden and the impact of potential interventions before substantial avoidable costs have incurred. In a financially constrained system, the ability to assign cost estimates to how intervention approaches influence the number of future HRUs in the population represents a major advantage in planning and prevention.

The High Resource User Population Risk Tool (HRUPoRT) is a validated tool that estimates the future risk of an individual becoming a new HRU and quantifies the impact of prevention strategies by applying routinely collected data from population surveys to a validated risk-prediction algorithm (Rosella et al. 2018). The HRUPoRT is unique from other risk prediction algorithms for HRUs that have traditionally been designed for applications in a clinical setting. Specifically, existing algorithms have focused on individual patients (Billings and Mijanovich 2007; Chang et al. 2016; Chechulin et al. 2014), using data that are not widely accessible to policy makers (for e.g., electronic medical records) (Chang et al. 2016; Frost et al. 2017) and have given little consideration to the impact of health behaviours on shaping healthcare spending (Billings and Mijanovich 2007; Chang et al. 2016; Frost et al. 2017; Hu et al. 2015; Lauffenburger et al. 2017). There are currently no other population risk tools for HRUs designed for application on publicly available survey data, allowing users to tailor the impact of interventions to the populations they serve. This article represents the first application of such a tool in a population covered under a single health system.

To date, to the best of the authors' knowledge, no study has focused on modelling the fiscal impact of multiple health behaviours on HRU, although a large subset of studies has attempted to determine risk factors for HRU, which consist of older age, comorbid health conditions, low socio-economic status and the presence of health risk behaviours (Alberga et al. 2018; Fitzpatrick et al. 2015; Rosella et al. 2014). The association between health risk behaviours and spending is well supported in the context of Ontario where physical inactivity and smoking are estimated to cost the province 22% of all health-related expenditures,

amounting to $4.9 billion in healthcare spending that could be averted through policy or program interventions (Manuel et al. 2016). The aim of the current study was twofold: (1) to apply the HRUPoRT to the Ontario portion of the Canadian Community Health Survey (CCHS) and model the potential impact of two different prevention scenarios aimed at individuals with health risk behaviours and multimorbidity; and (2) to estimate how reducing risk among population subgroups impacts HRU spending.

Methods

High Resource User Population Risk Tool

To estimate the predicted risk and number of new HRU cases, we used the HRUPoRT (Rosella et al. 2018). The HRUPoRT is a predictive algorithm that estimates the five-year risk of becoming an HRU, defined as persons in the top 5% of total annual healthcare utilization expenditures. The absolute definition of an HRU was adopted from our original development and validation paper and has not changed in the current application of the HRUPoRT. In Canada, there is no established or defined indicator for an HRU; however, a 5% threshold is commonly used in studies of HRUs locally and internationally (Clough et al. 2016; Guilcher et al. 2016; Muratov et al. 2017; Wodchis et al. 2016). The HRUPoRT was originally developed in a cohort of 58,617 Ontarians who responded to the 2005 and 2007–2008 CCHS and was validated in an external cohort of 28,721 Ontarians in the 2009–2010 CCHS. The predictive performance of the model was evaluated based on discrimination (i.e., the ability of the model to distinguish between individuals with and without the event) and calibration (i.e., the agreement between observed and predicted outcomes). The best prediction model for a five-year transition to HRU status had good discrimination (*c*-statistic = 0.8213) and calibration (HL χ^2 = 18.71) in the development cohort. The model performed similarly in the validation cohort (*c*-statistic = 0.8171; HL χ^2 = 19.95). Close approximation between predicted and observed number of HRUs by deciles of risk was observed, specifically for individuals in high deciles of risk. Overall, the HRUPoRT was shown to accurately project the proportion of individuals in the population that will transition to a HRU over a five-year time period. Predictive variables in the HRUPoRT algorithm include perceived health status, presence of a chronic condition, age group, sex, ethnicity, immigrant status, household income, food security, body mass index (BMI), smoking status, physical activity quartile and alcohol consumption (Table A1, available online at longwoods.com/content/26433). All variables that were used to derive the HRUPoRT were also available in the study data. To ensure the model was representative of the Ontario population, survey weights were incorporated into the analysis that also took into account non-response rates at baseline and follow-up. Healthcare costs were calculated by applying a person-level costing algorithm to the linked provincial health administrative databases, including in-patient hospitalizations, physician visits, complex continuing care, long-term care, home services and assistive devices. Full details on model specification and validation can be found in existing literature (Rosella et al. 2018).

Data sources and study population

For this study, we used the HRUPoRT to generate predictions based on responses to the Ontario portion of the 2013–2014 CCHS. The province of Ontario is located in central Canada and is the most populous province, representing approximately 40% of the Canadian population (Statistics Canada 2018). Briefly, the CCHS is a cross-sectional survey administered at the sub-provincial level, used to gather estimates of health determinants, health status and healthcare utilization. The CCHS is administered by Statistics Canada and is representative of 98% of the Canadian population aged ≥12 years, living in private dwellings. Detailed survey methodology is available in existing literature (Statistics Canada 2018). The sample size for this survey was 40,199; excluding respondents under 18 years of age, the final sample size used in analyses for this study was 36,920, representing 10,732,847 when weighted. For individuals missing covariate information (n = 117) that is required for the probabilities calculation (i.e., missing information on at least one variable required for the calculation), they were assigned the mean predictive probability from the overall cohort, as recommended by Harrell (2001). This approach was chosen because it would not change the overall predicted risk and allows for the number of cases to reflect the entire population without excluding those with missing values, which is important for estimating the HRU burden.

Descriptive statistics were calculated for sociodemographic and health behaviours at baseline (i.e., CCHS interview year) according to the overall cohort (Table 1). The HRUPoRT was used to estimate the five-year predicted risk by important population subgroups, including sex, age group, ethnicity, immigration status, BMI, education, household income, smoking status, physical activity, alcohol consumption, number of health risk behaviours and the number of chronic conditions. The risk of becoming an HRU was calculated by multiplying individual probabilities estimated by the HRUPoRT (ranging from 0 to 1) by 100. Statistics Canada sample weights were applied to each individual probability to generate the number of new HRU cases that is reflective of the Ontario population.

Intervention scenarios

In addition to the baseline estimates, we ran two intervention scenarios to examine how implementing prevention programs aimed at reducing new HRUs would affect the total predicted number of HRUs and the cost to the healthcare system.

First, we modelled a high-risk strategy in which individuals (65+) with multimorbidity and individuals (65+) without multimorbidity were targeted. A respondent was defined as having multimorbidity if they reported having two or more of the following conditions: self-reported asthma, arthritis, back problems, migraine headaches, chronic obstructive pulmonary disease, diabetes, hypertension, heart disease, cancer, stomach or intestinal ulcers, stroke, urinary incontinence, bowel disorder, mood disorder and anxiety disorder. The second intervention scenario was a community-wide strategy that targeted those with "any one" or "any two" health risk behaviours (including heavy alcohol consumption, overweight/obesity, current smoking and physical inactivity). Heavy drinking behaviour was specified using cut-points

for daily alcohol consumption and the presence of bingeing behaviour. The definition of overweight/obesity was based on the World Health Organization cut-offs (WHO 2000). Smoking behaviour was defined by combining separate questions about smoking status, daily cigarette consumption and past smoking behaviour. We categorized current smokers as heavy or light smokers. Physical inactivity was calculated using average metabolic equivalent of task (MET) per day derived from an aggregate list of leisure-time physical activities (frequency and duration) that were examined in the CCHS. The definition used to capture each risk factor variable can be found in Table A2, available online at longwoods.com/content/26433. These intervention scenarios were specifically selected based on efforts to generate the greatest returns on investment as indicated by the high baseline risk associated with increasing age, the presence of multiple chronic conditions and health risk behaviours. In addition, these scenarios were chosen due to prior work that suggests health behaviours are meaningful risk factors for incurring costs associated with HRUs (Alberga et al. 2018; Rosella et al. 2014), interest in these subgroups from knowledge users in local health departments and to demonstrate the utility of the HRUPoRT in providing evidence to support the best candidates for prevention.

Application of risk reductions to target intervention groups

For each intervention scenario, we subtracted 2.5%, 5% and 10% from an individual-level risk (ranging from 0 to 100) of transitioning to an HRU in five years as specified by the HRUPoRT (Table A1, available online at longwoods.com/content/26433). For example, if an individual were assigned a risk of 20%, their respective risk would be reduced to 15%, applying a 5% absolute risk reduction. To aggregate individual-level risk to estimate the total number of new HRUs at the population level, we applied bootstrap replicate survey weights provided by Statistics Canada to accurately reflect the Ontario population and account for the complex survey design of the CCHS. Weighted 95% confidence limits were calculated for all descriptive analyses. All statistical analyses were carried out using SAS version 9.4 (SAS Institute Inc., Cary, North Carolina, US).

Attributable cost estimates

To calculate healthcare costs of HRUs, including the associated costs averted with each prevention scenario, we used cost estimates from a previous study of ours that linked Ontario CCHS respondents to administrative data, estimated healthcare spending and ranked individuals in Ontario according to gradients of cost based on the top 1%, the top 2–5%, the top 6–50% and the bottom 50% (Rosella et al. 2014). The healthcare spending captured costs accrued by each person covered by the single-payer government insurer, Ontario Ministry of Health and Long-Term Care, including in-patient hospital stay, emergency department visits, same-day surgery, stays in complex continuing care hospitals, in-patient rehabilitation, long-term care, home care, in-patient psychiatric admissions, physician services and prescriptions for individuals eligible for the Ontario Drug Benefit program; the costing methodology is described in Wodchis et al. (2013). All costs are reported in 2016 Canadian dollars.

To determine total healthcare costs of HRUs in our study, we took 20% of 758,000 to ascertain the top 1% of HRUs and multiplied this value by $53,150 (i.e., the average per-person expenditure across healthcare services for the top 1%). We then took the remaining HRUs and multiplied this value by $13,450 (i.e., the average per-person expenditure across healthcare services for the top 2–5%). To determine cost estimates associated with the population subgroups, we took 20% of the number of HRUs averted (i.e., the results from the HRUPoRT after baseline reductions to risk were applied) to ascertain the top 1% of HRUs and multiplied this value by $53,150 (i.e., the average per-person expenditure across healthcare services for the top 1%). We then took the remaining HRUs and multiplied this value by $13,450 (i.e., the average per-person expenditure across healthcare services for the top 2–5%). The same approach was repeated for each prevention scenario. For further details on how cost reductions associated with each prevention scenario were estimated, see Table A3, available online at longwoods.com/content/26433.

In recognizing that not all healthcare costs among HRUs are avoidable, we present the five-year total cost of each prevention scenario and the five-year total cost that accounts for a baseline level of costs per person. To account for a baseline level of costs, we applied the average cost per person ($1,935) of a non-HRU to the predicted number of HRUs averted and subtracted this value from the five-year total cost. All cost estimates are presented with associated ranges to show uncertainty in the estimates.

Results

Overall, based on the 2013–2014 population in Ontario, the risk of transitioning to an HRU is 7.09%, translating to 758,000 new HRU cases in Ontario by 2018–2019. The five-year baseline risk for HRUs in the overall population and by important subgroups is reported in Table 1. Males are at a greater risk of transitioning into HRU status (five-year HRU risk of 7.42%) than females (five-year HRU risk of 6.78%) and are predicted to amount to 14,000 more HRU cases than females. Five-year HRU risk varies by age, whereby as age increases, the risk of becoming an HRU also increases with a risk of 1.10% among those 18-34 years compared to a risk of 21.20% among those 65 years and older. Individuals of white ethnicity are at a greater risk of becoming an HRU (five-year HRU risk of 8.14% compared to 4.29% among visible minorities) and are predicted to contribute the greatest number of HRU cases (n = 608,000), compared to visible minorities (n = 124,000). With the exception of being underweight, as BMI increases the predicted risk of becoming an HRU also increases (five-year HRU risk of 5.29% among normal weight compared to 7.96% among individuals who are overweight/obese). The largest number of HRU cases is predicted to occur among individuals with post-secondary education (n = 352,000); however, the greatest risk of becoming an HRU is among those with less than secondary school education (risk of 15.56% compared to a 5.53% risk among post-secondary graduates). Those in the lowest household income group are predicted to have the greatest HRU risk (five-year HRU risk of 10.18%) and the greatest number of cases (n = 222,000).

Considering health risk behaviours, former smokers are predicted to have the greatest risk of becoming an HRU (five-year HRU risk of 10.59%). However, the greatest absolute number of HRU cases is predicted to occur among non-smokers (n = 348,000) given that most of the population are non-smokers. This finding demonstrates that the number of predicted cases is both a function of level of risk and the distribution of risk among the population. Risk of becoming an HRU is greater among individuals who are physically inactive (five-year HRU risk of 8.31%). Individuals who are physically inactive are also predicted to contribute the greatest number of HRU cases (n = 416,000) compared to those who are active (n = 283,000). Those who are non-drinkers have both the greatest risk of becoming an HRU (five-year HRU risk of 7.65%) and are expected to contribute the largest number of cases (n = 469,000). As the number of health risk behaviours increases, the risk of becoming an HRU also increases (from 6.14% among those with zero health risk behaviours to 8.20% among those with ≥3 health risk behaviours). The largest number of new HRUs is expected to occur among those with 1–2 health risk behaviours. Finally, those with multimorbidity have three times the risk of becoming a new HRU than those with zero chronic conditions (five-year HRU risk of 12.99% compared to 4.35%, respectively). The number of predicted cases reflects the variation in risk across the population, in addition to the distribution of subgroups within the Ontario population.

TABLE 1. Baseline HRU risk overall and by important subgroups in the CCHS 2013–2014 Ontario cohort

	Overall (36,920) 10,732,847	**Five-year HRU risk (%)**	**Number of new HRU cases (thousands)**
	Percent of population*	Estimate	Estimate
Overall	100	7.09	758
Sex (male)	48.67 (48.54, 48.78)	7.42	386
Sex (female)	51.34 (51.22, 51.46)	6.78	372
Age group (years)			
18–34	28.75 (28.22, 29.28)	1.10	32.8
35–49	25.99 (25.21, 26.78)	2.37	65.6
50–64	26.62 (25.99, 27.26)	8.33	237
65+	18.63 (18.58, 18.68)	21.2	422
Ethnicity			
White	69.79 (68.75, 70.84)	8.14	608
Visible minority	27.09 (26.04, 28.13)	4.29	124
Immigration status			
Canadian-born	63.40 (62.34, 64.46)	6.71	455
Immigrant	32.93 (31.86, 34.01)	7.69	271
BMI			
Underweight	2.50 (2.21, 2.79)	5.74	15.3

	Overall (36,920) 10,732,847	Five-year HRU risk (%)	Number of new HRU cases (thousands)
Normal weight	40.54 (39.65, 41.42)	5.29	229
Overweight or obesity	50.81 (49.93, 51.69)	7.96	433
Individual education			
Less than secondary school graduation	11.94 (11.29, 12.60)	15.56	199
Secondary school graduation	21.62 (20.81, 22.44)	7.12	165
Some post-secondary	5.25 (4.80, 5.69)	3.97	22.3
Post-secondary graduation	59.74 (58.75, 60.72)	5.53	352
Equivalized household income quintile			
Lowest	20.34 (19.51, 21.17)	10.18	222
Low-middle	19.51 (18.75, 20.27)	9.09	190
Middle	19.68 (18.96, 20.39)	6.64	140
High-middle	19.68 (18.89, 20.47)	5.70	120
Highest	20.79 (20.05, 21.54)	3.96	87.5
Smoking status			
Current smokers	17.87 (17.17, 18.56)	7.05	134
Former smokers	20.57 (19.86, 21.28)	10.59	233
Non-smoker	57.56 (56.64, 58.47)	5.67	348
Physical activity			
Physically active (≥1.5 METs/day)	52.20 (51.19, 53.21)	5.20	283
Physically inactive (<1.5 METs/day)	47.80 (46.79, 48.81)	8.31	416
Alcohol consumption			
Heavy drinker	7.44 (7.00,7.89)	4.86	38.5
Moderate drinker	18.66 (17.91, 19.41)	6.45	129
Light drinker	13.15 (12.46, 13.83)	6.21	87.4
Non-drinker	57.38 (56.44, 58.32)	7.65	469
Number of health risk behaviours§			
0	22.26 (21.52, 23.00)	6.14	146
1	40.74 (39.81, 41.68)	6.29	274
2	29.53 (28.67, 30.38)	8.63	273
>3	7.47 (6.96, 7.98)	8.20	65.6
Number of chronic conditions¶			
0	68.25 (67.42, 69.08)	4.35	316
>1	31.75 (30.92, 32.57)	12.99	443

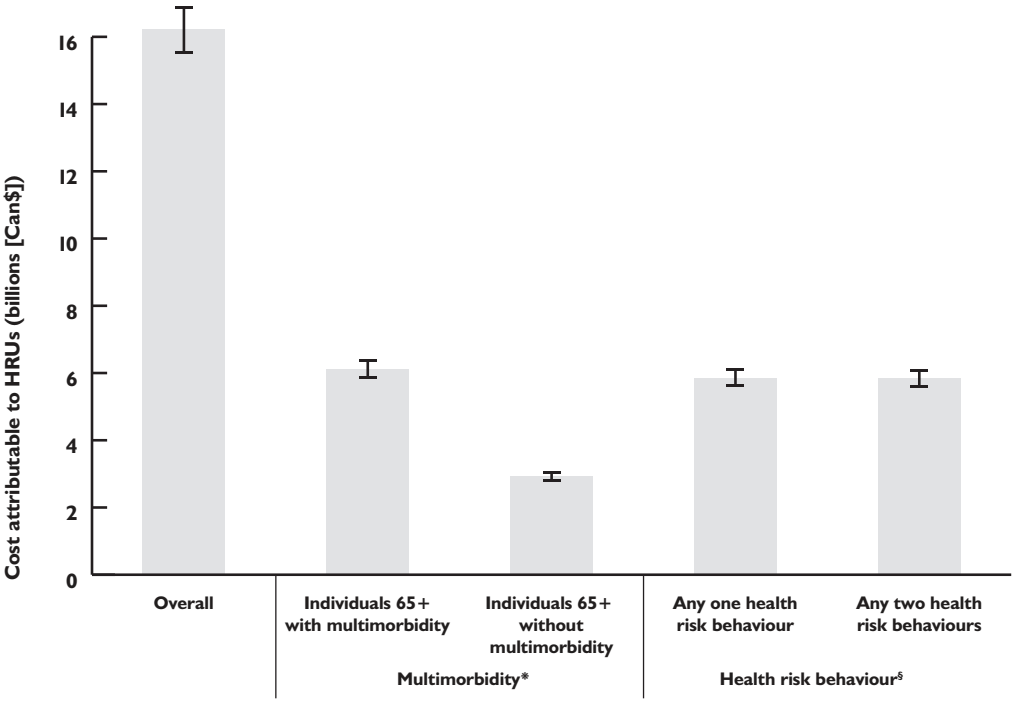
* Weighted using bootstrap weights as described by Statistics Canada. Column percentages do not total 100% where missing values are not reported.

§ Including heavy alcohol consumption, overweight/obesity, current tobacco use and physical inactivity.

¶ >1 chronic condition, including self-reported asthma, arthritis, back problems, migraine headaches, chronic obstructive pulmonary disease, diabetes, hypertension, heart disease, cancer, stomach or intestinal ulcers, stroke, urinary incontinence, bowel disorder, mood disorder and anxiety disorder.

Overall, the HRUPoRT predicted 758,000 new HRU cases in Ontario by 2018–2019, resulting in $16.20 billion in healthcare costs (Figure 1). Without intervention, the HRUPoRT estimated 286,000 new HRU cases among those 65+ with multimorbidity and 137,000 among those 65+ without multimorbidity. Altogether, these two segments of the population are estimated to cost $6.11 billion and $2.93 billion, respectively. Moreover, without intervention, the HRUPoRT estimated 273,000 new HRU cases among those with "any one" health risk behaviour and "any two" health risk behaviours, resulting in a cost of $5.85 billion and $5.83 billion to the healthcare system, respectively.

FIGURE 1. Baseline scenario of healthcare costs attributable to HRUs and corresponding costs associated with each prevention scenario, Ontario, 2011–2012 to 2018–2019



* >1 chronic condition, including self-reported asthma, arthritis, back problems, migraine headaches, chronic obstructive pulmonary disease, diabetes, hypertension, heart disease, cancer, stomach or intestinal ulcers, stroke, urinary incontinence, bowel disorder, mood disorder and anxiety disorder.

§ Including heavy alcohol consumption, overweight/obesity, current tobacco use and physical inactivity.

If a targeted intervention approach were put in place that resulted in a 5% reduction in risk among those 65+ with multimorbidity, it is estimated that we would save 59,100 new HRUs, resulting in $1.26 billion in savings (Table 2). In contrast, if a targeted intervention approach were implemented that resulted in a 5% reduction in risk among those 65+ without multimorbidity, we would prevent approximately 40,400 new HRUs producing a savings of $863 million.

Alternatively, if a population-level intervention were carried out that resulted in an average 5% reduction in the risk of becoming an HRU among those with "any one" health risk

behaviour in the population, the total number of HRU cases prevented would amount to approximately 125,000, equating to $2.67 billion in healthcare savings for Ontario. Finally, an intervention targeting individuals with "any two" health risk behaviours that produced a 5% reduction in risk would avert approximately 109,000 new HRUs and save $2.34 billion in healthcare costs. Reference costs are also provided for context, which include the baseline estimate among non-HRU within the target group (see Table 2).

TABLE 2. Healthcare costs averted with estimated five-year costs according to two intervention scenarios: Ontario 2011–2012 to 2018–2019

	Number of HRUs averted (thousands)	Five-year total cost reductions in billions (range) Can$	Five-year baseline total cost in billions (range; reference) Can$*
Individuals 65+ with multimorbidity§			
2.5%	29.6	$0.632 (0.606–0.659)	$0.575 (0.550–0.600)
5%	59.1	$1.26 (1.21–1.31)	$1.15 (1.10–1.20)
10%	117	$2.50 (2.40–2.61)	$2.27 (2.18–2.37)
Individuals 65+ without multimorbidity§			
2.5%	20.2	$0.432 (0.414–0.451)	$0.393 (0.376–0.410)
5%	40.4	$0.863 (0.827–0.900)	$0.785 (0.752–0.819)
10%	76.1	$1.63 (1.56–1.70)	$1.48 (1.42–1.54)
Any one health risk behaviour¶			
2.5%	79.8	$1.71 (1.63–1.78)	$1.55 (1.49–1.62)
5%	125	$2.67 (2.55–2.78)	$2.42 (2.32–2.53)
10%	182	$3.90 (3.74–4.07)	$3.55 (3.40–3.70)
Any two health risk behaviours¶			
2.5%	66.2	$1.42 (1.36–1.48)	$1.29 (1.23–1.34)
5%	109	$2.34 (2.24–2.44)	$2.13 (2.04–2.22)
10%	166	$3.54 (3.39–3.69)	$3.22 (3.08–3.36)

* The average per-person cost for all Ontarians was applied to the number of HRUs averted and subtracted from the five-year total cost to account for a baseline level of cost.

§ >1 chronic condition, including self-reported asthma, arthritis, back problems, migraine headaches, chronic obstructive pulmonary disease, diabetes, hypertension, heart disease, cancer, stomach or intestinal ulcers, stroke, urinary incontinence, bowel disorder, mood disorder and anxiety disorder.

¶ Including heavy alcohol consumption, overweight/obesity, current tobacco use and physical inactivity.

Discussion

Between 2013–2014 and 2018–2019, new HRU cases are estimated to result in $16.20 billion in Ontarian healthcare costs. To our knowledge, this is the first study to model the impact of prevention approaches to reduce the burden of HRUs of the health system. These models can help estimate the population impact of a range of intervention scenarios. To improve population and public health while containing costs, it is important to define populations that can be targeted to potentially impactful interventions. Appropriate and timely public health interventions can lead to considerable savings in future healthcare spending; however, due to scarce resources, decisions must be made to identify the best candidates for such interventions.

Despite recent literature that identifies behavioural risk factors to be associated with hospitalization, prolonged hospital stay, and overall high-cost utilization in the healthcare system (Manuel et al. 2014, 2016; Rosella et al. 2014), no prevention programs designed to target HRUs have addressed upstream health behaviours. Our study provides further evidence to support that health promotion and prevention strategies designed to reduce the burden of health risk behaviours at the population level, which in turn mitigate the pathway to HRUs, would have a more meaningful impact on conserving health system costs than targeting individuals after they develop chronic disease and multimorbidity. This population risk tool is particularly useful because it assists in identifying high-risk groups, whereby public health interventions may offer the greatest return on investment and considerable cost savings (Masters et al. 2017). However, population-wide efforts to encourage behaviour change are complex and nested within the broader socio-political context. Successful policy and program interventions aimed at targeting population health behaviours require multi-stakeholder and multi-sectoral collaboration, making such approaches difficult to initiate and sustain (Rosella and Kornas 2018).

Alternatively, reducing the risk of becoming an HRU among individuals with multimorbidity may also represent a meaningful approach but to a lesser extent than targeting health risk behaviours. The challenges associated with reducing healthcare use among individuals who have already developed multimorbidity are exacerbated by health systems that are siloed and have been designed to treat individual diseases with many treatments being medically necessary to sustain or increase quality of life (Barnett et al. 2012). In most cases, suitable interventions for individuals with multimorbidity are multi-faceted and oriented toward a person-centred perspective while acknowledging an individual's broader social and historical context (Poitras et al. 2018). Multimorbidity is more than just a health systems issue; it is also largely driven by health behaviours and the upstream social determinants. To that effect, investments in improving health behaviours and social supports, such as housing and basic income, are likely to translate into reductions in multimorbidity (Rosella and Kornas 2018).

In April 2019, the Government of Ontario announced efforts to restructure the healthcare system into an integrated model for organizing and delivering healthcare. These changes include the creation of Ontario Health Teams comprising groups of providers and organizations that are clinically and fiscally accountable for delivering care to a defined population (Ontario Ministry of Health and the Ontario Ministry of Long-Term Care 2019). These system changes have galvanized the attention of health decision makers leading Ontario Health Teams to identify population segments that consume a high proportion of costs. As such, population-based risk tools that can model the effect of interventions on containing costs become important decision-making tools. Furthermore, a strength of the HRUPoRT is the ability to incorporate upstream social determinants of health that have been identified as important targets in early reflections from Ontario Health Teams (Downey et al. 2020).

This work has important implications for policy makers seeking to improve healthcare spending in Ontario. First, our findings suggest that individuals with multiple health

risk behaviours should be considered in population approaches to reduce the burden of HRUs. This study also demonstrates the use of a population-based risk prediction tool (HRUPoRT) that can be leveraged using routinely collected representative population data to predict HRUs. Given that this algorithm is built on population survey data, the risk prediction model can be used by a broad audience, such as decision makers in local health departments to help understand characteristics of HRUs, including overall population risk, distribution of risk in the population and the total number of new cases in the population, which facilitates evidence-based decision making.

Limitations

One limitation of the HRUPoRT is that while the tool was applied to CCHS data that are representative of the majority of the Ontario population, some population subgroups were not surveyed by the CCHS, most notably on-reserve Indigenous peoples. This is an important consideration because the ability to generalize our results to important populations at risk, who may have greater health behaviour risk factors, is limited. Due to the sampling frame, the estimated number of new HRUs and corresponding costs is likely an underestimate, given that CCHS respondents are typically healthier than the general population (Keyes et al. 2018). In addition, this study used self-reported exposure to health risks, which can result in misclassification. It is possible that self-reported behaviours are an underestimate of the true risks (Newell et al. 1999), although several validation studies have been carried out to show good agreement (Wong et al. 2012). Despite this limitation, the use of self-reported risk factor measurements leveraged in the HRUPoRT algorithm were found to be accurate for HRU transitions (Rosella et al. 2018).

Healthcare costs were estimated based on publicly funded healthcare coverage in Ontario using an established costing methodology at ICES, Ontario, that captures new HRUs across the main domains of spending. The HRUPoRT does not capture spending in domains that are not covered in a single-payer system, including dental visits, eye care, physiotherapy, chiropractic and other allied health professions, such as drug claims for those under 65 years old (Rosella et al. 2018). In addition to the direct health system costs, the model does not capture costs for HRUs that may include out-of-pocket expenses or indirect emotional and social costs for patients, family and friends. Avoidable healthcare costs due to HRUs by population subgroups may have been overestimated given that not all healthcare costs are avoidable. To facilitate a balanced interpretation of this estimate, we have supplemented this information with an estimate that accounts for a baseline cost per person. Finally, individuals who experience several HRU transitions or new transitions to HRU status within the first year are not captured, although prior literature suggests that HRU status remains relatively stable (Wodchis et al. 2016). Given this, the HRUPoRT projections are likely to underestimate the true HRU burden in the population. Furthermore, we acknowledge that HRU risk-reduction values associated with modifying health risk behaviours are not well established; however, one risk prediction tool estimated that a weight-loss

intervention targeted at severely obese individuals was expected to reduce the risk of high medical spending in the subsequent year by 1.5–27.4% depending on the baseline level of overweight/obesity (Snider et al. 2014).

Conclusions

Containing healthcare spending has been identified by governments in multiple health systems as a top priority for improving efficiency and sustainability. Population risk tools, such as the HRUPoRT that considers the upstream determinates of HRUs, can be leveraged to improve health planning and to explore the impact of different prevention strategies and associated cost savings up to five years in the future. In addition, predictive tools such as the HRUPoRT can assist in using evidence-based planning to identify optimal population subgroups for intervention and provide insight into how extensive a strategy must be to achieve the desired risk reduction in the number of new HRU cases.

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RESEARCH PAPER

Paramedics Have Untapped Potential to Address Social Determinants of Health in Canada

Potentiel inexploité des ambulanciers paramédicaux pour la question des déterminants sociaux de la santé au Canada

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Abstract

The role of paramedics, including select paramedics providing primary and preventive care in homes and community settings, is evolving in health systems around the world. These developments are associated with improvements in health outcomes, improved access to services and reduced emergency department use. Building on these existing trends in paramedicine, and because social conditions contribute to illness and are strong predictors of future health service use, addressing patients' social needs should be integrated into core paramedic practice in Canada. We discuss how paramedic education, culture and governance could better enable paramedics to address the social determinants of health.

Résumé

Le rôle des ambulanciers paramédicaux, notamment ceux qui fournissent des soins primaires et préventifs à domicile ou en milieu communautaire, est en pleine évolution dans les systèmes de santé du monde entier. Ces changements sont associés à une amélioration des résultats cliniques, à un meilleur accès aux services et à une utilisation réduite des services d'urgence. Dans la foulée des tendances actuelles en matière de services paramédicaux – et puisque les conditions sociales influent sur l'état de santé et constituent de forts prédicteurs de l'utilisation des services de santé – il faudrait intégrer les besoins sociaux des patients dans la pratique paramédicale de base au Canada. Nous discutons de la façon dont l'éducation, la culture et la gouvernance paramédicales pourraient mieux permettre aux ambulanciparamédicaux de tenir compte des déterminants sociaux de la santé.

Introduction

Social determinants of health are "the conditions of daily life, the circumstances in which people are born, grow, live, work and age" and include our income, housing conditions, employment status, food security and social support networks (World Health Organization 2008). Epidemiological studies have strongly supported the influence of social determinants on morbidity, mortality and health status. Precise estimates vary, but it is likely that at least half of the differences in health status observed between groups can be explained by social factors (Keon and Pépin 2009). Social determinants have been found to predict who becomes a frequent user of health services, including paramedic services and emergency departments (Fitzpatrick et al. 2015).

Paramedics regularly engage with patients who have complex health and social service needs, including people with precarious housing and employment status and those with chronic addiction and mental health conditions (McCann et al. 2018). Not all emergency calls are acute, and up to 50% of cases that paramedics attend may not need care at an emergency room (Snooks et al. 2013). As mobile healthcare professionals who spend one-on-one time with patients, paramedics are uniquely positioned to understand and address the social factors that contribute to patients' health.

In this commentary, we explore how paramedics can address the social determinants of health. We draw on literature from around the world and discuss the implications for Canadian jurisdictions.

Paramedicine Is Evolving

Paramedics have historically only been responsible for providing medical care before and during transport to an emergency department (ED). This is changing: paramedicine has evolved over the last two decades, in both acute and non-acute settings. Specially trained paramedics in many jurisdictions conduct medical, social and environmental assessments and provide preventative care to patients without transport to a hospital. In other cases, they transport patients to alternative destinations or refer them directly to follow-up services. This is known as *community paramedicine*, also sometimes referred to as *mobile integrated healthcare* in the US (Bigham et al. 2013). Originally conceived to extend access to services for rural, underserved and vulnerable populations, community paramedicine programs now exist in many countries, including Canada, the UK, the US and Australia (Choi et al. 2016). In the UK, Australia and New Zealand, there are also *extended care paramedics* and *paramedic practitioners* providing out-of-hospital care. The breadth and scope of programs vary, exist in both urban and rural settings and are context-specific. A systematic review found that community paramedicine is associated with improved health outcomes, reductions in healthcare spending and reduced ED use (Bigham et al. 2013). These programs also tend to increase patient satisfaction (Dainty et al. 2018) and are examples of patient-centred, integrated care (Rasku et al. 2019).

These newer models of paramedic care suggest that paramedics are capable of addressing social factors when appropriately educated and supported. In Canada, most community paramedicine programs are targeted at a small number of patients and are not available to everyone. Over 70% of these programs operate through scheduled home visits, where patients have been selected using operationally driven criteria such as being a "frequent caller" or at-risk for hospital readmission (Chan et al. 2019). Less than 20% of programs include initiatives that occur on an unscheduled emergency call. As such, assessing and treating for social determinants is not integrated into front-line paramedics' scope of practice, but rather, it is left to a small number of community paramedics treating a relatively small number of patients.

Integrating a Social Determinants Lens into Core Paramedic Practice

Not all paramedics can or should be community paramedics, and not all patients need the in-depth case management that community paramedicine typically offers (Leyenaar et al. 2018). However, given that many emergency calls are non-urgent, exacerbated by social factors (Agarwal et al. 2019) and related to gaps in primary care (Booker et al. 2014), all paramedics could play a role in addressing social determinants. Two specific ways in which

core paramedic practice could be enhanced are (i) conducting better social and environmental assessments and (ii) directly conferring with primary care teams and community-based organizations.

Conducting social and environmental assessments

Several projects and robust trials have evaluated the impact of paramedics conducting social assessments. In Hamilton, Ontario, community paramedics utilize lifestyle-based risk questionnaires and pre-specified algorithms to refer patients to preventative care (Agarwal et al. 2018). Another study validated paramedic use of a clinical decision tool to assess risk factors for independence loss in the elderly and initiate preventative care (Lee et al. 2016). Most municipalities in Ontario have integrated some form of Community Referral by Emergency Medical Services, a program whereby any paramedic on an emergency call can initiate community paramedicine follow-up on the basis of factors such as risk of falls, medication non-compliance, poor hygiene and caregiver burnout (MOHLTC 2017). Similar programs exist in Manitoba and Alberta.

Paramedics on emergency calls could be further equipped with tools and questionnaires to assess patients for risks associated with housing, income and food security. Studies from primary care and pediatrics suggest that these social needs can be addressed. A growing number of clinically validated tools are available for the assessment of these risks. Paramedic services could make such tools available to their staff, educate them on social assessment and encourage them to gather the patients' social history where relevant. When paramedics interact with patients in the community, they can document important contextual and circumstantial information about a patient's living conditions that impact their health. This must be done with explicit patient consent and in a manner that is sensitive to privacy concerns. Current patient-care records could be updated for fields to contain this information. As electronic medical records become more integrated, these assessments could be shared, with patient consent, with other members of the care team to assist with care planning and activation of additional services.

Directly conferring with primary care teams and community-based organizations

Thorough assessments can help paramedics identify unmet social and health service needs and gaps in care. While in some cases it may be appropriate to refer a patient to community paramedicine, paramedics on an emergency call could also consider directly contacting other members of the patient's care team, including family physicians and social workers. This would imply a shift in the norms of paramedicine toward shared responsibility for care continuity, rather than simply transporting a patient to an ED where patients may not receive that level of care coordination (Hjälte et al. 2007).

Paramedics could be oriented to the social services and agencies that operate in their

area. These include legal aid, housing, food banks, shelters, detox centres and employment agencies. Paramedic services could establish agreements that allow staff to confer with these agencies while on an emergency call and directly refer patients based on agreed-upon criteria. This would allow paramedics to expand the range of options they can exercise to address the social determinants of health. While nearly 40% of community paramedicine programs already collaborate with community services such as detox facilities and mental health hospitals (Chan et al. 2019), these options are unavailable to most Canadian paramedics on emergency calls.

Implications for Education, Culture and Governance

To better enable paramedics to address social determinants of health, change is needed in at least three broad, interconnected areas: education; culture; and governance and payment models. Healthcare is under provincial jurisdiction in Canada and some paramedic services are under municipal control. While there are common themes, any changes would need to be adapted to uniquely local contexts across the country.

Education

Currently, all Canadian paramedics are educated at the diploma or certificate level through vocational institutes and private colleges. Their curriculums are governed by standards set by provincial licensing bodies or Ministries of Education and informed by the National Occupational Competency Profile for paramedics (NOCPs). These competencies focus on knowledge and skills in emergency medicine. Assessing social risks, integration with community services and patient advocacy are not emphasized. Only the small number of paramedics who become community paramedics, often later in their career, receive supplemental training in these topics. The NOCPs could be updated to include knowledge and skills about social determinants and primary care coordination. Recent work on developing a Canadian paramedic profile (Tavares et al. 2016) is a promising step, and it could help inform a new framework for paramedic education in Canada. This would further be aided by establishing faculties or departments of paramedicine at universities with investment in curriculum development and pedagogical research.

Paramedic curricula worldwide are undergoing reform to reflect the changing role of paramedics in health systems (Hou et al. 2013), with the UK, Australia and New Zealand establishing bachelors- and masters-level degree programs in paramedicine (O'Meara et al. 2017). This transformation is starting in Canada as well. Ontario is moving toward three-year advanced diplomas as a minimum entry to practice for paramedics. A few universities now offer degrees in paramedicine, including in Alberta, Ontario and Prince Edward Island; however, degrees are not mandatory for practice in Canada. Transition to university settings presents an opportunity for paramedic educators to collaborate with faculties of nursing, social work and medicine. Paramedics need a theoretical foundation in topics such as how social factors impact health, power and privilege and the role of race, gender and

socio-economic striations in contributing to health inequity. This could be supplemented by teaching paramedics how to elicit a social history during patient care, collaborate with different providers in the community and consider how inequities impact patients' experiences in the health system. Paramedic programs could also consider partnering with social service organizations and local clinics to expose paramedic students to underserved populations through field placements and coach them on how to interact with a diversity of patients. These changes would pave the way for a generation of paramedics better equipped to address social determinants.

Culture of paramedicine

Paramedicine in many western nations, including Canada, has its roots in trauma and transport medicine practised by returning soldiers after the World Wars (Shah 2006). Despite the complex social problems such as mental health, poverty and substance abuse that paramedics frequently encounter, there are conflicting views within the profession on what is within their scope of practice (McCann et al. 2018). Paramedics are still taught and indoctrinated with the sentiment that a paramedic's role is to respond to high-acuity biological emergencies and rapidly transport patients to a hospital. The organizational cultures and operational realities they operate within reinforce these ideas, and paramedics performing roles such as referrals to community services can experience "role confusion" (Brydges et al. 2015).

There is need for the paramedic profession in Canada to update its definition of a "paramedic" and embrace an identity that more fully reflects the broad spectrum of primary and emergency care paramedics now provide. This will help normalize practices such as assessing for social determinants and conferring with other care organizations. National associations such as the Paramedic Chiefs of Canada and the Paramedic Association of Canada as well as provincial and municipal paramedic labour unions all need to agree on a unified paramedic identity. This needs to be reflected in their branding and messaging to help the paramedic workforce coalesce around shared principles and enable other health providers to better collaborate with paramedics.

Governance and payment models

Paramedic governance varies significantly across Canada. Historically, paramedic scope of practice has been defined by a small number of emergency physicians with a narrow focus on treating acute emergencies such as trauma and cardiac arrest. However, there is a global trend toward professionalization and self-regulation (Maguire et al. 2016). Five Canadian provinces now have self-governing colleges of paramedicine. There have been similar developments in the UK, Australia and New Zealand over the past two decades. As paramedics in Canada become independent clinicians leading their own profession, regulatory bodies could support practices to address the social determinants of health. These topics could be integrated into mandatory continuing medical education and included as formal clinical guidelines for paramedics.

Paramedic services tend to be funded on the basis of the number of patients transported and evaluated on the speed of their response time. As such, paramedic organizations are not necessarily incentivized to address social determinants of health especially when they do not involve transport to a hospital (Munjal et al. 2019). Changing this requires legislative or regulatory reform by provincial governments, as it relates to healthcare billing and performance indicators. The form these changes take depends on the organizational relationship between paramedics and the health system, which varies between the provinces. In provinces such as British Columbia (BC), paramedicine is a centralized provincial service managed by the Provincial Health Services Authority. This is in contrast with Saskatchewan, Ontario and Quebec, where hundreds of municipal and private organizations provide paramedic services. BC, Alberta and Nova Scotia now have "treat and release" and "treat and refer" guidelines, whereby paramedics can provide some alternate services to transport, but how these costs are accounted for is unclear. The Ontario government is in the early stages of piloting payment mechanisms for what they call "new models of care" provided by paramedics on emergency calls (Government of Ontario 2019). Better integration with the health system or new payment models for paramedic services may help realign the incentive to address social determinants, particularly where there are cost savings that occur in other parts of the health system as a result of paramedic care.

Conclusion

As complex needs and aging populations strain healthcare systems across Canada, we need to find creative and innovative ways to utilize existing resources. Paramedics are part of these untapped resources, which, if utilized wisely, can help reduce the healthcare burden from social determinants and improve quality of care. This is compatible with existing trends in paramedic education, culture and governance. As provinces across the country re-think the role of paramedics in their health systems, the time is ripe to integrate social determinants of health into core paramedic practice.

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RESEARCH PAPER

What Factors Impact Implementation of Critical Incident Disclosure in Ontario Hospitals: A Multiple-Case Study

Quels facteurs influent sur la mise en œuvre de la divulgation d'incidents critiques dans les hôpitaux ontariens : une étude de cas multiples

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Abstract

Guidelines and legislation prescribe how hospitals should conduct critical incident disclosures with patients. However, variation in secondary disclosure implementation can occur. Using the Consolidated Framework for Implementation Research, this qualitative multiple-case study explored the factors that impact Ontario hospitals' secondary disclosure of critical incidents. The study concludes that while hospitals generally implement guidelines consistently, complex environments and differing professional backgrounds lead to variations. Consequently, hospitals should address timing delays, improve documentation and enhance support to clinicians who conduct the disclosures. Policy makers should consider the benefits

and challenges of written disclosure, and offering patients a choice in the setting where disclosure occurs, as potential improvements.

Résumé

Les lignes directrices et la législation prescrivent la façon dont les hôpitaux doivent divulguer les incidents critiques qui concernent les patients. Cependant, il peut y avoir une variation dans la mise en œuvre de la divulgation secondaire. À l'aide du cadre consolidé pour la recherche sur la mise en œuvre, cette étude qualitative de cas multiples a permis d'explorer les facteurs qui influent sur la divulgation secondaire des incidents critiques dans les hôpitaux ontariens. L'étude conclut que si les hôpitaux mettent en œuvre les directives de manière cohérente, les environnements complexes et les divers antécédents professionnels entraînent des variations. Par conséquent, les hôpitaux devraient réduire les délais, améliorer la documentation et renforcer le soutien aux cliniciens qui procèdent aux divulgations. Les décideurs devraient considérer, comme mesures d'amélioration potentielle, les avantages et les défis de la divulgation écrite et ils devraient offrir aux patients le choix du cadre où la divulgation a lieu.

Introduction

Patient safety literature has demonstrated that open, transparent disclosure of critical incidents to patients and families improves confidence in the health system (Gallagher et al. 2007; López et al. 2009; O'Connor et al. 2010). As a result, guidelines issued by agencies such as the Canadian Patient Safety Institute (CPSI), Accreditation Canada and the Healthcare Insurance Reciprocal of Canada (HIROC) outline the processes that hospitals should follow in conducting disclosure conversations (Accreditation Canada 2014; CPSI 2011; HIROC 2015). In Ontario, Regulation 965 of the *Public Hospitals Act* was amended to detail legislative requirements related to engaging the patient and family in disclosure, designating who is responsible for disclosure, noting when disclosure should occur and identifying how disclosures should be documented (Government of Ontario 1990).

Despite guidelines and legal requirements, the delivery of disclosure can vary (Bell et al. 2017). Variation in disclosure practices can be attributed to the lack of education and training needed to assist clinicians in disclosure (Manser 2011), fear of litigation (Iedema et al. 2011) and limitations in institutional support structures (Wu et al. 2013). Non-uniformity in critical incident disclosure can also be attributed to limited understanding of patient needs and the anticipation of adverse impacts on the patient–provider relationship (Bell et al. 2017; Kalra et al. 2013). Clinician experience in disclosure conversations has been shown to influence their effectiveness, with those with more experience being better attuned to using culturally sensitive, plain language when apologizing (Bell et al. 2017; Gallagher et al. 2006). A lack of strong leadership and role modelling is a factor in front-line clinicians hesitating to participate in the process (Harrison et al. 2017).

The existing literature primarily addresses implementation factors and barriers related to physician participation in disclosure. Limited research has explored how consistently disclosure guidelines are implemented in Canadian hospitals, involving not only physicians but also nursing and allied health professionals. Furthermore, there has been limited study of how hospitals complete secondary disclosure, the point at which the findings of a formal incident analysis are communicated with patients and families. To explore how these guidelines are applied in hospitals, a multiple-case study involving three Ontario hospitals was conducted using the Consolidated Framework for Implementation Research (CFIR) as a guiding analytical framework (Damschroder et al. 2009). This framework explores a wide variety of external, organizational, intervention, individual and process factors that shape implementation of a given intervention or policy. Exploring the research question "What factors impact implementation of critical incident disclosure guidelines in Ontario hospitals?" the study identifies key implementation considerations and offers suggestions on how to improve secondary disclosure guidelines and policies in Ontario hospitals.

Methodology

This study adopted an exploratory qualitative approach based on multiple cases using two data sources: semi-structured informant interviews and documentation analysis (Yin 2018). Consistent with a case-study approach, the CFIR (Damschroder et al. 2009) was used as a guiding conceptual framework. The CFIR identified 23 constructs that affected the implementation of a policy or intervention within five domains: policy/intervention characteristics; outer setting; inner setting; characteristics of individuals; and process factors. Approved by McMaster University's Research Ethics Board, the selection of case units included three acute-care hospitals in Ontario in distinctly different geographic areas of the province. The sample included hospitals within urban, suburban and rural settings to capture a range of contexts; however, the analysis did not compare findings along these lines to preserve confidentiality of the participating hospitals. Data sources included semi-structured interviews with multiple leaders within each hospital. The selection of hospital leaders was purposeful with informants being management leaders responsible for the overall process of disclosure or clinical leaders who have directly participated in disclosure discussions. Ten hospital leaders were interviewed between November 8 and 28, 2019, with four interviews at hospital 1 (H1) and three interviews each at hospitals 2 and 3 (H2 and H3). The sampling approach sought variation of professional perspectives, including at least one physician and one registered nurse from each hospital and three allied health professionals. Multiple professionals were interviewed from each hospital to identify a common organizational perspective rather than relying on a single leader to represent the entire hospital.

Interviews were conducted in person and by telephone and followed an established interview protocol. The protocol included 13 questions categorized into the five CFIR domains.

Interview participants were provided with the interview protocol and an overview of the CFIR ahead of time. The CPSI disclosure guidelines and the hospital's policy on disclosure were used as reference tools throughout the interviews. Interviews lasted approximately 30-45 minutes.

Upon receiving consent from participants, nine of the 10 interviews were audio-recorded and transcribed using a professional transcription service. The tenth participant consented to the interview but did not give consent to be audio-recorded. The tenth participant's interview was documented and transcribed manually.

The interview data were initially analyzed manually by case, using a coding and memo approach (Saldana 2013). The findings by hospital were categorized into themes and categories using deductive coding. Deductive codes were developed based on the CPSI disclosure guidelines, Ontario's legislative requirements (Regulation 965 of Ontario's *Public Hospitals Act*) and the CFIR model (CPSI 2011; Damschroder et al. 2009; Government of Ontario 1990). Findings from each hospital were then analyzed within the CFIR to identify commonalities for discussion.

Following the semi-structured interviews, the study's second component involved document analysis whereby individual hospital policies were deductively coded and compared to the (CPSI) guidelines and Ontario's legislative requirements to assess alignment. Individual hospital policies on disclosure of critical incidents were forwarded to the researcher by the hospital ahead of informant interviews. The results of the document analysis were triangulated with the interview results to assess if the implementation factors identified by informants were also contained or referenced in the hospital policy (Creswell and Creswell 2018).

Documents and conceptual frameworks

Three documents and frameworks were used as analytic guides. The first two documents used were the CPSI's Disclosure Guidelines and Regulation 965 of Ontario's *Public Hospitals Act* (CPSI 2011; Government of Ontario 1990). The third framework used in the study was the CFIR (Damschroder et al. 2009). The CFIR identified 23 constructs within five domains of implementation: intervention characteristics; outer setting; inner setting; characteristics of individuals; and process factors. These documents and frameworks formed the basis of the deductive codes by which the quantitative interviews and documentation analysis were studied.

Results: Implementation Factors

The following section presents the findings of each hospital case study and summarizes their commonalities.

Hospital 1 (H1)

The following table (Table 1) illustrates the CFIR factors H1 considers when implementing their disclosure policy.

TABLE 1. H1 implementation factors

CFIR Domain	Results
Intervention characteristics	• The hospital uses the CPSI guidelines to inform and hold itself accountable. • The hospital is most compliant with pre-disclosure preparation meetings. • The hospital has an opportunity to improve documentation in the health record.
Outer setting	• Different patient populations may impact use of sensitive, plain language. • Multiple patient events may influence timing and methods of disclosure. • The hospital references professional colleges to help convince those who are hesitant to disclose that they are supported by a third party.
Inner setting	• The hospital's culture of putting the patient first guides most disclosure conversations, but there is variation by program and profession. • Experience in disclosure impacts sensitivity of disclosure. • The hospital's complex setting can lead to challenges in scheduling that can delay disclosure and prevent offering patients a choice in the location of disclosure.
Individual characteristics	• Different professional backgrounds within the hospital impact approaches, with social workers seeing disclosure as therapeutic, nurses seeing it as a practice component and physicians seeing it as a clinical risk management strategy.
Process factors	• The hospital rarely takes time to reflect and evaluate how well they disclose. • The hospital noted the need to provide training and support for those who do not regularly disclose.

In summary, H1 indicated its patient experience culture was the strongest factor in its ability to disclose consistently with attention to preparation, supporting the patient clinically and ensuring the disclosure conversation communicates the facts and next steps. H1 leaders reference regulatory colleges, insurance constructs and legal requirements to convince clinicians who are hesitant to disclose that they are supported by their professional bodies. H1's busy environment often leads to postponements in the incident analysis, which in turn can delay secondary disclosure. H1 recognized that different patient populations require different approaches in terms of language and culture sensitivity. Due to scheduling challenges, H1 does not consistently offer patients the opportunity to conduct the disclosure conversation at a location of their choice. This is only offered if H1 proactively notices a different location may be needed or if a patient asks. While H1 agreed that they consistently documented secondary disclosure in the hospital incident reporting system, physicians may not consistently do so in the patient's health record. H1 leaders were incongruent in whether patients should receive either an explanation of the disclosure process or incident review recommendations in writing.

Hospital 2 (H2)

The following table (Table 2) illustrates the CFIR factors H2 considers when implementing their disclosure policy.

TABLE 2. H2 implementation factors

CFIR Domain	Results
Intervention characteristics	• The hospital uses the CPSI guidelines to inform their process. • The hospital is most compliant in preplanning disclosure by ensuring role clarification. • The hospital has opportunities for improvement, including the methods used for documentation and in the use of sensitive, plain language in disclosure conversations.
Outer setting	• Different patient populations may impact the use of sensitive, plain language, especially in areas such as pediatrics and mental health. • Multiple patient events may influence timing and methods of disclosure. • The hospital noted that patient cases involving outside legal agencies and coroners lead to greater compliance with policy, especially documentation.
Inner setting	• The hospital's mission and culture of patient first guides most disclosure conversations, but there is variation by program and profession. • The hospital's busy complex setting can lead to challenges in scheduling that can delay incident analysis and timing of disclosure and prevent offering patients a choice in the location of disclosure.
Individual characteristics	• Different professional backgrounds within the hospital impact approaches. • Physicians feel the emotional burden of disclosure as the most responsible provider and leader of disclosure discussion.
Process factors	• The hospital recognizes the need to slow down the pace of disclosure discussions, as not all patients' health literacy and reactions are the same. • The hospital is considering amending its practice to explain the process of disclosure and case review recommendations to patients and families in writing. • The hospital is building an in-house wellness program to specifically support clinicians during disclosure discussions as an alternative approach to traditional employee assistance programs.

In summary, H2's strong focus on quality and practice make disclosure a priority and enables greater role clarity. H2 noted that timeliness of secondary disclosure can be impacted when incidents involve multiple patients or other outside agencies. H2 also noted that different patient populations impact the language used in disclosure, based on the observation that conversations may vary with patients of lower economic status or certain cultural backgrounds. Physician leaders at H2 experience an emotional burden in disclosure given that they are designated as the "most responsible" for the patient's care and may feel shame for the error. As a result, H2 is developing an in-house program to train and emotionally support those who disclose given that traditional employee assistance programs may not be suitable. H2 participants agreed that they consistently document secondary disclosure in the hospital incident reporting system, but do not necessarily do so in the patient's health record. H2 is supportive of issuing the details of the disclosure process and incident recommendations in writing to patients and families.

Hospital 3 (H3)

The following table (Table 3) illustrates the CFIR factors H3 considers when implementing their disclosure policy.

TABLE 3. H3 implementation factors

CFIR Domain	Results
Intervention characteristics	• The hospital uses the CPSI guideline to inform its work. • The hospital is most compliant in adopting a multidisciplinary team approach. • The hospital has opportunities to improve the timeliness of the incident analysis and disclosure discussion.
Outer setting	• Different patient populations may impact the use of sensitive, plain language, especially those with lower health literacy. • Multiple patient events may influence timing and methods of disclosure. • The hospital references professional colleges to help convince those who are hesitant to disclose that they are supported.
Inner setting	• The hospital's senior team shares a mission and culture that prioritizes disclosure conversations, but variation within programs and professions impact timeliness and the clinician's ability to use plain, sensitive language. • The hospital's complex setting can lead to delays in scheduling that can impact incident analysis and timing of disclosure and prevent offering patients a choice in the location of disclosure.
Individual characteristics	• Different professional backgrounds within the hospital impact approaches. • Physicians feel the most responsible for the emotional burden of disclosures as the leaders of the disclosure discussion. • The personal experiences of hospital leaders as patients and families themselves have led to the use of more sensitive, non-clinical language in disclosure.
Process factors	• The hospital noted that improvements could be made to preplanning in order to support clinicians and the timing of disclosure. • The hospital is open to amending its practice to explain the process of disclosure to all the patients and families in writing. In the past, this has been done when requested.

In summary, although H3 noted senior team support for disclosure, the hospital stated they often rely on legislative requirements to ensure clinicians complete disclosure. Like H1 and H2, H3's busy environment leads to unintended delays in incident analysis due to scheduling issues. H3 leaders use different language, depending on the patient population, most notably in explaining complex clinical issues to patients with lower health literacy skills. H3 reported that documentation practices improve in cases where outside agencies such as the coroner, professional colleges or legal bodies are involved in the incident review process. H3 leaders noted that their own personal experiences as either patients or family who have received difficult news have led to providing patients with more time to understand the disclosure and encouraging them to ask for more information at any time. Programs within H3 that have less experience in secondary disclosure may not use plain, culturally sensitive language in patient and family discussions. Like H2, H3's physicians feel an emotional burden in disclosure.

Cross-Case Analysis: Common Implementation Factors

The three hospitals shared similar implementation factors that cross all five CFIR domains.

Intervention characteristics

Hospitals noted that while the legislation was important, their own culture of patient engagement and the CPSI's disclosure guidelines were more influential. This was attributed to an evidence-based tool perceived to offer more clinical credibility than legislation. Hospitals complied the most with the CPSI guidelines on supporting patients clinically, preparing for disclosure, adapting to different patient populations and documenting the disclosure in corporate reporting systems. Challenges were evident in delays in completing the incident analysis; the time it took to share the results of the analysis with patients and families; the inability to offer patients a choice in where they would receive secondary disclosure – whether at the hospital, their home, a neutral location of their choice or by telephone – and inconsistent documentation of the secondary disclosure in the patient's health record.

Outer setting

Hospitals observed that both patients and health sector partners influence how they implement the guidelines and their local policy. Different patient populations by disease type impact disclosure preparation and use of plain language, but so do issues related to culture, health equity and health literacy. Hospitals also consider the difference in disclosing to a mentally competent patient compared to a guardian, a parent or an estate. To support physicians and staff who may hesitate to participate in disclosure or apologize for the fear of risk, hospitals refer the clinical staff to their professional college or insurance bodies who openly support disclosure. If outside auditing bodies such as the coroner or legal representatives are involved in a case, hospitals are more attuned to certain clauses within policies such as documentation.

Inner setting

Complex hospital environments impact implementation. The difficulty of scheduling professionals to analyze the specific critical incident, to participate in a pre-disclosure planning meeting and to attend a date that accommodates the patient often leads to delays in secondary disclosure. This is further complicated when a patient case may require input from a variety of clinical programs. Limited communication with the patient and family throughout the process can be an unintended impact of scheduling challenges. These delays lead to an assumption that the hospital is the rightful location for the secondary disclosure conversation without the patient and family being proactively asked if they wish to return to the site where the critical incident occurred. Scheduling and workload impact the most responsible physician's compliance with guidelines of documenting the post-incident analysis disclosure in the individual patient's health record.

Some programs within hospitals may be better equipped to participate in disclosure due to the nature of their service and training. Clinicians in high-risk or high-volume programs have more experience in disclosure compared to clinicians in programs where critical

incidents and professional college complaints may be less frequent. To help all physicians and staff with emotional wellness during disclosure, the hospitals noted a need for improved support programs.

Individual characteristics

All 10 informants expressed how their professional and personal backgrounds impacted their approach to disclosure. Allied health professionals viewed disclosure as a therapeutic process that takes time. Nurses viewed disclosure as an opportunity to support the patient and enhance their professional practice requirements of being open and transparent in all communication. Physician leaders admitted that while they fully support disclosure, some within their profession often approach disclosure as a clinical risk management process. Physicians also shared the emotional burden they feel given their role as the most responsible clinician. Each leader noted that their experience in disclosure has led them to self-identify their personal bias, and welcomed a multidisciplinary approach to enrich the disclosure process for patients and families.

Process factors

Hospitals rarely reflect on the effectiveness of their disclosure practices by asking patients and families how the disclosure process was received. Given that most front-line clinicians may not participate in multiple disclosure conversations in their career, there is a greater need for training of physicians and staff on how to disclose. The hospitals recognized that leaders who participate in multiple disclosures are at risk for becoming numb to individual patient experience and may accidentally treat the process as mechanical versus therapeutic. To that end, the hospitals emphasized the need for multidisciplinary teams to balance perspectives and skills sets, and ensure patient-relations staff focus on self care and personal well being.

In summary, positive factors related to implementation include organizational culture, the support of outside agencies and the involvement of a multidisciplinary team. Factors challenging implementation include the busy nature of hospital environments that lead to delays in both incident analysis and secondary disclosure conversations, the assumption that the hospital is the location where disclosure to patients should occur, inconsistent documentation practices, limited support to physicians and staff following disclosure and an inability to evaluate the effectiveness of disclosure conversations.

Hospital Policies Documentation Analysis

Following semi-structured interviews, the study's second component involved documentation analysis. The following table (Table 4) illustrates the compliance of the individual hospital policies with the CPSI disclosure guidelines and Ontario's legislative requirements.

TABLE 4. Hospital policy compliance: document analysis

CPSI Guidelines and Legislative Requirement	H1	H2	H3
Meeting immediate needs and providing support to patients	Yes	Yes	Yes
Preparing for initial disclosure	Yes	Yes	Yes
Initial disclosure	Yes	Yes	Yes
Conclusions from incident analysis	Yes	Yes	Yes
Post-analysis disclosure to patient	Yes	Yes	Yes
Documentation in health record	Yes	Yes	Yes
CPSI Implementation Considerations	**H1**	**H2**	**H3**
Emphasizes the use of clear, supportive language	No	No	No
Provides support for physicians and staff	No	Yes	No
Considers different patient populations	No	No	No
Considers multi-patient events	Yes	No	No
Offers written documentation for patients and families	No	No	No
Offers patients a choice in location or method	No	No	No
Addresses the need to train staff and physicians	Yes	No	No
Addresses the need to evaluate disclosure effectiveness	Yes	No	No
References other supportive professional bodies	Yes	Yes	Yes

Each hospital's disclosure policy includes the main components of the CPSI guidelines and all legislative requirements. However, there is an inconsistency between the implementation factors and the opportunities for improvement as pointed out by our informants. H1 identified a need to improve training for and evaluation of disclosure despite these two clauses already being in their policy. H2's policy already stated the need to support physicians and staff; however, H2 leaders identified this was not implemented consistently, and as a result, they were building an internal support program versus contracting a third party. H3's policy does not cover most of the implementation considerations, but its policy was the only one that identified the patient as having the right to refuse the opportunity for disclosure. While all hospital policies referenced other supportive professional bodies, they primarily did so only in terms of physician-based organizations versus other professional bodies such as nursing or allied health colleges and insurance or legal representatives.

Implications and Recommendations

This study identifies hospitals' general ability to implement disclosure of critical incidents to patients and families, but some variations do exist. The following improvements should be considered with respect to disclosure guidelines and local hospital policy changes.

Include multidisciplinary backgrounds in disclosure teams

To ensure that disclosure conversations are adaptable to different patient populations and use culturally sensitive language, hospitals should ensure the professional backgrounds of those

disclosing are multidisciplinary. This will not only aid the patient and family in better understanding the incident but create a supportive environment for the clinicians leading the discussion.

Proactively offer patients a location choice

While the hospitals stated that they had conducted secondary disclosure conversations at settings other than the hospital in question, the default location was consistently the hospital unless otherwise asked by the patient or family. To empower patients and families to feel comfortable in receiving secondary disclosure and participating in difficult conversations, policies should consider mandating the question that asks all patients and families where they wish to hold such discussions, be it at the hospital, their home, a neutral location of their choice or by video or telephone.

Improve the timeliness of incident reviews and secondary disclosure

Ontario's regulation requires that secondary disclosure should occur within a time frame that is practicable given that clinical reviews are complicated matters. The hospitals, however, noted that their complex environments could lead to unreasonable scheduling delays. As a result, hospitals should find innovative ways to improve the timeliness of incident reviews to better support patients and families.

Issue disclosure summaries to patients and families in writing

To help patients and families understand that critical incident reviews can often take time, future guidelines and local hospital policies should consider the benefits and challenges associated with requiring hospitals to explain the critical incident review process and share post-incident analysis recommendations with patients and families in writing.

Identify supports for those participating in disclosure

In addition to supporting patient and family well-being, hospitals should provide improved support for physicians and staff both in preparing for and after disclosure given the emotional burden of disclosing critical incidents to patients and families.

Reference supportive external partners, agencies and networks

To encourage clinicians who may be hesitant to disclose, local hospital policies should reference all supportive external partners, agencies and networks such as professional colleges, quality and patient safety institutes, insurance and legal networks, and patient and family associations.

Limitations

This study has two limitations. First, its methodology does not include the perspectives of patients and families who are on the receiving end of secondary disclosure discussions. While

this was designed to study the implementation factors of those hospital leaders preparing to disclose, future studies that examine the effectiveness of disclosure should include patients and families within their sample. Secondly, as an exploratory qualitative case study, the findings are not expected to be generalizable across Canada due to the different legislative and policy environments across the country.

Conclusion

Using the CFIR, this multiple-case study has found that Ontario hospitals report a consistent approach to implementing secondary disclosure guidelines due to positive factors such as organizational culture, the support of outside agencies and the involvement of multidisciplinary teams. However, there remain variations in certain circumstances due to complex work environments, increasingly diverse patient populations and the impact of professional backgrounds on the delivery of disclosure conversations. As a result, hospitals should advance secondary disclosure by reducing the time it takes to complete incident analysis, improving documentation and enhancing support to clinicians who may experience emotional stress as a result of the process. Similarly, health policy makers and hospital leaders should engage patients and providers in investigating the benefits and challenges of issuing disclosure in writing and enabling patients to choose the location where they receive disclosure as improvements to current guidelines, hospital policies and legislation.

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RESEARCH PAPER

Understanding the Feasibility of Implementing CAR T-Cell Therapies from a Canadian Perspective

Comprendre la faisabilité d'une mise en œuvre des thérapies CAR-T au Canada

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Abstract

In Canada, chimeric antigen receptor (CAR) T-cell therapy was recommended for funding for the treatment of select hematological cancers. Canadian hospitals have limited experience and capacity in administrating this therapy. We conducted a qualitative interview-based study with stakeholders in Canada. Questions were asked related to the development, administration, implementation and logistical planning of CAR T-cell therapy. Results were summarized into four main themes: (i) novel; (ii) patient characteristics and the delivery of care; (iii) processes from "bench-to-bedside"; and (iv) the future state, including both

challenges and recommendations to ensure sustainability. Valuable perspectives from stakeholders highlight some of the unique challenges to implementing a highly personalized and expensive-to-deliver therapy.

Résumé

Au Canada, on a recommandé le financement de la thérapie par lymphocytes T à récepteur antigénique chimérique (thérapie CAR-T) pour le traitement de certains cancers hématologiques. L'expérience et la capacité des hôpitaux canadiens pour l'administration de ce type de thérapie demeurent limitées. Nous avons mené une étude qualitative à l'aide d'entrevues auprès des intervenants au Canada. Nous les avons questionnés au sujet du développement, de l'administration, de la mise en œuvre et de la planification logistique de la thérapie CAR-T. Les résultats ont été résumés en quatre thèmes principaux : (i) nouveauté; (ii) caractéristiques des patients et prestation de soins; (iii) processus « du laboratoire au chevet du patient »; et (iv) la situation à venir, notamment les défis et recommandations pour assurer la durabilité. Le point de vue précieux des intervenants révèle certains des défis uniques liés à la mise en œuvre d'une thérapie hautement personnalisée et dont l'administration est coûteuse.

Introduction

In 2019, it was estimated that there would be 10,000 new cases of non-Hodgkin lymphoma in Canada, including 2,700 deaths. Of these, 30% to 40% were estimated to have diffuse large B-cell lymphoma (DLBCL) (Levine et al. 2017). For patients with DLBCL, approximately 60% can be successfully treated with first-line chemo-immunotherapy, whereas the remaining 40% are likely to experience a relapse and require second-line therapy – usually a second chemo-immunotherapy (Gisselbrecht and Van Den Neste 2018; Sehn and Gascoyne 2015; Staton et al. 2015). If DLBCL patients respond effectively to chemo-immunotherapy but their cancer recurs, they may go on to receive high-dose chemotherapy followed by an autologous stem cell transplant (SCT; Chaganti et al. 2016; Jain et al. 2018; NCCN 2018). Those who do not respond effectively to these treatments, who experience resistance to chemotherapy or who relapse again following an SCT have a poor prognosis, as there are few treatment options left (Jain et al. 2018). For this reason, there has been considerable interest in the recent development of a novel gene therapy called chimeric antigen receptor (CAR) T-cell therapy, as it offers potentially life-saving treatment for relapsed and refractory patients with DLBCL (Neelapu et al. 2017; Schuster et al. 2019).

The response rate with CAR T-cell therapy in patients with relapse/refractory DLBCL is as high as 71%, and is dramatically greater than the 20% seen in the historical control of patients treated with traditional salvage/palliative regimens (CADTH 2019c). This improved response rate translates to an overall survival rate of 49.0% at 12 months. To date, two different CAR T-cell therapies for refractory large B-cell lymphomas in adults have been approved by Health Canada, including axicabtagene ciloleucel and tisagenlecleucel (Health Canada 2019). The dramatic improvement in the overall survival rate seen in patients with DLBCL

treated with CAR T-cell therapy led the Canadian Agency for Drugs and Technologies in Health (CADTH) to conclude that there was a clinical benefit associated with the medications axicabtagene ciloleucel and tisagenlecleucel for patients with relapse/refractory DLBCL (CADTH 2019c, 2019d). There are, however, numerous adverse events associated with the treatments. During the first 28 days, common adverse events included cytokine release syndrome (CRS), neurologic events (CAR T-cell associated neurotoxicity), cytopenias, infections and febrile neutropenia (Maude et al. 2018; Neelapu et al. 2017; Schuster et al. 2019). CRS is seen in up to 93% of patients with DLBCL and is characterized by symptoms ranging from mild hypotension and fever to severe capillary leak syndrome, disseminated intravascular coagulation, coagulopathy and multiple organ failure. Up to 22% of patients with DLBCL experienced grade 3 and higher CRS (Schuster et al. 2019). Neurotoxicity is seen in up to 64% of patients and is characterized by mild cognitive impairment and delirium in mild cases and hallucination, global encephalopathy, aphasia, seizure and cerebral edema in the most severe cases. Grade 3 and higher neurotoxicity is reported in up to 28% of patients (Neelapu et al. 2017). Grade 3 or higher CRS or neurologic events commonly required intensive care unit (ICU) admission (Levine et al. 2017). Thus, patients must be closely monitored for severe side effects such as CRS and neurotoxicity over the next few days to a few weeks after infusion.

CAR T-cell therapy is unique because it is highly personalized and can lead to long-term remission, but it comes at a very high cost. These costs are believed to reflect the complexity of the product as well as the original investment of the companies that did the pivotal studies (Pharmaceutical Technology 2018). With a number of CAR T-cell therapies recently evaluated by regulators and health technology agencies in Canada and recommended for funding, the anticipated impact on the capacity of the current healthcare system is great, as the CAR T-cell therapies require hospitals and healthcare professionals with specialized skills for development and effective delivery. In this way, CAR T-cell therapy would disrupt existing markets by displacing previous technologies. This therapy is proving to be one of the first disruptive interventions to undergo the regulatory approval process in Canada, leading to many questions, concerns and hope. The cost of axicabtagene ciloleucel and tisagenlecleucel are US$373,000 and US$475,000, respectively (IBM Micromedex RED BOOK n.d.). Converting the USD list price to CAD using purchasing power parity would be Can$464,385 and Can$591,375, respectively (OECD 2017). However, in both cases, the products are patient-specific, and the processes for manufacturing them and administering them to Canadian patients are not well-described. Although CADTH has identified some ethical and implementation challenges of CAR T-cell therapies (CADTH 2019c, 2019d), barriers to the adoption of CAR T-cell therapy in the healthcare system have not been well-documented or described in a Canadian context (Lam et al. 2019; Tong et al. 2007). Our aim is to use a qualitative approach to describe stakeholder perspectives on the state of CAR T-cell therapy in patients with large B-cell lymphomas within the context of the Canadian healthcare system.

Method

A qualitative interview-based study was conducted with CAR T-cell therapy stakeholders including scientists, clinicians, manufacturer representatives and policy makers in Canada. This study was approved by a University of Waterloo research ethics committee. The Consolidated Criteria for Conducting Qualitative Research checklist was used for reporting results (Tong et al. 2007). Questions were designed for the three different target participant groups including: scientists involved in CAR T manufacturing; clinicians who treat pediatric or adult hematological cancers; and reimbursement specialists that include manufacturers' representatives who work in pharmaceutical market access and reimbursement in Canada and policy makers who are members of agencies that are involved in the reimbursement decision and/or the implementation process in Canada. Semi-structured interview questions (Table A1, available online at longwoods.com/content/26430) were developed by the authors to address the purpose of the study and to learn about the specific processes in Canada for developing CAR T-cell therapy and administering it to the patients; the patient experience; and the processes of drug review for reimbursement approval. Open-ended questions were also developed to understand the views of participants on the challenges to implementing CAR T-cell therapy in Canada. Participants were asked semi-structured questions most relevant to their role as a scientist, a clinician, a manufacturers' representative or a policy maker.

Participants

Participants were recruited using a combination of purposive and snowball sampling and were identified because of their known role in CAR T-cell–related projects based on publicly available information that include funding announcements and new releases from national and provincial agencies. The sample of participants included three scientists/researchers, five clinicians in hematology and five reimbursement specialists that included four policy makers and one manufacturers' representative who works in the drug review and reimbursement space. All participants were based in Canada. A total of 13 interviews were conducted between March and July 2019. The detailed recruitment and interview processes are described in Appendix 1 and Figure A1, available online at longwoods.com/content/26430.

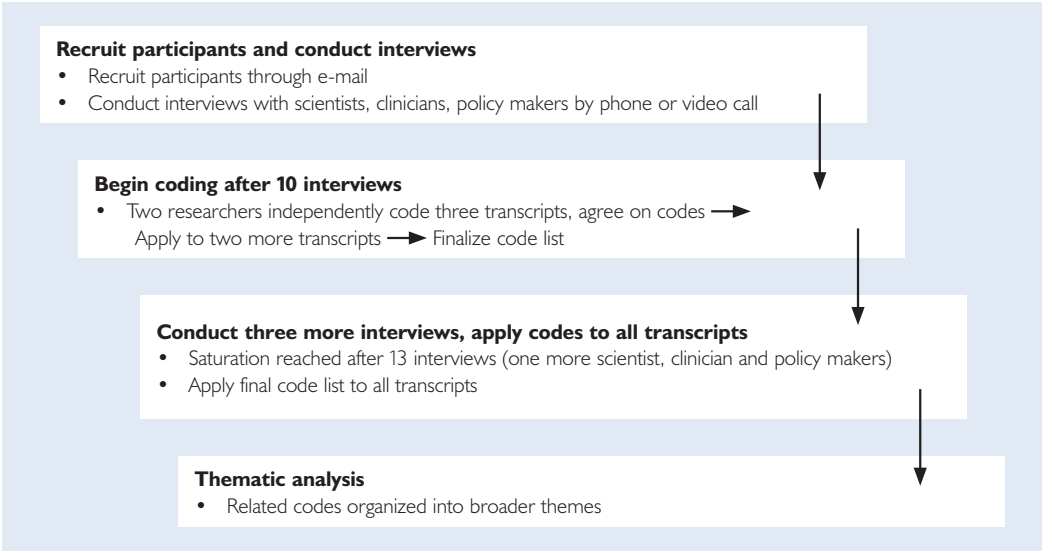
Analysis

After the interview process, each interview was transcribed and de-identified using a transcription service, and each participant was given a unique identifier using a number and their role in the study. Data analysis was completed in four stages:

(1) Independent coding by two researchers (Kristina Ellis and Stephen Tully) to reduce bias: The interviewer and another researcher independently coded three transcripts of three different types of participants and met to refine codes. Another researcher (Kelly Grindrod) was consulted to resolve differences in coding schemes.

(2) Agreement on codes and applying to new transcripts: Ellis and Tully agreed on a set of common codes and then applied these codes to two more transcripts of the three different participant groups.
(3) Finalization of codes and application to all transcripts: Ellis and Tully finalized the list of codes and reviewed them with other members of the research team (Table A2 available online at longwoods.com/content/26430). This set of codes was then applied to all the transcripts using the NVivo 12 (QSR International) qualitative data analysis software.
(4) Thematic analysis: Related codes were organized into broader themes. Saturation was determined through the repetition of ideas and themes in the developed code categories (Saunders et al. 2018; Vasileiou et al. 2018). Three additional interviews were conducted after saturation to fill any gaps identified by the primary researcher and to confirm saturation had been reached (Figure 1). A complete description of the study methodology, interview questions and coding list can be found in Appendix 1, available online at longwoods.com/content/26430.

FIGURE 1. Interview and analysis process



Results

Four key themes were identified through qualitative analysis:

- *Novel:* CAR T-cell therapy is novel in many ways: it has a unique mechanism of action as a gene therapy; it is highly personalized; it has a high per-patient upfront cost; it can lead to long-term survival and remission in patients; and it requires significant hospital and health system resources. These characteristics make CAR T-cell therapy difficult to classify as a typical drug.

- *Patient characteristics and the delivery of care*: This theme includes characteristics of patients who are eligible to receive CAR T-cell therapy based on Health Canada–approved indications; the impact of CAR T-cell therapy on patients; the current unmet need of patients who have not been successfully treated with previous lines of therapy; and why equitable access to CAR T-cell therapy for patients across Canada needs to be considered.
- *Processes from "bench-to-bedside"*: There are specific processes and requirements to deliver CAR T-cell therapy: each CAR T product must be effectively manufactured for each individual patient; the patient must undergo leukapheresis and be medically stable to receive treatment; the product must be transported from the manufacturer to the treating facility; and the product must be administered to the patient in an accredited institution.
- *Future state of CAR T-cell therapy in Canada*: Planning for CAR T-cell therapy needs to consider the current barriers and challenges to the implementation of CAR T-cell therapy in the healthcare system; the long-term sustainability of CAR T-cell therapy implementation in Canada; ways to enhance and improve the ability to deliver CAR T-cell therapy; addressing current barriers such as education and training; and planning the logistics of implementation of CAR T-cell therapy across Canada.

Novel

When asked to describe CAR T-cell therapy in their own words or talk about why it is unique, participants often described CAR T-cell therapy as difficult to classify because it is more than just a drug – it is an extremely expensive and a highly personalized therapy. One participant said:

> Well, it's unique because it's really a game changer, that's one thing. Second of all, it's completely different in terms of it's not a drug, at least not as we see it presently. It's a cellular therapy, it's got its whole set of complications and it's got a significant cost. It needs special expertise in terms of manufacturing. (Clinician, C3)

In addition, participants stated that CAR T-cell therapy offers patients a potentially curative and life-saving treatment option when they would have otherwise received salvage chemotherapy or palliative care. As one clinician stated,

> It's the only chance at cure, or at complete responses. So, I think it has the ability to prolong life, which is what the current regimens for relapsed or refractory disease (DLBCL) don't have. (Clinician, C1)

CAR T-cell therapy was also described by participants as novel in terms of the infrastructure and resources required to effectively deliver it, and that poses a unique challenge to

ensuring equitable access across Canada. On equity, a participant stated,

> There have been a lot of discussions around equity, the fact that there really isn't [any]. Even if the drug was available and cheap, the access is a different issue because of the fact that ... because of how it's supposed to be delivered, because of expertise required, because of the infrastructure that's required. (Reimbursement specialist, P2)

Although many participants commented on CAR T-cell therapy being novel in some way, participants also recognized that the complexity of delivering CAR T-cell therapy is similar to that of an SCT, which has set a precedent for CAR T-cell therapy. As one participant pointed out,

> It's more similar to administering stem cell therapy where it's kind of a stem cell transfer versus administering chemo. (Reimbursement specialist, P2)

Patient characteristics and the delivery of care

Participants indicated that DLBCL patients who would be eligible for CAR T-cell therapy do not have other treatment options and a poor prognosis. One clinician stated,

> … it actually causes disease remission … for refractory lymphoma ... That's kind of a big, important thing. It meets an unmet need. (Clinician, C2)

Clinicians described eligible patients as being very sick but also physically well enough to survive until the CAR T-cell manufacturing process of a few weeks is completed for the patients to receive the therapy. One participant said,

> The challenge is to just give them just enough chemotherapy to keep them well, but not enough that you make them sick and land them in the hospital … and result in an infection, because that all delays getting to the CAR T-cells. (Clinician, C4)

After being infused with CAR T-cell therapy, which was described as a straightforward in-patient procedure, patients are monitored for side effects. Clinicians discussed two common side effects that can be life-threatening and require immediate treatment, namely, CRS and neurotoxicity that occurred in most of the patients in the pivotal clinical trials for the two Health Canada–approved CAR T-cell products. When summarizing these adverse events, one clinician said,

> ... It all depends on what it is. If we're talking about, let's say, cytokine release syndrome. I said 80% [of patients] develop it. Then it depends what kind of degree you

> have ... If they have higher degrees of CRS, then they may need ICU care, they may need (vaso)pressors, they may need to be on the ventilator, they may need dialysis. Neurotoxicity, same thing… (Clinician, C5)

Clinicians indicated that patients would be heavily monitored during the first week after the infusion as an in-patient and treated for side effects if they occur. The patients return home after the first week of heavy monitoring, and clinicians are then likely to see them as outpatients every week for a few weeks, and then monthly for a few months. One clinician stated,

> Well, if the risk-period for CRS and neurotoxicity is over, so if they haven't developed that, then I'd say [in] 10 days they'd probably go home. Their ongoing follow-up would be once or twice a week in clinic, blood count checks, like that, for the rest of the month, and then less frequently if they're doing well. (Clinician, C2)

Processes from "bench-to-bedside"

Participants described the process of leukapheresis, which is the collection and isolation of white blood cells from a blood sample to be used to create the CAR T product (Figure 2). This can be done at a hospital facility in Canada. The cell sample is then transported to the manufacturing facility, where the cells are re-engineered by combining the cell sample and the lentivirus/retrovirus and growing them in large numbers to produce the final product. Participants highlighted how the manufacturing sites of the two commercial products that have been approved by Health Canada are located in the US (Health Canada 2019). As with similar commercial products, the final CAR T-cell product needed to be frozen and sent back to the treating hospital. Researchers developing products in Canada noted that the manufacturing turnaround time may be reduced to around two weeks if manufacturing facility set-up is in Canada. Participants with experience in manufacturing were also asked to discuss errors that could occur in manufacturing that would lead to a failure. They noted that although errors can still occur, the cause of such errors has changed over time, with one participant stating,

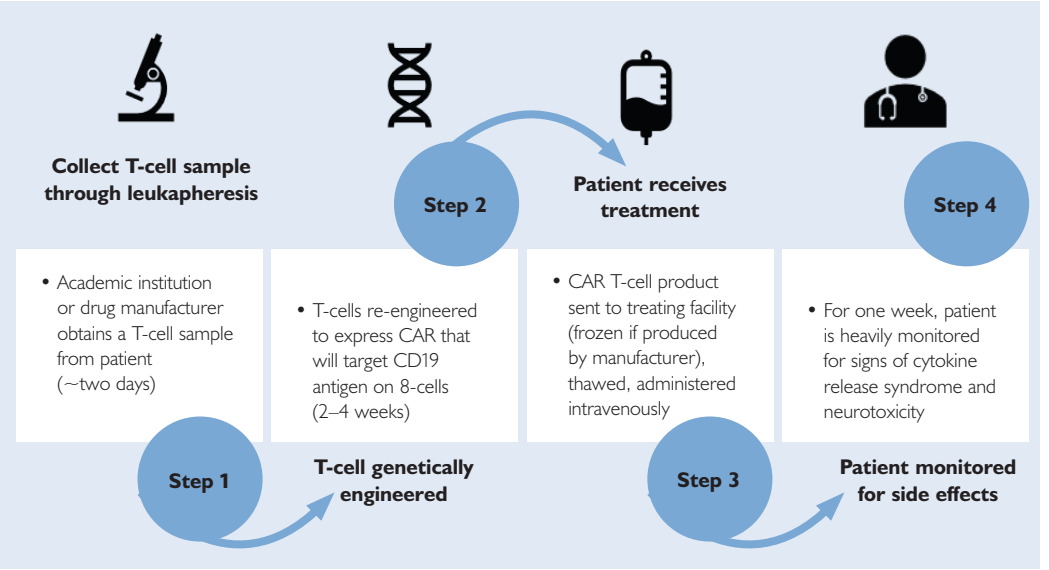
> So, you know, the 7% manufacturing failure that we saw with Novartis when the studies were published, that was because (they) couldn't expand enough cells to make it a viable CAR T product. Nowadays, the manufacturing failures are often related to the functionality of the product. (Clinician, C1)

Future state of CAR T-cell therapy in Canada: The challenges

Participants were asked about current challenges to effective implementation of CAR T-cell therapy in Canada and for recommendations to ensure long-term sustainability. Some key challenges identified were as follows:

- the high cost of CAR T-cell therapy to the healthcare system and maintaining funding;
- limited capacity of manufacturers and hospitals to develop and deliver CAR T-cell therapy; and
- government and regulatory agencies working with short-term efficacy data and having to make decisions for the future with limited evidence.

FIGURE 2. Processes from "bench-to-bedside"



CHALLENGE 1: HIGH COST TO THE HEALTHCARE SYSTEM

Participants noted that CAR T-cell therapy products are already very expensive, but there are many additional hospital costs to consider as well. The cost for the approved CAR T-cell products ranges from US$373,000 to US$475,000 (IBM Micromedex RED BOOK n.d.), or Can$464,385 to Can$591,375 (OECD 2017). Because administering CAR T-cell products to patients is new to Canadian hospitals, clinicians noted that patients would likely be admitted as an in-patient in the days leading up to the therapy and may stay in the hospital for one to two weeks. Some patients who experience serious adverse events may need to be transferred to the ICU, which also increases costs. Summarizing this theme, one participant stated,

> Well, the biggest challenge is clearly the costs associated with it, right? The commercial products that are coming out of the US companies have costs of hundreds of thousand[s] on top of the actual clinical treatment costs. (Scientist, S3)

CHALLENGE 2: LIMITED CAPACITY

Across all areas of expertise, participants felt that one of the largest barriers to implementation is capacity. Participants spoke about capacity in the context of the current healthcare system not being able to meet the demand for CAR T-cell therapy. Participants agreed that even if CAR T-cell therapy was affordable, hospitals are currently at capacity with other procedures such as bone marrow transplants, which clinicians noted are similar to CAR T-cell therapy in terms of the hospital resources required. Participants were concerned about the number of patients who would be eligible for CAR T-cell therapy, which may exceed the capacity of the limited hospital resources – specifically regular ward beds and ICU beds. One participant stated,

> Everything you need to treat these complicated patients is what we're short of. And we've been working to improve that, so we're just sort of catching up on the transplant side and then these guys came along. (Clinician, C4)

Another noted, "at this point, we don't have enough bed space in the province to meet the need for the number of patients who would be eligible for CAR-T in [Ontario]" (reimbursement specialist, P4).

CHALLENGE 3: LIMITED EVIDENCE

Based on interview responses, "limited evidence" refers to the lack of long-term efficacy data for the approved CAR T-cell therapy products. Participants described how decisions are being made at the government level about the funding and implementation of CAR T-cell therapy based on data from single-arm clinical trials that ranged from 14 to 27 months of follow-up (Neelapu et al. 2017; Schuster et al. 2019). The following quote shows the challenge of working with short-term data to make long-term decisions about healthcare.

> ... we also don't have long-term data on the products that are currently marketed. And so, when you try to do planning at a system level, it becomes very difficult because you're not planning for today or even the year after, you're trying to plan five to 10 years down the road. So, trying to estimate the number of patients that would require this therapy, and then the proper resources as far as health human resources, capital infrastructure … is quite difficult. So, the costs of not just purchase of the CAR T-cell but the cost of the actual care and management of these patients, there is limited information to go on. Even the clinical trials that have occurred have fairly small numbers when you compare them to clinical trials in other therapeutic areas … That's a big challenge for us in the planning phase. (Reimbursement specialist, P1)

Future state of CAR T-cell therapy in Canada: Planning at the system level

The recommendations to support the sustainability of CAR T-cell therapy and other cell and gene therapies fell under four main categories:

- coordinating among stakeholders;
- implementing infrastructure, training and education;
- considering reimbursement strategies and cost-effectiveness; and
- adapting to emerging evidence.

RECOMMENDATION ONE: COORDINATE AMONG STAKEHOLDERS

Participants discussed the need for CAR T-cell therapy stakeholders to be aligned to ensure that patients can get timely access to CAR T-cell therapy. Key stakeholders included government and regulatory agencies, manufacturers, clinicians, hospitals and patients.

> I think the manufacturer working with the provinces to achieve a price that's equitable, sustainable for the success of CAR T. The first step. I think that's one. In terms of other steps to maintain or improve the success, or sustainability of the treatments, I think we need to continue with research, which we're doing. It can't stop with these three indications, or two indications that exist in the market. If the technology is going to be sustainable, you need the evidence to support funding it. (Reimbursement specialist, P3)

Another participant stated,

> I have to say that my perception is that there's a lot of people on the various levels that are involved being in politics, being in health administration, being at the hospitals, that there's a lot of good will, enthusiasm to make this happen. (Clinician, C5)

Participants felt that CAR T-cell therapy stakeholders were willing to achieve effective and efficient implementation.

RECOMMENDATION TWO: IMPLEMENT INFRASTRUCTURE, TRAINING AND EDUCATION

Participants recognized that infrastructure is an important consideration regarding which hospitals would be best suited to deliver CAR T-cell therapy and the resources that would be required. Participants reported that establishing centres of excellence that are accredited through the Foundation of Accreditation for Cellular Therapy (FACT) will be required to effectively deliver CAR T-cell therapy (http://www.factwebsite.org/). To summarize these points, a participant stated,

> In terms of treating patients, a lot of the infrastructure already exists, so if sites administer, for example, allogeneic stem cell transplant, a lot of these procedures already exist to accommodate CAR T therapies. It's one of the main reasons why some of the first centres that we approach are the FACT-certified centres. They have the infrastructure, for the most part, to accommodate these therapies. (Reimbursement specialist, P3)

Along with infrastructure comes training and education within manufacturing facilities and hospitals. Participants agreed that safely and effectively delivering CAR T-cell therapy in the hospital requires specific training, as illustrated by one participant stating,

> I think in Canada what we need to do is get the infrastructure in place, which we're beginning to do now, get the training … It'd take a lot of training to get people up to speed, so the technicians who run the machines, the doc[tor]s who give the treatment, they have to become familiar with what to expect and how to treat it and so on, and all that has to be built. (Scientist, S1)

RECOMMENDATION THREE: CONSIDER REIMBURSEMENT STRATEGIES AND COST-EFFECTIVENESS

Another key area for system-level planning was reimbursement. While funding was mentioned as one of the most prominent challenges, it was noted that provinces will have to make decisions about which budget the funding for these therapies will come from for reimbursement. A participant stated,

> So, in essence, all of that is the same for CAR T except who is actually funding it. It's a bit different depending on the jurisdiction. So, it may come out of the hospital or whether it may come out of the cancer agency or whether it may come out of something else. That's a bit of a challenge, and a bit of a uniqueness to this particular product. And I'm not really sure entirely whether every single province and territory have sorted out exactly where the money or the funding is going to come from. (Reimbursement specialist, P2)

Some participants also discussed the importance of establishing value for money for CAR T-cell therapy. One participant said,

> In terms of sustainability, I think again, we have to do everything we can to negotiate the prices down as far as we can to make sure that, because we do have limited healthcare dollars, and we're in a socialized medicine environment, we do need to make sure that we're using our money wisely. And so, if we can negotiate the prices down, and maybe even come up with novel ways of administering the therapy. So,

> like, maybe moving it to the outpatient setting in the hospitals, could result in less cost to the tax payer. (Reimbursement specialist, P4)

RECOMMENDATION FOUR: ADAPT TO EMERGING EVIDENCE

Participants discussed that while there are two Health Canada–approved indications for CAR T-cell therapies at present, there are many more being developed and tested, which should be accounted for in long-term planning. A quote illustrating this is as follows:

> I think we have to change our mindset and say we have to deliver these drugs, or these therapies, in a different way. We have to approach it differently because they're [going to] continue to evolve. This is not the end. This is the very … I'm [going to] sound very Churchill-like. This is the end of the beginning. We really are beginning to see these expand and if you keep going at it in a one-at-a-time in the sort of side-level approach of pharma, it'll take 50 years. (Scientist, S1)

Thinking ahead, participants recognized that, in its current state, the healthcare system is not fully prepared to implement CAR T-cell therapy for the approved products for the anticipated number of patients. A participant shared,

> … if in fact the indications stand and grow and CAR T becomes more commonplace, then we do have to look at how it would be more broadly available. We can't rely on just a handful of sites in the province, or in the country to do this. So, where should we be planning and how should we be training these individuals for this therapy? (Reimbursement specialist, P4)

On the topic of developing CAR T-cell products in Canada and the evolution of CAR T-cells, one scientist stated,

> There is a push to allow centres that have bone marrow expertise but are not necessarily set up for GMP [good manufacturing practice] labs, to have a manufacturing facility to actually make these CAR T-cells on machines that you can just put in your lab as we normally do for cell sorting during the transplant process, and in a way like that, produce CAR T-cells that meet all the criteria to be given to a patient. (Clinician, C5)

Discussion

The results of this study highlight the challenges policy makers face with the implementation of CAR T-cell therapy in the Canadian healthcare system. The qualitative interviews led to the development of four key themes: CAR T-cell therapy is novel; patient characteristics and the delivery of care; processes from "bench-to-bedside"; and the future of CAR T-cell

therapy in Canada, including challenges to implementation and recommendations for long-term sustainability. Participants consistently described CAR T-cell therapy as novel in terms of its therapeutic benefit and the way it is developed and administered to patients. In addition, participants focused on the patient experience living with large B-cell lymphoma and their experiences with CAR T-cell therapy, emphasizing on the two common but serious adverse events CRS and neurotoxicity. In the experiences of both scientists and clinicians, the processes range from collecting cells and manufacturing CAR T-cell therapy in a lab to administering the therapy in the hospital and monitoring patients after therapy. Lastly, participants in all the fields outlined key barriers to implementation, including high drug and hospital costs and many hospitals' current lack of capacity to effectively deliver an additional resource-intensive therapy. Participants commented on the future of CAR T-cell therapy in Canada, giving recommendations for planning at the system level and looking ahead to what is next in the cell therapy space. To facilitate implementation of CAR T-cell therapy, participants noted that alignment and coordination with stakeholders, tailored training and education at hospitals and establishing cost-effectiveness and negotiating a fair price are all important.

The results presented in this study align with other reports on challenges with implementing CAR T-cell therapy in the healthcare system, although they have not been described qualitatively through interviews in a Canadian context. In the Optimal Use reports published by CADTH for approved CAR T-cell therapy products, ethical, legal and implementation issues were highlighted as part of a comprehensive review (CADTH 2019a, 2019b). CADTH highlighted views from stakeholders about how to roll out the delivery of CAR T-cell therapy (CADTH 2019c, 2019d).

High cost of the therapy remains one of the reimbursement challenges when adopting CAR T-cell therapy into the healthcare system in Canada and other developed countries. The centralized manufacturing model was associated with high per-unit manufacturing costs, which may allow a limited room for potential price negotiation (Harrison et al. 2019). Other countries are looking into innovative ways to potentially lower the price and improve access. For example, an alternative mode of regulation pathway instead of a traditional "drug" pathway was suggested (Chalasani et al. 2020). Countries such as Germany, Italy and Spain have come up with innovative reimbursement models that linked the reimbursement-staged payment/rebates to individual patient outcomes (Jørgensen et al. 2020).

Limitations

This study had several limitations. Although saturation was reached, there was a small sample size of 13 participants (three scientists/researchers, five clinicians and five reimbursement specialists that included policy makers and manufacturers' representatives). In addition, this study did not include patients, who are at the centre of discussions about CAR T-cell therapy. Future research would benefit from patients' perspectives on their own experiences with CAR T-cell therapy and their views on challenges to implementation. Another limitation is that the majority of participants (12) were from Ontario, with only one participant from

British Columbia. The perspectives are limited to the experiences of participants in these areas and may not be generalizable to the perspectives across all of Canada. This was the case due to certain national drug regulatory agencies located in Ontario, the leadership demonstrated by Ontario and British Columbia with developing CAR T-cell therapy products and the location of currently specialized hospital centres in delivering cell and gene therapies.

Conclusion

Our study highlighted some of the unique challenges to implementing CAR T-cell therapy in Canada and considerations for the future of novel cell and gene therapies entering the Canadian healthcare system. There has been tremendous growth in the number of clinical trials in the field of advanced therapy medical products (ATMPs)/cell and gene therapies. At the end of 2016, there were 220 documented CAR T-cell clinical trials, and this number continues to grow (Hartmann et al. 2017). The findings from this study can be used to inform policy makers in Canada and other countries and the public about logistical and feasibility concerns with implementing CAR T-cell therapy and other ATMPs/cell and gene therapies. Canada-specific views on barriers to implementation and recommendations for planning at the system level had not been well-documented prior to this study. Future research would benefit from the perspectives of Canadian patients and their experiences with accessing CAR T-cell therapy before and following funding approval.

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RESEARCH PAPER

The Allocation of Medical School Spaces in Canada by Province and Territory: The Need for Evidence-Based Health Workforce Policy

Attribution des places dans les facultés de médecine au Canada selon la province ou le territoire : pour une politique de la main-d'œuvre de la santé fondée sur les données probantes

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Abstract

Background: Most Canadian medical schools allocate admission based on province or territory of residence. This may result in inequities in access to medical school, disadvantaging highly qualified students from particular provinces.

Method: The number of medical school spaces available to applicants from each province and territory was compared to the total number of available spaces in Canada, the regional application pressure and enrolment in 2017/2018.

Results: There is differential access to medical schools based on the absolute numbers of available spaces and application pressure. Applicants from Prince Edward Island are afforded the greatest number of spaces per 100,000 population aged 20 to 29 (5,568.8). Applicants from Ontario experience the lowest ratio of available spaces to relevant population (54.3).
Discussion: Health workforce policy must balance equity and regional social accountability. Privileging regional residence over academic aptitude and personal characteristics may be justified by strong evidence that these applicants are likely to serve populations that would otherwise be underserved.
Conclusion: The availability of medical school spaces in Canada differs as a function of the province or territory from which applicants apply. Determining whether this differential is justified requires appraisal of the consequences of the policies with respect to their goals.

Résumé

Contexte : Au Canada, la plupart des facultés de médecine prennent les décisions d'admission en fonction de la province ou du territoire de résidence des candidats. Cela peut entraîner des inégalités dans l'accès aux facultés de médecine, désavantageant ainsi les étudiants hautement qualifiés de certaines provinces.
Méthode : Le nombre de places disponibles dans les facultés de médecine pour les candidats de chaque province et territoire a été comparé au nombre total de places disponibles au Canada, à la pression de la demande régionale et aux inscriptions de 2017-2018.
Résultats : Il existe un accès différentiel aux facultés de médecine en fonction du nombre absolu de places disponibles et de la pression des candidatures. Les candidats de l'Île-du-Prince-Édouard bénéficient du plus grand nombre de places pour 100 000 habitants âgés de 20 à 29 ans (5 568,8). Les candidats de l'Ontario ont le plus faible ratio de places disponibles par rapport à la population pertinente (54,3).
Discussion : La politique de la main-d'œuvre de la santé doit concilier équité et responsabilité sociale régionale. Privilégier le lieu de résidence plutôt que l'aptitude scolaire et les caractéristiques personnelles peut être justifié par de solides données qui démontrent que ces candidats sont plus susceptibles de desservir des populations qui seraient autrement mal desservies.
Conclusion : La disponibilité des places dans les facultés de médecine au Canada diffère en fonction de la province ou du territoire à partir duquel les candidats postulent. Pour déterminer si ce critère est justifié, il faut évaluer les conséquences des politiques par rapport à leurs objectifs.

Introduction

The availability of medical school spaces in Canada is determined according to health workforce policies that, among other purposes, aim to ensure that there is a sufficient physician workforce to meet the healthcare needs of the population (Birch 2002; Herbert 2007; Institute of Medicine of the National Academies 2005). Regardless of increases in the number of spaces, there have long been more applicants for medical school than opportunities to enrol (AFMC 2018), and medical schools have developed and implemented individual

policies to assist in the allocation of admission spaces to prospective candidates they deem the most qualified. The most recognizable and scrutinized of these applicant selection policies are those that aim to differentiate candidates according to their cognitive abilities and interpersonal skills – qualities many consider the most important for being a physician (Siu and Reiter 2009). Increasingly, medical schools are also using social accountability policies designed to offset much of the inequity inherent to merit-based selection practices (Boelen 2011; Chapman and Jagsi 2017; De Freitas et al. 2019; Razack et al. 2015). Among these are a considerably less-publicized set of policies that involve the selection of physician trainees on the basis of their regional residence. For example, Memorial University (Newfoundland [NFLD]) holds 60 of 80 available spaces for residents of NFLD and Labrador (Memorial University 2019).

Policies of admission on the basis of residence are designed to meet obligations of regional accountability, founded upon an assumption that the social attachments that applicants have to their place of residence will promote the graduation of physicians who will choose to practise in those regions (Dahl and Sorenson 2010; Ellaway et al. 2018). The Northern Ontario School of Medicine (Ontario [ON]), for instance, has succeeded in increasing the number of physicians serving rural, francophone and Indigenous communities by selecting applicants from these communities (Strasser et al. 2009). Yet, it is important to be mindful that every set of policies has both intended and unintended consequences, some of which are potentially undesirable. In the case of policies that allocate medical school spaces by region of applicant residence, one consequence is that applicants across the country are not afforded equitable access to the opportunity to enrol in medical school. This, in turn, may mean that less-qualified applicants from the one region may gain admission into medical school, while more-qualified applicants from other regions are excluded.

The origin of regional allocation policies is opaque and idiosyncratic, decided at individual medical schools and in negotiation with the provincial government. The results of these negotiations determine a medical school's ability to open new seats, and provincial governments have used this policy as a lever to enact geographical policies pertaining to the allocation of medical school spaces for residents from particular provinces (Government of Nova Scotia 2019) and the establishment of regional campuses in areas with physician shortages (Hill 2016). However, individual medical schools have significant autonomy in how they decide to select students and allocate existing spaces, and there are numerous competing priorities, including increasing the representation of Indigenous, rural, francophone and Black students. The accreditation standards for admissions put forth by the Committee on Accreditation of Canadian Medical Schools stand as the main policy lever for a pan-Canadian strategy, yet, to date, they do not explicitly address geographical allocation. However, these standards do indicate that medical schools have a social accountability to admit applicants who will "address the priority health concerns of the populations [the medical school] has a responsibility to serve" (CACMS 2019). The medical schools have significant discretion in interpreting this directive and creating a strategy to fulfill this requirement (Hanson et al. 2016).

In this study, we appraise medical school admission policies and describe the distribution of available medical school spaces across Canada by province and territory. Our purpose in doing this is to determine whether current regional medical admission policies constrain equitable access to medical school for applicants across the country. The distribution of available spaces is also considered alongside data pertaining to regional application pressure (i.e., the number of applications generated from applicants within a province or territory), regional medical school enrolment success and regional physician-to-population ratios. Together, this descriptive policy analysis offers insight into the impact regional selection policies may have on the selection and graduation of aspiring physicians from across Canada.

Method

In this descriptive policy analysis, publicly available policies concerning the regional allocation of medical school spaces for the 2018 admissions cycle were collated in order to determine the total number of spaces afforded to applicants from each province and territory in that admission cycle. This included a concurrent review of the policies and statistics listed in the 2017 Association of Faculties of Medicine of Canada (AFMC) Canadian Medical Education Statistics (CMES) report (AFMC 2018: 3, Table 2b) and the admissions websites of each of Canada's 17 medical schools. Our primary interest was in determining the total potential opportunities to gain access to a medical school for applicants from each of the provinces and territories.

We began by determining the number of medical school spaces that were specifically "allocated" to applicants from each province and territory. This involved considering the potential availability of any one medical school space from the perspective of an individual making an application from any particular province or territory. We identified whether or not that seat was allocated based on provincial or territorial residence (i.e., X spaces to be held only by students from a particular region[s]). Determining the allocation of a space was straightforward for medical schools reserving spaces for applicants from the province in which the university is located. In some cases, however, we noted that the potential availability of allocated spaces is shared by applicants from different provinces or territories. For instance, Dalhousie University (Nova Scotia [NS]) reserved 99 of its medical school spaces for applicants from the Maritimes. Accordingly, these 99 spaces were included independently in the counts for Prince Edward Island (PEI), NS and New Brunswick (NB).

Notably, we recognized numerous policies that allocated spaces specifically for individuals with particular characteristics. These comprised spaces dedicated to Indigenous and francophone applicants, those that reside in rural regions, members of the Canadian Armed Forces, international medical graduate and visa students and applicants with interest in oral and maxillofacial surgery, dentistry or concurrent MD and PhD studies. We deemed these "special allocations" and considered them only when they impacted the total number of potential spaces available to applicants who did not meet the criteria for these spaces. That is, when these special allocations were presented alongside polices that created regional

application groups larger than the special allocation, we reasoned that they would not necessarily impede the total potential opportunity for individuals from either the sanctioned or unsanctioned region. For example, the University of Alberta (Alberta [AB]) maintained a regional admission policy that dedicated 85% or 138 of its 162 spaces to residents of AB. This meant that there were up to 24 spaces available for applicants from a province or territory other than AB. The institution also maintained an admission policy that described five spaces for Indigenous applicants and 10 spaces for individuals whose permanent residence is deemed rural. Because it is possible for all of these special allocations to be subsumed as part of either of the regional allocation groups (i.e., Indigenous and rural applicants may be from any province), these 15 spaces were not removed from the count of total potential spaces appropriated to residents from AB or those from outside AB. However, if special allocations were not presented alongside regional allocations, then we recognized them as limiting total potential opportunity for some applicants. For instance, the Northern Ontario School of Medicine (ON) dedicated two spaces for Indigenous applicants while holding no regional allocation policy. In this instance, we denoted the two spaces as specially allocated and subtracted them from the total number spaces available to applicants from regions across Canada. Special allocations that were explicitly denoted as "additional" were also subtracted from the total number spaces available to applicants from regions across Canada. Any spaces denoted as supernumerary to the institution's normal quota of spaces were not included in our calculations.

Lastly, McMaster University (ON) does not articulate a policy that reserves a particular number of spaces to applicants from any province or territory, but it does have an explicit policy of reserving 90% of its pre-admission interview spots to applicants from ON. For this school, regional allocations were determined by calculating the potential number of interviews that may be offered to non-ON residents (550 interviews × 10% = 55 interview spots) and subtracting this number from the institution's total number of medical school spaces (203 medical school spaces − 55 applicants = regional allocation of 148 applicants from ON).

Once the data were assembled, the potential number of spaces for an applicant from each province and territory was determined by summing the relevant region's specifically allocated spaces with the total number of unallocated spaces. A medical school space was deemed as "unallocated" when it *could* potentially be filled by any Canadian applicant, including applicants already considered by a contemporaneous regional allocation policy.

We also collated data pertaining to the number of applications for medical school spaces by province or territory, the relevant population of the province or territory, the eventual enrolment by province or territory for the 2018/2019 academic year and the physician-to-population ratios for each region.

The data on application pressure by province were calculated by summing the number of applications submitted by men and women from each province or territory as presented in the 2018 AFMC CMES report's table of *Acceptances by Province or Country of Residence*

of Applicants and Sex (Table F-14; page 93; AFMC 2019). The number of first-year students that were enrolled into Canadian medical schools as a function of province or territory of application was extracted from the AFMC CMES 2018 report (Table A-4; page 16; AFMC 2019). The data pertaining to relevant regional populations were extracted from the 2017 Statistics Canada (2020) reports for population of individuals between the ages of 20 and 29 years, a window that represents the most likely cohort of medical school applicants (Young et al. 2012). The 2018 AFMC CMES report lists application pressure and enrolment numbers for the Yukon, Northwest Territories (NWT), and Nunavut (NVT) in aggregate. Data for the territories are accordingly also combined here. To facilitate comparison with the application and enrolment numbers, the total available seats for the territories included seats available to any territory, even if they were not available to each territory.

These statistics permitted us to determine the relative number of spaces, applications and enrolments per relevant (i.e., persons aged 20–29 years) 100,000 population. They also allowed us to determine the expected applications and enrolments per 100,000 population, given assumptions of equal interest in medical school and equitable regional admission to medical school, respectively, by province and territory. These values were achieved by multiplying the total number of applications or enrolments by 100,000 and dividing that number by the total Canadian population between the ages of 20 and 29 years. In calculating these expected application and enrolment values, we were presented with an opportunity to further extrapolate the impact of the regional allocation policies on applicants from across Canada.

We also extracted the number of physicians per 100,000 population for each region from Canadian Institute for Health Information's *Physicians in Canada, 2017* report (CIHI 2019: 42). We present these physician-to-population numbers in order to investigate whether more medical school opportunities are being presented to those provinces with the lowest number of physicians. Notably, CIHI excluded the NWT and NVT from their calculations due to small numbers; accordingly, we do not present this comparison for the territories.

Research ethics approval was not required, as all data are publicly available.

Results

In 2018, 1,928 (67.4%) of Canada's 2,860 medical school spaces were specifically reserved for applicants from particular provinces and territories, with each of the provinces and territories realizing different proportions of these allocations. There were 76 special allocations (2.7%) that needed to be accounted for outside of the regional allocations. The remaining 856 (29.9%) medical school spaces in Canada were potentially accessible by applicants from any province or territory (Table 1, available online at longwoods.com/content/26429).

Consideration of the allocated and unallocated medical school spaces in aggregate reveals that applicants from each of the provinces and territories were afforded a differential number of potentially available spaces. Applicants from Quebec (PQ) were afforded the greatest number of potential spaces (1,693), while those from the territories, combined, were afforded the fewest (912). NFLD was the province from which applicants had the fewest number of

potential spaces (963). When considering the number of available spaces with regard to the size of the population in each province, applicants from PEI were afforded the most spaces relative to the relevant 100,000 population (5,468.8), and applicants from ON were afforded the fewest (54.3; Table 2).

TABLE 2. Total available medical school spaces by province and territory in the 2018 admissions cycle

Region	Allocated spaces	Unallocated spaces	Total available spaces	Population (20–29 years)	Spaces per 100,000 population (20–29 years)
NFLD	107	856	963	59,036	1,631.2
NS	145	856	1,001	119,397	838.4
NB	161	856	1,017	86,003	1,182.5
PEI	149	856	1,005	18,377	5,468.8
PQ	837	856	1,693	1,046,698	161.7
ON	203	856	1,059	1,948,658	54.3
MB	160	856	1,016	190,325	533.8
SK	145	856	1,001	159,268	628.5
AB	326	856	1,182	605,154	195.3
BC	314	856	1,170	663,336	176.4
Territories	56	856	912	18,811	4,848.2
Total				4,915,063	

Review of the 2017/2018 application statistics by province and territory indicated that 13,540 Canadians applied to medical school in 2018. Of these, individuals from ON made the most applications (4,651), and individuals from the territories made the fewest (31). The highest number of applications per relevant 100,000 population was realized for QC (425.2), and the lowest number was realized for the territories (164.8). Assuming that interest in medical school is equal across provinces and territories, it is expected that each region would produce approximately 275.5 applications per relevant 100,000 population. A review of Table 3 highlights that NFLD, NB and PQ exceeded this expected application pressure, while all other provinces and the territories fell short of this benchmark.

Review of the enrolment metrics by province and territory revealed that 2,859 students enrolled in medical school in 2018. Applicants from ON secured the most medical school spaces in Canada (916), and applicants from the Territories secured the fewest (eight). The province securing the fewest medical school spaces in 2017/2018 was PEI (11). NFLD had the highest enrolment per relevant 100,000 population (115.2), and the NWT had the lowest enrolment (42.5) per relevant 100,000 population. The province with the lowest enrolment per relevant 100,000 population was ON (47.0). Assuming a system of equitable regional admissions, it is expected that each province and territory would account for 58.2 enrolments per relevant 100,000 population. A review of Table 3 highlights that NFLD,

TABLE 3. Medical applications and enrolments in the 2018 admissions cycle

Region	Applications	Applications per 100,000 population (20–29 years)	Enrolment	Enrolment per 100,000 population (20–29 years)
NFLD	215	364.2	68	115.2
NS	278	232.8	89	74.5
NB	248	288.4	84	97.7
PEI	40	217.7	11	59.9
PQ	4,451	425.2	846	80.8
ON	4,651	238.7	916	47.0
MB	447	234.9	113	59.4
SK	273	171.4	85	53.4
AB	1,312	216.8	316	52.2
BC	1,594	240.3	323	48.7
Territories	31	164.8	8	42.5
Total	13,540		2,859	

NS, NB, PEI, QC and Manitoba (MN) exceeded this number of enrolments, while all other provinces and the territories fell short of this benchmark.

Table 4 presents the number of physicians per 100,000 population (CIHI 2019) alongside the total number of available medical spaces for each province. This table shows that PEI had the lowest number of physicians per 100,000 population (189.2) and the highest number of available medical school spaces per relevant 100,000 population (5,368.8); NS had the highest number of physicians per 100,000 population (256.5). However, the total number of available spaces per relevant 100,000 population in NS is intermediate with respect to the other provinces (838.4). Considering these relationships across all provinces, the table highlights that regional allocation policies across Canada are not determined solely as a function of the size of the physician workforce in each province.

Discussion

This descriptive policy analysis shows that availability of medical school spaces in Canada differs as a function of the province or territory from which applicants apply. At its most extreme, this difference amounts to 781 medical school opportunities – more than a quarter of all eventual enrolments – that are available to applicants from QC but are not available to applicants from the territories. Determining whether this differential is justified requires appraisal of the consequences of the policies with respect to their goals.

To begin, it is clear that a higher number of potential available spaces within a population is insufficient to ensure enrolment for certain regions. For instance, the territories (4,848.2) and PEI (5,468.8) are afforded considerably more potential spaces per 100,000 population between the ages of 20 and 29 years than any of the other regions. Despite this, enrolment from the territories is much lower than would be expected, given equitable processes of regional admissions; enrolments from PEI are roughly at the expected number.

TABLE 4. The number of physicians per 100,000 population and the total number of available medical school spaces by relevant (aged 20–29 years) 100,000 population by province

Province	Physicians per 100,000 population	Spaces per 100,000 population (20–29 years)
NFLD	255.3	1,631.2
NS	256.5	838.4
NB	236.2	1,182.5
PEI	189.2	5,468.8
PQ	247.7	161.7
ON	223.9	54.3
MB	210.3	533.8
SK	201.4	628.5
AB	247.3	195.3
BC	243.4	176.4

On the other hand, QC is afforded a number of spaces per relevant 100,000 population (161.7) that registers toward the lower end of the overall tally and yet secures a relatively large proportion of enrolments. This implies that the simple opportunity to compete for spaces does not do enough to enhance regional enrolment. Indeed, the application pressure from the territories and PEI is relatively low, as it is for many provinces that see fewer applicants enrol in medical school. This suggests that increasing medical school representation from certain regions likely requires greater policy intervention than simply granting potential access. In particular, policies should focus on increasing the number and competitiveness of applicants from the intended regions. This position is substantiated by evidence that early identification of potential physicians from underrepresented groups can be successful in increasing the number of qualified applicants when those students are provided with relevant learning opportunities and mentorship (Kosoko-Lasaki et al. 2006; Salto et al. 2014).

Although the data point to the importance of policy that increases the number of qualified individuals who apply to medical school, it is also clear that the specific and unshared allocation of spaces for a particular region is an important driver of increased regional enrolment. That is, the data highlight that the medical schools that explicitly reserve spaces for residents of the province in which the institution is located are able to enrol higher numbers of applicants from that province. This bears out for applicants from NFLD, NS and QC. Furthermore, admissions via these allocations reflect the vast majority of medical school enrolments from QC (98.9%) and British Columbia (BC; 97.2%). In this regard, the data suggest these policies are successful in meeting the objective of ensuring that education resources are being dedicated to the populations that reside there. However, they also suggest that applicants from these provinces are either not applying or are not successful in obtaining admission via the portion of spaces not allocated to particular regions.

These policies of regional allocation of medical school spaces may also discourage the enrolment of applicants from certain regions. In particular, the enrolment statistics show

that the allocations may work to offset the number of spaces attained by Ontarians. Consider this: ON applicants are afforded 203 regionally allocated spaces. All things being equal, the expectation would be that Ontarians would secure a proportion of the 856 unallocated spaces that equals their proportion of the application pressure (34.4%). However, the data presented here indicate that Ontarians secured 916 of 2,018 enrolments, 713 of which would be unallocated. This means that these applicants were successful in securing 83.2% of the total unallocated spaces. This distribution raises questions about the way in which Ontarians command such a large proportion of the enrolment even though they have among the fewest number of spaces available to them. One possibility is that the applicants from ON are judged to be of better quality than their counterparts from the rest of Canada, whether in a wholly valid sense or because the typical admissions metrics provide a better frame for these individuals. If this is the case, then the regional allocation policies may be working to reconcile some structural inequity in pre-medical school education and/or opportunity that favours ON applicants. Another possibility is that the ON medical schools are preferentially favouring ON applicants in the absence of any explicit policies. If this were the case, then these institutions may consider formalizing and making their selection processes pertaining to regional allocation transparent. This would allow applicants across the country to be judicious with regard to the way they apportion their own personal resources to the application process.

In considering these data, it is important to acknowledge that although the seat allocation numbers remain relatively static year-over-year, our interpretations of policy impacts with respect to application pressure and enrolments is limited: the values analyzed here are specific to the 2018 admissions cycle and are not necessarily representative of annual trends. Nevertheless, the demonstrated inequity in opportunity highlights the need for deeper study into whether current regional admissions policies are indeed serving the health human resources goals of medical education in Canada. For instance, medical school regional allocation policies that create inequity in opportunities might be warranted by strong evidence that the selection of students from particular regions indeed leads to a better distribution of physicians within those regions (Ellaway et al. 2018). In this regard, while the Northern Ontario School of Medicine success in rural contexts is encouraging (Strasser et al. 2009), the overall evidence base in support of this proposition remains small, with the most recent literature in the area (Goodfellow et al. 2016; Hughes et al. 2005; O'Connell et al. 2018; Puddey et al. 2017; Rabinowitz et al. 2000; Wayne et al. 2010) relying heavily on a single study that showed an association between physician gender, race, and socio-economic background and the likelihood of their serving low-income and racial minority populations (Cantor et al. 1996). Moreover, there is no compelling evidence that training *within* particular regions alters any future attachment that learners feel toward their place of origin. Given that this is a foundational assumption of policies designed to maintain physician supply by educating medical students in their home region, provinces and territories may find that fostering the overall competitiveness of their residents' applications to medical school and

advocating for their equitable opportunity to enrol into any Canadian medical school is a fairer and potentially more effective way of shaping their physician workforce.

Given the underdevelopment of evidence showing that the location of undergraduate medical training influences physicians' decisions regarding where and how to practise, we submit that policy makers wishing to increase the physician supply in a given area should focus on policy interventions within the training trajectory and the early years of independent practice (Lee et al. 2016; Myhre and Hohman 2012; Playford et al. 2017; Strasser et al. 2010; Walker et al. 2012). This may include the creation of additional postgraduate training spots, pipeline programs to support high-quality applicants from underserved communities or incentives for new graduates to establish practices in particular regions (Rourke et al. 2018; Young et al. 2017). We also suggest that access be considered as a function of not just geography but also language, culture, race and ethnicity. Improving access to groups currently underrepresented in medicine may necessitate the revision of geographical policies in favour of other affirmative admissions strategies (Saha et al. 2000).

Conclusion

There is an inequity in the opportunity to obtain medical school enrolment in Canada as a function of the province or territory of origin of the applicant. This highlights the need for deeper study into whether current regional admissions policies are indeed serving the health human resources goals of medical education in Canada. This will undoubtedly require more explicit articulations of the intended goals of admissions policies. Health human resource research should work to demonstrate the relationship between current admissions policies and the amelioration of regional physician shortages or identify other strategies to increase the regional physician workforce.

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RESEARCH PAPER

Evaluation of Rheumatology Workforce Supply Changes in Ontario, Canada, from 2000 to 2030

Évaluation des changements dans l'offre de main-d'œuvre en rhumatologie en Ontario, au Canada, de 2000 à 2030

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Abstract

Rheumatology workforces are increasingly challenged by too few physicians in face of the growing burden of rheumatic and musculoskeletal diseases (RMDs). Rheumatology is one of the most frequent non-surgical specialty referrals and has the longest wait times for subspecialists. We used a population-based approach to describe changes in the rheumatology workforce, patient volumes and geographic variation in the supply of and access to rheumatologists, in Ontario, Canada, between 2000 and 2019, and projected changes in supply by 2030. Over time, we observed greater feminization of the workforce and increasing age of workforce members. We identified a large regional variation in rheumatology supply. Fewer new patients are seen annually, which likely contributes to increasing wait times and reduced access to care. Strategies and policies to raise the critical mass and improve regional distribution of supply to effectively provide rheumatology care and support the healthcare delivery of patients with RMDs are needed.

Résumé

La main-d'œuvre en rhumatologie est de plus en plus confrontée au manque de médecins et au fardeau croissant des maladies rhumatismales et musculosquelettiques (MRM). La rhumatologie constitue l'une des spécialités non chirurgicales vers lesquelles on aiguille le plus fréquemment des patients, et les délais d'attente pour consulter un surspécialiste y sont les plus longs. Nous avons utilisé une méthode axée sur la population pour décrire les changements dans la main-d'œuvre en rhumatologie, le volume de patients ainsi que la variation géographique de l'offre et de l'accès aux rhumatologues, en Ontario, au Canada, entre 2000 et 2019; avec une projection des changements de l'offre d'ici à 2030. Au fil du temps, nous avons observé une plus grande féminisation de l'effectif et une augmentation de l'âge de la main-d'œuvre. Nous avons observé une grande variation régionale dans l'offre en rhumatologie. Moins de nouveaux patients sont vus chaque année, ce qui contribue probablement à l'augmentation des temps d'attente et à une réduction de l'accès aux soins. Il est nécessaire de mettre au point des stratégies et des politiques pour accroître la masse critique et pour améliorer la distribution régionale de l'offre de main-d'œuvre, et ce, afin de fournir efficacement des soins de rhumatologie et afin de soutenir la prestation de soins de santé aux patients atteints de MRM.

Introduction

Rheumatic and musculoskeletal diseases (RMDs) represent a multitude of degenerative, inflammatory and autoimmune conditions affecting millions of people worldwide (Al Maini et al. 2015). RMDs have one of the largest impacts on population health in terms of death and disability (GBD 2013 Mortality and Causes of Death Collaborators 2015; Global Burden of Disease Study 2013 Collaborators 2015). The costs associated with RMDs are significant. For example, tumour necrosis factor inhibitors (TNFis), now a therapeutic mainstay in rheumatology, gastroenterology and dermatology, remain the costliest therapeutic category in Canada, costing public drug plans $801.4 million in 2016; yet, only 0.5% of beneficiaries use these drugs (CIHI 2018). TNFis also accounted for 55% of growth in public spending on prescription drugs between 2007 and 2012 (CIHI 2012). There is potential to avoid these costly interventions, as advances in early diagnoses and treatment strategies for inflammatory arthritis have revolutionized patient care. Improving early access to rheumatologists for diagnosis and treatment with disease-modifying anti-rheumatic drugs (such as methotrexate in rheumatoid arthritis), could result in savings of almost $39 billion over the next 30 years (Bombardier et al. 2011). Thus, while rheumatologists represent a small subspecialty, they have the potential to influence a large and growing segment of healthcare spending.

It is well established that rheumatology specialty care is vital to the timely and accurate diagnosis and treatment of RMDs and to improving health outcomes of various RMD-affected populations (Gossec et al. 2016; Keeling et al. 2018; Monti et al. 2015). Currently, Canadian healthcare for RMDs is suboptimal, indicating barriers to accessing rheumatology specialty care and timely treatment (Barber et al. 2020; Lacaille et al. 2005; Widdifield et al. 2016b). Rheumatology is one of the most frequent non-surgical specialty referrals (Liddy et al. 2017) and has the longest wait times for subspecialists (Jaakkimainen et al. 2014; Shadd et al. 2011), far exceeding established benchmarks for timely care (Barber et al. 2020; Widdifield et al. 2016a, 2016b). High-volume rheumatology practices have been reported as a barrier to providing guideline-concordant care (Haraoui et al. 2012). Restricted availability of rheumatology services may create barriers to optimal care, contributing to suboptimal outcomes, increased healthcare costs and reduced quality of life (Barnabe et al. 2015; Feldman et al. 2013; Haraoui et al. 2012; Harris et al. 2013; Pease et al. 2010; Widdifield et al. 2016a, 2016b, 2017a, 2017b; Yazdany and MacLean 2008; Yazdany et al. 2014). There are increasing concerns over the rapidly rising prevalence of RMDs in aging populations placing greater demands on rheumatology services (Al Maini et al. 2015). Furthermore, smaller subspecialties, such as rheumatology, are especially sensitive to minor changes in physician supply. Thus, understanding rheumatology supply is vital for developing sound health human resource policies.

Within Canada, the number of rheumatologists has increased over time, but remains inadequate compared to the numbers in other Organisation for Economic Co-operation and

Development countries. As of 2018, there were approximately 400 rheumatologists practising in Canada (Barber et al. 2017), leaving an estimated deficit of 200 rheumatologists, with all provinces failing to meet the Canadian Rheumatology Association recommendation of one rheumatologist per 75,000 population (Barber et al. 2017). This Canadian recommendation may underestimate population demand requirements for rheumatologists, as a recent international systematic review estimated that approximately two rheumatologists per 100,000 adults are needed (Dejaco et al. 2016). Despite the discrepancy in the ratio of rheumatology supply recommendations, international reports have identified major demographic and geographic changes that are significantly impacting rheumatology workforces, including baby boomer retirements, a millennial predominance and an increase in female and part-time providers (Battafarano et al. 2018). In addition, the major advancements in medication (biologics and small molecules) and diagnostic tools have made it increasingly difficult for primary care physicians to provide comprehensive care to the RMD-affected population due to the growing array of advanced services used in rheumatology (Isaacs 2015).

To date, previous Canadian rheumatology workforce studies have involved physician surveys, which may be incomplete and do not evaluate trends over time (Barber et al. 2017; Brophy et al. 2016; Kur and Koehler 2011). Ontario, being the most populous Canadian province, contains the largest Canadian rheumatology workforce, and while rheumatology supply differs across Canada, changing workforce characteristics in Ontario are likely to be generalizable to the Canadian rheumatology workforce as a whole. Ontario also contains a validated physician registry linkable to health services data, whereas, in many other Canadian provinces, there is no identifier to distinguish rheumatologists from internists in their provincial administrative data sets (Barber et al. 2020), making it difficult to evaluate health services use by patients of rheumatologists.

The purpose of this study is to describe changes in the Ontario rheumatology workforce and activity over the past 19 years. In addition, we sought to quantify provincial and practice-level patient volumes and geographic variation in the supply of and access to rheumatologists.

Method

We conducted a population-based study using linked health administrative databases in Ontario from 2000 to 2019. Rheumatologists and their characteristics were identified using the ICES Physician Database, which is constructed and routinely validated using the Ontario Health Insurance Plan (OHIP) Corporate Provider Database, Ontario Physician Human Resources Data Centre and physicians' OHIP billings. We included active rheumatologists defined as those with fee-for-service claims during each fiscal year. Pediatric rheumatologists were not included. We identified all patients 18 years and older with rheumatology encounters by linking the OHIP claims history database and the Registered Persons Database (RPDB). Annual population denominators were derived from the RPDB,

including all living OHIP beneficiaries who had had contact with the healthcare system in the past seven years.

We identified the annual number of rheumatologists overall by clinical full-time equivalents (FTEs) classification and by healthcare planning region. Using annual fee-for-service billing claims, physicians below the 40th percentile of total billings were classified as providing less clinical activity (<1 FTE), 40th to 60th percentile were classified as 1 FTE, and >60th percentile as >1 FTE (Alberta Medical Association 2015). Practice volumes (defined as the median number of patient visits per year) and practice sizes (defined as the median number of unique patients per year) were assessed according to clinical FTE classification. To identify new patients, we applied a three-year washout period to identify individuals with no prior rheumatology contacts. Regional rheumatology supply, patient encounter rates, and access measures were assessed across 14 Local Health Integration Networks (LHINs). Measures of cross-boundary flow across LHINs assessed the local service rate and regional outflow rate. We used geographic information systems to map patient encounter rates across 76 sub-regions and the locations of rheumatology practices for 2019 as well as primary practice locations and maps of patients' inflow and outflow across LHINs.

Descriptive statistics were used to analyze characteristics of rheumatologists and their patients by fiscal year. Per capita rheumatology supply is expressed as per 75,000 residents, and provider-level rheumatology volume rates are expressed per 1,000 population.

A traditional stock-and-flow projection model was developed to project the provincial supply of rheumatologists by 2030. This was done by using the most current data available in 2019 and accounting for the addition of the rheumatology residents entering the practising rheumatology population, and the subtraction of the retiring rheumatologist population. Estimated practice entry cohort numbers were ascertained from the Canadian Post-M.D. Education Registry (CAPER 2019). Two alternative assumptions were made on the annual number of new rheumatologists entering the workforce, including a high scenario (assuming growth trends over time, with one additional trainee entering the workforce per year on top of the 15 new rheumatologists reported in 2019) and a low scenario (assuming the practice entry cohort remained constant). Both projected estimates assumed all graduates of Ontario training programs remained to practise in Ontario.

Results

There were 146 active rheumatologists in 2000, which increased to 230 rheumatologists by 2019 (Table 1). More female rheumatologists and more international graduates entered the workforce over this time. There was a shift in workforce demographics, with 66% male rheumatologists in 2000 compared to 48% in 2019. The overall workforce is aging, with an increasing proportion of rheumatologists aged 60 and older (16% in 2000 vs. 25% in 2019). More male rheumatologists were identified as high-volume providers across each time point (Table 1). There was a significant reduction in the median (interquartile range [IQR]) days providing patient care, from 220 (178–243) days in 2000 to 172 (136–210) days in 2019.

TABLE 1. Demographics and clinical activity of the Ontario rheumatology workforce

	Year		
Demographics	**2000**	**2008**	**2019**
Total number of rheumatologists	146	155	230
Female, n (%)	50 (34.3%)	59 (38.1%)	119 (51.7%)
Number of >1 FTE rheumatologists	89	94	139
Female[1], n (%)	24 (16.4%)	29 (18.7%)	65 (28.3%)
Male[1], n (%)	65 (44.5%)	65 (41.9%)	74 (32.2%)
Age, mean (*SD*) <40 years of age, n (%) 41 to 60 years of age, n (%) >60 years of age, n (%)	48.5 (10.6) 34 (23.3%) 88 (60.3%) 24 (16.4%)	51.5 (10.9) 31 (20.0%) 94 (60.6%) 30 (19.4%)	49.1 (12.7%) 69 (30.0%) 102 (45.2%) 57 (24.8%)
Urban location[2], n (%)	105 (71.9%)	145 (93.6%)	218 (94.8%)
Canadian medical graduate, n (%)	108 (74.0%)	118 (76.1%)	129 (56.1%)
High volume provider: >10 patient encounters/day on >209 days in the year[3] Both sexes, n (%) Male rheumatologists, n (%) Female rheumatologists, n (%)	 43 (29.5%) 36 (37.5%) 7 (14.0%)	 38 (24.5%) 33 (34.4%) 5 (8.5%)	 45 (19.6%) 31 (27.9%) 14 (11.8%)
Number of days with patient assessments in the year[4], median (IQR)	220 (178–243)	189 (143–224)	172 (136–210)
Number of rheumatologists with hospital encounters[5], n (%)	127 (87.0)	129 (83.2)	151 (65.7%)

[1] Denominator is the total number of rheumatologists.
[2] Urban location defined using the rurality index of Ontario.
[3] 209 days is a proposed benchmark for FTE (26).
[4] Based on the number of days on which a physician provided at least one claim for an assessment during the fiscal year.
[5] Based on the number of rheumatologists with at least one OHIP C fee code.

We observed a noticeable difference in rheumatology practice volumes and practice sizes according to clinical FTE classification (Table 2, available online at longwoods.com/content/26428). Median patient volumes and practice sizes per rheumatologist were the lowest in 2019, and there was a reduction in the median number of new patients seen per rheumatologist over the years.

Despite the growth to the workforce between 2000 and 2019, the percentage of the Ontario population seen by an Ontario rheumatologist remained constant at <3% (Table 3). Patients of rheumatologists were predominately female (68%), with an increasing proportion of older adults across time.

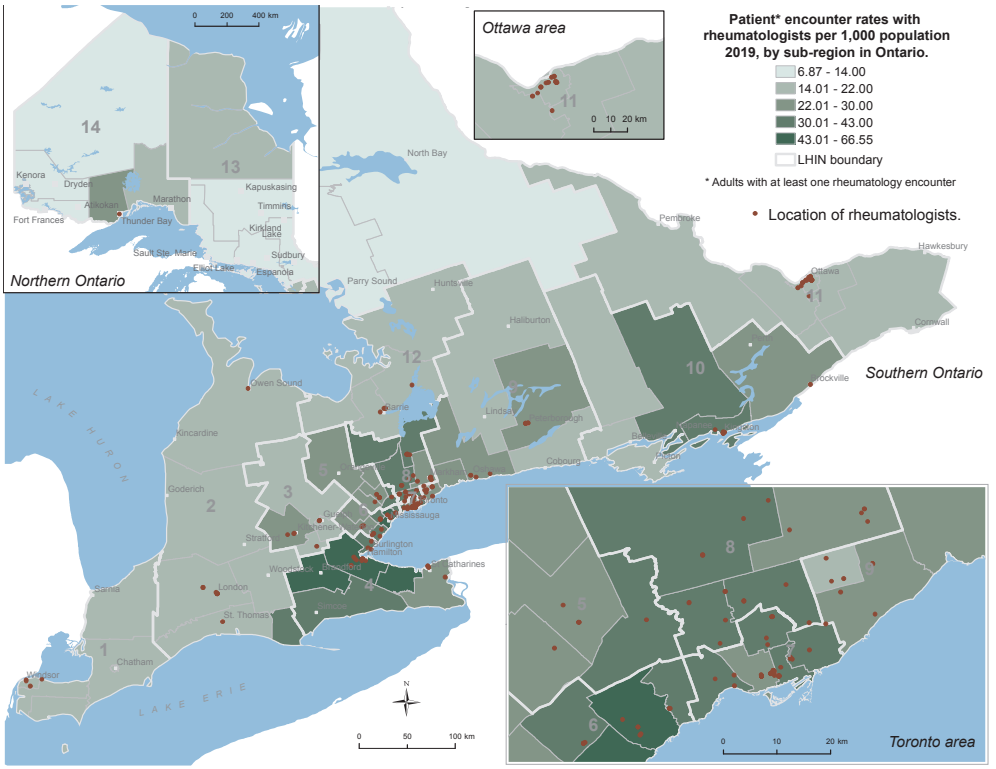
In 2019, the provincial per capita rheumatology supply was 0.9 FTEs per 75,000 residents. There was a large regional variation in rheumatology supply and access (Table 4, available online at longwoods.com/content/26428; Figure 1), ranging from 4.8% of residents in Hamilton seeing a rheumatologist compared to 0.8% in the North East LHIN (the latter of whom travelled a mean distance of 354 km to see a rheumatologist). There was also a strong linear correlation between regional rheumatology supply and volume rates.

TABLE 3. Characteristics of patients with rheumatology encounters

	Year		
Patient characteristics	**2000**	**2008**	**2019**
Number of Ontarians who visited a rheumatologist	245,486	280,072	326,814
Percentage of Ontarians under rheumatology care[1]	2.7%	2.8%	2.8%
Age, years median (IQR)	58 (46, 70)	59 (48, 71)	61 (49, 72)
Males (all ages) n (%)	76,691 (31.2%)	88,275 (31.5%)	105,265 (32.2%)
18 to 34 years, n (%)	6,969 (9.1%)	6,621 (7.5%)	9,448 (9.0%)
35 to 64 years, n (%)	42,344 (55.2%)	48,812 (55.3%)	51,281 (48.7%)
65 to 84 years, n (%)	25,052 (32.7%)	29,377 (33.3%)	39,245 (37.3%)
>85 years, n (%)	2,326 (3.0%)	3,465 (3.9%)	5,291 (5.0%)
Females (all ages), n (%)	168,795 (68.8%)	191,797 (68.5%)	22,1549 (67.8%)
18 to 34 years, n (%)	13,299 (7.9%)	12,401 (6.5%)	18,663 (8.4%)
35 to 64 years, n (%)	94,724 (56.1%)	106,812 (55.7%)	109,661 (49.5%)
65 to 84 years, n (%)	55,154 (32.7%)	63,972 (33.4%)	81,117 (36.6%)
>85 years, n (%)	5,618 (3.3%)	8,612 (4.5%)	12,108 (5.5%)
Ratio (females/males)	2.2	2.2	2.1

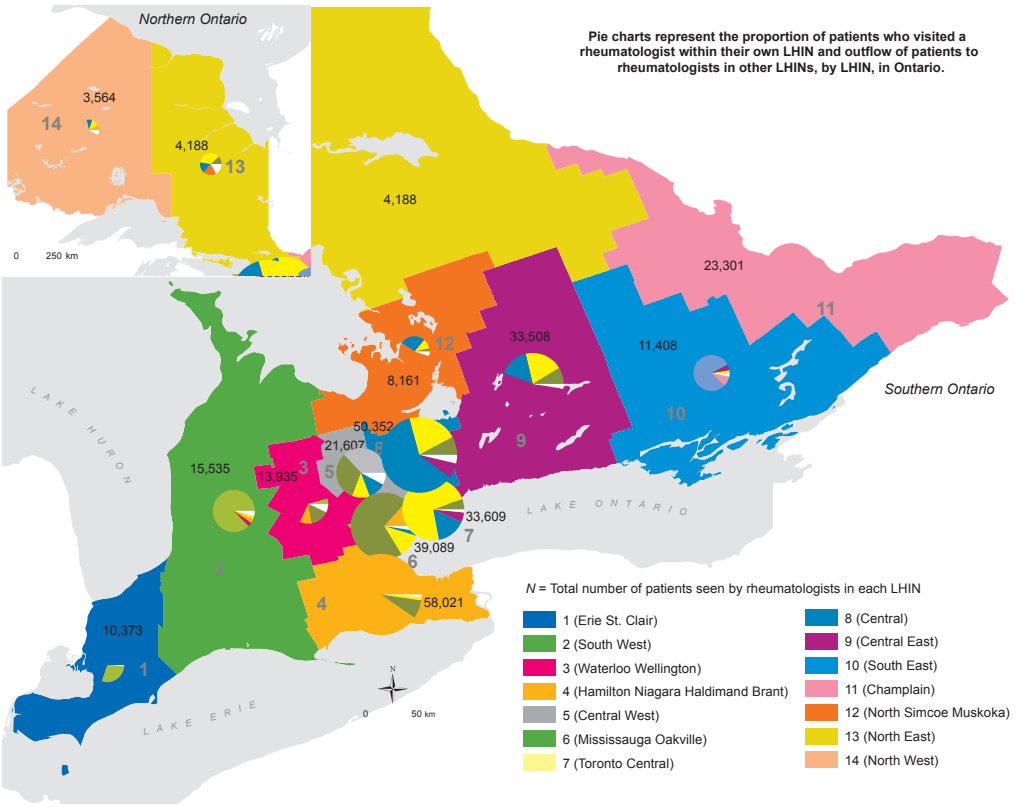
[1] 18 years and older for population denominator.
IQR = interquartile range.

FIGURE 1. Rheumatology practice locations and patient encounter rates by sub-region (2019)



We also observed significant cross-boundary flow with some patients travelling long distances to see rheumatologists in other areas of the province (Table 4 , available online at longwoods.com/content/26428; Figure 2). Collectively, four LHINs (Hamilton Niagara, Mississauga Halton, Toronto Central, and Central [comprising Newmarket, North York, Richmond Hill]) provide rheumatology services to 66% of all of Ontario's rheumatology patient population (Table 4 and Figure A1, available online at longwoods.com/content/26428).

FIGURE 2. Patient encounters according to patients' LHINs (2019)



In our projection of the rheumatology workforce by 2030 – accounting for the incoming rheumatology workforce and the outflow of retiring rheumatologists – our high scenario (continued growth model) predicted a total of 363 Ontario rheumatologists by 2030, comprising 218 clinical FTEs. Based on our low scenario, a projected workforce by 2030 would comprise a total of 308 rheumatologists, of which 185 would be clinical FTEs.

Interpretation

Our findings provide baseline information on the state of rheumatology supply in Ontario for developing sound health human resource policies. Over the past two decades, several

important rheumatology workforce changes took place, which were identified in this study. We discuss these changes and their implications on the future supply of and access to rheumatologists to inform considerations for workforce policy development.

The first notable trend is the growth in the total number of rheumatologists in Ontario. However, the overall clinical workforce remains low, with only 139 rheumatologists practising at or above one clinical FTE as of 2019. We project a modest increase by 2030. Despite the growth, changes in the demographic characteristics of the workforce – including increasing age of workforce members and more female rheumatologists over time (Table 1) – are unlikely to sustain the same level of patient volumes and services as previously. On average, studies have reported that female physicians work fewer hours than male physicians (Bae et al. 2016; Fisher et al. 2014; Pelley et al. 2016; Spector et al. 2014) and on a part-time basis (Pearse et al. 2001; Spector et al. 2014), and are more likely to take periods of leave (Bae et al. 2016), which could result in reduced workforce clinical capacity to meet population needs. Indeed, we found that there were twice as many male rheumatologists practising as at least one FTE or as a high-volume provider compared to the number of female rheumatologists. The declining number of annual days providing clinical service may also be reflective of generational effects as younger physicians (under 35 years) in the US and Canada report working fewer hours than previous generations (The Royal College of Physicians and Surgeons of Canada 2009; Deal et al. 2007; The College of Family Physicians of Canada et al. 2019). We also identified that average practice volumes and sizes were the lowest in 2019. Generational effects alone may not be the only cause for declining service capacity. Other factors – including additional administrative workloads, such as the migration to electronic medical records, drug authorization approvals and insurance form completion, greater demands for continuing medical education and research activity – could be impacting clinical capacity.

The complexity of care is also increasing among this patient population, which may also impact workforce capacity. The aging patient demographic and complexity of care management involved with comorbid illnesses in aging populations is placing greater demands on rheumatology services (Al Maini et al. 2015; Roubille et al. 2015). Due to the chronic nature of RMDs and high co-occurrence of multimorbidity and disability, patients require complex medication regimens and consistent, longitudinal interaction with rheumatology care. We have previously shown changes over time to the composition of patients under rheumatology care, with fewer patients being seen with non-inflammatory conditions (e.g., osteoarthritis and self-limiting musculoskeletal conditions) in recent years (Widdifield et al. 2020). A separate Ontario study identified that 17% of rheumatology referrals did not result in a rheumatology consultation (Widdifield et al. 2016b). In the present study, the proportion of the Ontarians under rheumatology care remained constant (2.7%) during our study period, despite a rising burden of RMDs in the population (Eder et al. 2019; O'Donnell et al. 2011; Widdifield et al. 2013) and growth in rheumatology supply. Taken together, these findings are likely a reflection of rheumatologists adapting to prioritize patients with systemic inflammatory conditions

in light of a strained rheumatology supply. Other areas of Canada have similarly reported the prioritization of systemic inflammatory conditions in rheumatology care and the triage of patients as a means to improve access to care (Delaurier et al. 2012; Hazlewood et al. 2016).

Furthermore, Ontario rheumatology practice sizes and patient volumes (Table 2) appear to be in excess of those reported for both American (Raffoul et al. 2016) and Canadian family physicians, who have a median number of 1,025 to 1,400 patients (Ministry of Health and Long-Term Care 2011). There is evidence from primary care that the quality of care, access to services and continuity of care delivered decreases when physicians care for large practice panels (Campbell 1996; Hogg et al. 2009; Hudon et al. 2004; Murray et al. 2007; Russell et al. 2009; Wilkin and Metcalfe 1984). As clinics become saturated with patients requiring chronic care, rheumatologists' ability to provide services to new patients declines. Despite the growth in workforce size, on average, fewer new patients per rheumatologist are being seen. Moreover, as a large number of rheumatologists in the workforce are currently exiting the workforce (n = 72 nearing retirement), new rheumatologists entering the workforce are not necessarily increasing patient access, as they are taking over existing established rheumatology practices, which already contain a high case-load of patients requiring chronic care.

Finally, our findings highlight significant regional disparities in rheumatology supply, which have persisted during the study period. We observed a lower proportion of area residents seen by rheumatologists in areas with lower rheumatology supply. Thus, many areas in Ontario are insufficiently serviced, creating inequitable access to care. Regional maldistribution of rheumatology supply is also necessitating long travel times (and potentially long wait times) for patients looking to access a rheumatologist. Evidence suggests that more attention is needed on the distribution of physicians and not simply the absolute supply of physicians (Goodman 2004). Considering that RMDs often impair mobility, which hampers patients' ability to participate in society and in seeking medical care, barriers to rheumatology care also need to be understood using an ethical paradigm (MacKenzie et al. 2005; Rom et al. 2007). Early diagnosis of RMDs is critical in lessening disability, permanent organ system damage, potential disfigurement, poor health outcomes including premature mortality and excessive and unsustainable prescription drug costs (van Nies et al. 2014). Thus, ensuring this vulnerable patient population receives accurate and timely care is of great concern. In addition, as two-thirds of the rheumatology patient population are female, the inequitable access to care is disproportionally affecting women.

Our results are concordant with previous Canadian research on an insufficient rheumatology supply and maldistribution of rheumatologists across Canada (Barber et al. 2017; Brophy et al. 2016). A comprehensive US workforce study reported a ratio of provider per 100,000 patients as 3.1 in the northeast to 1.3 in the southwest in 2015 (Battafarano et al. 2018). The US rheumatology workforce also projected major demographic and geographic changes that will significantly impact the supply of the future workforce in parallel with an

increased demand for adult rheumatology care due to the growing and aging US population (Battafarano et al. 2018).

Ontario rheumatologists practise using the fee-for-service model and currently there is no specific funding allocated for physiotherapists, occupational therapists, nurse practitioners (NPs), physician assistants (PAs), administrative overhead and nursing staff who are essential to supporting rheumatologists caring for people with RMDs. In order to support a sustainable rheumatology workforce, a competent health workforce is required to support the effective implementation of models of care and the associated models of service delivery (Chehade et al. 2016). While clinical service capacity may be increased by models of care that integrate the work of multidisciplinary teams – thereby shifting work flow, responsibilities and access to programs – the impact on workforce capacity arising from the implementation of alternative service delivery models has not been comprehensively studied in Canada (Chehade et al. 2016). Expanding the rheumatology workforce capacity, by incorporating well-trained allied health practitioners, NPs and PAs, has been a viable option in the US and England (Hooker 2008; Solomon et al. 2014). However, rheumatologists remain a vital component of all models of care involving systemic RMDs (Arthritis Alliance of Canada 2014; Keeling et al. 2018; Smolen et al. 2017). These multidisciplinary care models may also be associated with superior patient clinical outcomes (Solomon et al. 2015) and improving access to care and treatment for patients with RMDs (Ahluwalia et al. 2020). While multidisciplinary care funding models exist in some areas of Canada (Martin 2015; Stewart and Teo 2014), stable funding in Ontario would increase the ability of rheumatologists to provide more comprehensive care to a larger volume of patients, and improve earlier access to care. Health budgets would likely benefit from a reduction in health costs through avoidance of inappropriate delays to care, unnecessary investigations and a reduction in complications resulting from inadequately or inappropriately treated disease. However, the cost-effectiveness of models of care and multidisciplinary care funding models in the context of rheumatology is an area in need of future study.

Strengths of this study include the use of population-based data from a large single-payer jurisdiction, which has the strength of being relatively complete for rheumatology billing claims and population coverage. Moreover, Ontario has a validated physician registry, whereas in other provinces it is difficult to accurately distinguish rheumatologists from internists in administrative data. Although the use of administrative data represents an advantage to this study, we were unable to assess the totality of physician activity (e.g., time spent with patients). Another caveat is that some rheumatologists practise in multiple locations, and we were only able to identify each physician's primary practice location. In addition, supply projections are dependent upon assumptions that do not take into account transfers between provinces or international medical graduates. Further research is needed to predict the demand for supply taking into account population needs.

In summary, Ontario rheumatology supply falls below the national benchmark of one FTE per 75,000 population, and many regions are without equitable access to care. Changing workforce demographics is further compounding service capacity. The implications of our work should drive policies related to improving distribution and not merely supply of rheumatologists. The increase in the absolute number of rheumatologists in Ontario also needs to be viewed in the context of the changes occurring within the workforce, including the increasing proportion of female rheumatologists, generational effects and that rheumatology practices may be operating at an unsustainable capacity. Strategies and policies to raise the critical mass to effectively provide rheumatology care and support healthcare delivery to patients with RMDs across Ontario are urgently needed.

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