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IN THIS ISSUE

DANS CE NUMÉRO

Preparing general surgery residents for rural practice

Eliminating postop day 1: Cataract surgery

Canadian CT head rule adherence

The Occasional dental avulsion



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VOL. 29, No. 4, FALL 2024 / AUTOMNE 2024

EDITORIALS / ÉDITORIAUX

- 151 In defence of 'non-adherence' — *Peter Hutten-Czapski, MD*
- 152 À la défense de la 'non-adhésion' aux directives —
Peter Hutten-Czapski, MD
- 153 President's Message: Relationships — *Gavin Gerard Parker, MD*
- 154 Message du Président: Les Relations — *Gavin Gerard Parker, MD*

ORIGINAL ARTICLE

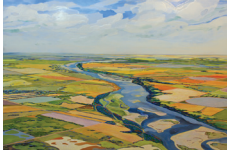
- 155 Preparing general surgery residents for rural practice in British
Columbia: Competencies, privileging and geography —
*Rebecca M. Afford, MD, Sara D. Bolin, MD, Madeleine E. Armstrong, BSc,
Tracy M. Scott, MD, FRCSC, Abmer A. Karimuddin, MD, MAEd, FRCSC*
- 167 Canadian CT head rule adherence in a rural hospital without in-house
computed tomography — *Matthew D. Lavery, BSc,
Rylen A. Williamson, BSc, Jason Curran, BSc, BJourn, MPH,
Judy Wilkey, RN, Kirk McCarroll, MD, CCFP-FPA, FCFP*
- 173 Advantages of eliminating the cataract surgery post-operative day 1
appointment in a rural practice — *Gavin Bahadur, MD,
Lewis Macdonald, BS, Shawn Lin, MD, Cynthia Boxrud, MD,
Ralph Crew, DO*

THE OCCASIONAL

- 177 The Occasional tooth avulsion — *Tayler Young, MD,
Sarah M. Giles, MD*

LEARNERS' CORNER

- 183 Taking flight — *Sarah MacVicar, MD, MSc*



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In defence of 'non-adherence'

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Guidelines are often promulgated by specialists and special interests without regard to the fact that the adoption of any guideline is balanced by the reduction of resources, especially time, for other care. There is not enough time in a day to follow all the guidelines.^{1,2}

Given that sobering consideration, let's look at this issue's article on 'Canadian CT Head Rule adherence in a rural hospital without in-house CT'. At that hospital, it was 'only' 35%.

I like the Canadian CT Head Rule (CCHR). When I worked in rural hospitals without an in-house CT, the rule was particularly useful in enabling the transfer of a patient who I wanted, sometimes desperately, elsewhere. However, I confess that that rule was quite selectively used. This lack of 'adherence' is not just in Canada; a quick look at the literature reveals the use of CT in minor head injuries in a New Zealand rural hospital at 22%.³ So, is this bad? An excess of urban and specialised care guidelines can lead to the belief that rural generalist physicians offer inferior care. This is a misconception that even some rural generalists subscribe to. There is no evidence for it.

In regard to the guideline in question, it was generated by ten large Canadian urban hospitals staffed with inexperienced residents and students.⁴ They had a pre-existing high rate of (in-house) CT head for

a minor head injury. The CCHR successfully reduced the CT rate without increasing missed cases.

So, how relevant is the rule for small rural hospitals mostly staffed with experienced generalist physicians without an in-house CT? In such settings, applying the CCHR would dramatically *increase* the number of CTs, and it is still untested if this would improve clinical outcomes. Let's think of the resources involved. CT, of course, but also time and transfer. Some patients really don't want to leave town, especially for a 'minor' head injury.

Ultimately, we cannot be held to guidelines that do not apply to us. Clinical judgment will lead us to weigh the issues that need addressing in our admittedly complex patients. Always, we need to prioritise for clinical reasons, respecting the values of our patients. Sometimes, we will apply guidelines. Sometimes, we will not. We should not be browbeaten for it.

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À la défense de la 'non-adhésion' aux directives

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Les directives sont souvent promulguées par des spécialistes et des intérêts particuliers sans tenir compte du fait que l'adoption d'une directive est compensée par une réduction des ressources, plus spécifiquement du temps pour d'autres soins. Il n'y a pas assez de temps dans une journée pour suivre toutes les directives.^{1,2}

Compte tenu de ces considérations qui donnent à réfléchir, examinons l'article de ce numéro intitulé « Adhésion au Canadian CT Head Rule (CCHR, règlement canadien relatif à la tomodensitométrie de la tête) dans un hôpital rural ne disposant pas d'un service de tomodensitométrie ». Dans cet hôpital, ce taux n'était que de 35%.

Permettez-moi tout d'abord de dire que j'apprécie le CCHR. Lorsque je travaillais dans des hôpitaux ruraux ne disposant pas d'une tomographie par ordinateur interne, la citation de ce règlement était particulièrement utile pour permettre le transfert d'un patient que je voulais, parfois désespérément, transférer ailleurs. Cependant, j'avoue que ce règlement a été utilisé de manière assez sélectif et que les transferts pour une tomodensitométrie étaient assez similaires à ceux de l'hôpital étudié. Ce manque « d'adhésion » n'est pas propre au Canada. Un rapide coup d'œil à la littérature m'a permis de remarquer que l'utilisation de la tomodensitométrie pour les traumatismes crâniens mineurs dans un hôpital rural de Nouvelle-Zélande est de 22%.³ Alors, est-ce si mauvais? L'excès de directives en matière de soins urbains et spécialisés peut conduire à penser que les médecins généralistes ruraux offrent des soins de qualité inférieure. C'est une idée fausse à laquelle souscrivent même certains généralistes ruraux. Il n'y a aucune preuve à l'appui.

En ce qui concerne la directive en question, elle a été élaborée par dix grands hôpitaux urbains canadiens dotés d'un personnel composé de résidents et d'étudiants inexpérimentés.⁴ Ces hôpitaux avaient déjà un taux élevé

de tomodensitométrie (interne) pour les traumatismes crâniens mineurs. Le CCRH a réussi à réduire le taux de tomodensitométrie sans augmenter le nombre de cas manqués.

Quelle est donc la pertinence de ce règlement pour les petits hôpitaux ruraux dont le personnel est essentiellement composé de médecins généralistes expérimentés et qui ne disposent pas d'une tomographie par ordinateur interne? Dans ce cas, l'application du CCRH augmenterait considérablement le nombre de tomodensitométries, et il n'a pas encore été prouvé que cela améliorerait les résultats cliniques. Pensons aux ressources impliquées, notamment la tomodensitométrie, le temps nécessaire et le transfert. Certains patients ne veulent vraiment pas quitter la ville, surtout pour un traumatisme crânien « mineur ». La crédibilité du praticien est donc également mise à mal (car, bien entendu, la grande majorité des têtes examinées par tomodensitométrie sont normales).

En fin de compte, nous ne pouvons pas être tenus de respecter des directives qui ne s'appliquent pas à nous. Le jugement clinique nous amènera à peser les questions qui doivent être abordées chez nos patients, certes complexes. Nous devons toujours établir des priorités pour des raisons cliniques, en respectant les valeurs du patient concerné. Parfois, nous appliquerons les directives, et parfois, nous ne le ferons pas. Cependant, nous ne devrions pas être réprimandés pour nos décisions.

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President's Message: Relationships

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As rural physicians, we understand better than most the importance of relationships in our communities. Many of you are not only compassionate caregivers in your area, but also coaches, mentors, volunteers and business owners. As someone who did not know the privilege of a rural upbringing, my wife Jennifer and I have been overjoyed at the opportunity to raise our children in a welcoming, culturally diverse and supportive community.

The SRPC has enjoyed productive relationships with several other organisations that set forth policies impacting rural health. One of the most notable relationships is with the College of Family Physicians of Canada (CFPC). The creation of the rural road map and subsequent implementation plan was an important collaboration between our two organisations. Hundreds of our members benefited from the National Advanced Skills Training Programme highlighting another important joint venture. We were invited to the Education Design Retreat in 2023 and the SRPC perspective was incorporated into the aspects of curricular redesign in family medicine training.

Recently, past president Dr. Sarah Lesperance, our COO Jennifer Barr and I have had several opportunities to dialogue with the new CEO of the CFPC, Dr. Mike Allan, President Dr. Mike Green, as well as other CFPC board members. We introduced the concept of our role in 'rural proofing', as far upstream as possible, decisions that affect our members and most importantly our communities. These were the first in what will be an on-going commitment to collaborative meetings amongst our organisations.

As the leaves were turning your executive was hard at work representing the SRPC at a variety of meetings. We were at the WONCA Rural-Ubuntu 2024 in South Africa in September. The Canadian Medical Association invited us to their Apology to Indigenous peoples in Victoria the same month. October reunited us with our Australian colleagues at Rural Medicine Australia in Garramilla (Darwin). Mini Rural and Remote is back and will take place in Charlottetown, Prince Edward Island, from 29 November 2024 to 1 December 2024. The opportunity to learn and grow alongside these like-minded organisations is a privilege, and your executive will represent you well.

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Message du Président: Les Relations

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En tant que médecins ruraux, nous comprenons mieux que quiconque l'importance des relations dans nos communautés. Nombre d'entre vous sont non seulement des soignants compatissants dans votre région, mais aussi des entraîneurs, des mentors, des bénévoles et des chefs d'entreprise. N'ayant pas eu le privilège d'une éducation en milieu rural, mon épouse, Jennifer, et moi-même avons été ravis de pouvoir élever nos enfants au sein d'une communauté accueillante, culturellement diversifiée et solidaire.

La SMRC entretient des relations fructueuses avec plusieurs autres organisations qui définissent des politiques ayant un impact sur la santé rurale. L'une des relations les plus remarquables est celle avec le Collège des médecins de famille du Canada (CMFC). La création de la Feuille de route rurale et du plan de mise en œuvre qui en découle est le fruit d'une collaboration importante entre nos deux organisations. Des centaines de nos membres ont bénéficié du Programme national de formation et compétences avancées, soulignant aussi une autre collaboration importante. En 2023, nous avons été invités à la séance de réflexion sur la conception pédagogique et le point de vue de la SMRC a été intégré dans les aspects de la refonte du curriculum de la formation en médecine familiale.

Récemment, la présidente sortante, la Dre Sarah Lesperance, notre directrice de l'exploitation,

Jennifer Barr, et moi-même avons eu plusieurs occasions de dialoguer avec le nouveau directeur général du CMFC, le Dr Mike Allan, le président, le Dr Mike Green, ainsi que d'autres membres de leur conseil d'administration. Nous avons introduit le concept de notre rôle dans la « validation rurale », le plus en amont possible, des décisions qui affectent nos membres et, plus important encore, de nos communautés. Il s'agissait de la première réunion d'un engagement continu en faveur de réunions collaboratives entre nos organisations.

Même avec l'arrivée proche de l'automne, les membres de l'exécutif continuent leurs efforts pour représenter la SMRC lors de diverses réunions. Nous serons présents à la conférence WONCA Rural-Ubuntu 2024 en Afrique du Sud en septembre. Ce même mois, l'Association médicale canadienne nous a invités à présenter ses excuses aux peuples autochtones à Victoria, ce qui devrait constituer un acte de réconciliation important. En octobre, nous retrouverons nos collègues australiens à Rural Medicine Australia à Garramilla (Darwin). Le Mini Rural & Remote est de retour et aura lieu à Charlottetown, Île-du-Prince-Édouard, du 29 novembre au 1^{er} décembre 2024. L'opportunité d'apprendre et de s'améliorer aux côtés de ces organisations aux vues similaires est un privilège, et nous ferons tout notre possible pour bien vous représenter.

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Preparing general surgery residents for rural practice in British Columbia: Competencies, privileging and geography

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Abstract

Introduction: For general surgeons practising in rural areas, multiple factors influence care beyond skills learned in residency. The British Columbia Privileging Dictionary (BCPD) defines core and non-core procedures that shape the scope of general surgeons. Moreover, the Royal College has adopted a Competence by Design (CBD) curriculum which employs entrustable professional activities (EPAs) that list surgical skill residents must be proficient in by graduation. Our goal is to understand the current practice patterns of rural general surgeons in BC based on these policies and local factors.

Methods: Medical service plan (MSP) data were collected from 2011 to 2021 based on general surgeons working in rural subsidiary agreement (RSA) communities. The MSP fee codes were organised into core or non-core procedures, as outlined by the BCPD. EPAs were assessed and compared to the non-core procedures.

Results: From 2011 to 2021, 223,103 procedures were performed in rural sites in BC. On average, 90.97% (standard deviation = 20.78) of procedures done in all communities were BCPD core procedures. The most common non-core surgical care performed by general surgeons was in plastic surgery ($n = 8035$). Over 8% of procedures performed were not general surgery EPAs. Notably, none of the EPAs are considered non-core privileges and all EPAs have been performed in rural settings.

Conclusion: General surgeons working in rural settings perform multiple procedures outside of EPAs which account for over 8% of their caseload and approximately 6% of procedures performed are non-core privileges. This provides some insight into the potential limitations of the BCPD on graduates hoping to practise in rural communities. As the CBD curriculum has been reported to provide a more flexible approach to learning, it may be tailored to suit residents' learning and career goals, including varied surgical skills to suit rural needs.

Keywords: Medical education, residency, rural surgery

Résumé

Introduction: Pour les chirurgiens généraux exerçant en zone rurale, de multiples facteurs influencent les soins, et ce au-delà des compétences acquises en résidence.

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Le British Columbia Privileging Dictionary (BCPD) définit les procédures essentielles et non essentielles qui déterminent le champ d'action des chirurgiens généraux. En outre, le Collège royal a adopté un programme d'études intitulé « La compétence par conception » (CPC) qui utilise des activités professionnelles fiables (APC) qui énumèrent les compétences chirurgicales que les résidents doivent maîtriser avant d'obtenir leur diplôme. Notre objectif est de comprendre les modes de pratique actuels des chirurgiens généralistes ruraux en Colombie-Britannique en fonction de ces politiques et des facteurs locaux.

Méthodes: Les données du Medical Service Plan (MSP, Plan de service médical) ont été recueillies entre 2011 et 2021 auprès des chirurgiens généralistes travaillant dans les communautés du « Rural Subsidiary Agreement » (RSA). Les codes d'honoraires du MSP ont été organisés en procédures essentielles ou non essentielles, comme indiqué par le BCPD. Les APC ont été évalués et comparés aux procédures non essentielles.

Résultats: Entre 2011 et 2021, 223 103 procédures ont été réalisées dans des sites ruraux en Colombie-Britannique. En moyenne, 90,97% (écart-type = 20,78) des procédures effectuées dans toutes les communautés étaient des procédures de base du BCPD. Les soins chirurgicaux non essentiels les plus courants effectués par les chirurgiens généraux étaient la chirurgie plastique ($n = 8035$). Plus de 8% des procédures réalisées n'étaient pas des APC de chirurgie générale. Il est à noter qu'aucune des APC n'est considérée comme un privilège non essentiel et que toutes ont été réalisées en milieu rural.

Conclusion: Les chirurgiens généraux travaillant en milieu rural pratiquent de nombreuses procédures en dehors de l'APC, représentant plus de 8% de leur charge de travail et environ 6% des procédures pratiquées sont des privilèges non essentiels. Cela donne une idée des limites potentielles du BCPD pour les diplômés qui espèrent exercer dans les communautés rurales. Étant donné que le programme d'études CPC est réputé offrir une approche plus souple de l'apprentissage, il peut être adapté aux objectifs d'apprentissage et de carrière des résidents, notamment en leur permettant d'acquérir des compétences chirurgicales variées pour répondre aux besoins des zones rurales.

Mots-clés: Chirurgie générale; compétences chirurgicales; chirurgie rurale; procédures de base en chirurgie générale; procédures non essentielles en chirurgie générale

INTRODUCTION

General surgery residency in Canada is a 5-year programme with the goal of training surgeons proficient in the management of a broad range of gastrointestinal, breast, endocrine, traumatic and soft-tissue illnesses. Competence by Design (CBD) is a model for resident assessment and promotion that was adopted by the Royal College of Physicians and Surgeons of Canada (RCPSC) in 2020. Residents are provided learning objectives called entrustable professional activities (EPAs) to be observed, evaluated and attained at distinct stages of training before progressing to the next phase.¹ These EPAs are based on the CanMEDS framework as well as core general surgery competencies.¹ Included in the definition for general surgery practice competencies by the RCPSC is the recognition that there is a diversity of healthcare environments general surgeons will work in.¹ Specifically, practice patterns depend on community location, resources, needs and access to other specialists, noting that rural or remote general surgeons practise a wide variety of procedures based on these factors.^{2,3} Furthermore, general surgeons practising in rural

and remote areas may also have to play a role in providing care outside of general surgery core competencies for these very same reasons.³

In British Columbia (BC), 38.2% of the population lives outside of urban areas (population <100,000).⁴ In addition to this, an estimated 14.1% of general surgeons work in small communities with a population <50,000.² General surgeons working in these areas have been found to have a diverse practice including tendon repair, facial soft-tissue surgery, skin grafting, circumcision, hydrocelectomy, tubal ligation, caesarean section, ovarian cystectomy, varicose vein surgery, amputation and many more procedures that are not usually considered general surgery practices.²

The BC Privileging Dictionary (BCPD) was created in 2015 in response to the Cochrane Report (2011) to ensure adequate credentialing and patient safety.⁵ It outlines core procedures that a recent general surgery graduate would reasonably be expected to perform as well as non-core procedures, in which further training, experience or skill must be demonstrated before these privileges are granted.⁵ Many of these

non-core procedures are the aforementioned procedures performed by general surgeons working outside of urban centres. For general surgery graduates hoping to enter rural practice in BC, this may pose an added challenge of obtaining extra training as well as maintaining the skills needed to support the communities that they serve.

The University of BC is the only RCPSC general surgery training programme in BC, allowing residents the opportunity to train at 26 sites throughout the province; 7 of these are defined as rural locations.⁶ The goal of this study is to better understand which procedures that fall outside of general surgery EPAs are being performed by BC rural general surgeons. With this, we are also hoping to evaluate which procedures historically being done in rural settings may have been affected by the BCPD. By doing so, we hope to better inform training programmes about preparing residents for rural practice in BC as well as understand what further competencies general surgeons should attain before entering practice in rural and remote communities.

METHODS

Data collection

The Rural Practice Subsidiary Agreement (RSA) has defined rural communities in BC; these were selected for data collection. The Rural Practice Subsidiary Agreement is a collaboration between BC Government, Doctors of BC and the Medical Services Commission of BC to address the unique considerations of providing healthcare to rural communities. Data demonstrating what procedures rural general surgeons perform were obtained through the BC Ministry of Health Medical Service Plan (MSP) fee-for-service billing codes through the BC Ministry of Health. These data are publicly available by request and no identifiable patient or provider information was included; therefore, no ethics approval was required. Our data request included surgical procedures billed to MSP by general surgeons in rural communities between 2011 and 2021, organised by the community. Communities that are no longer considered rural by the RSA (Kamloops, Chilliwack and Western Communities) were excluded from the study.

EPA data were collected from the RCPSC website (<https://www.royalcollege.ca/content/dam/documents/ibd/general-surgery/epa-guide-general-surgery-e.pdf>) to define the core competencies that residents must demonstrate and attain before the completion of residency. Within each EPA group (e.g., C6: performing procedures on the small bowel), the subheadings for specific procedures were defined (e.g., lysis of adhesions, resection and anastomosis, stoma creation, stoma closure, feeding jejunostomy insertion and repair of enterotomy).

The BCPD definitions of core and non-core procedures were extracted from their website.⁷ These were listed and compared against the EPAs as well as the MSP procedures for rural general surgeons.

Data stratification

Communities were grouped by alphabetic categorisation defined by the RSA. These categories are designated A, B, C or D depending on the number of designated specialties within 70 km, the number of general practitioners within 35 km, community size, distance from a major medical community, degree of latitude, specialist centre and location arc.⁸

The MSP fee codes from the RSA communities were organised into categories of abdominal, breast, skin and soft tissue, orthopaedic, obstetric/gynaecologic, neurosurgical, vascular, urologic, plastic, head and neck and thoracic surgeries as well as endoscopy and pacemaker/port insertion. Subcategories were then created for each heading. EPA subheadings were then correlated to the BCPD core and non-core competencies to look for correlation or discordance.

Statistical analysis

We looked at the total number of cases outside of the EPAs that are being done in each rural community annually. The same was done for core and non-core procedures. Welch's *t*-tests were used to determine if the proportion of non-core surgery cases significantly changed after the implementation of the BCPD in 2015. Welch's *t*-tests were also used for assessing if the proportion of non-EPA cases significantly changed after the adoption of the BCPD. Furthermore, we used

a Mann–Whitney *U*-test to determine if there was a correlation between a community's RSA alphabetic designation and the proportion of non-core cases that were performed. Finally, a Mann–Whitney *U*-test was also used to determine if there was a correlation between the RSA rurality classification and the proportion of non-EPA procedures performed in these communities.

RESULTS

In this retrospective observational study, there were a total of 223,103 cases included from 2011 to 2021. There were 23 rural communities included in this study, from the Northern Health Authority, Interior Health Authority, Island Health Authority and Vancouver Coastal Health Authority [Figure 1].

Entrustable professional activities

Of the total number of procedures done, 203,949 (91.41%) had associated EPAs, whereas 19,154 (8.59%) were non-EPA procedures. The most common EPA procedures were colonoscopy ($n = 80,453$, 36.06%), colorectal ($n = 23,696$, 10.62%), hernia ($n = 20,890$, 9.36%), wound management ($n = 17,966$, 8.05%) and breast ($n = 9,801$, 4.39%) [Table 1].

The most common non-EPA procedures were plastic surgery ($n = 8035$, 3.60%), vascular surgery ($n = 3,389$, 1.52%), minor urology procedures ($n = 1,835$, 0.82%) and

Endoscopic retrograde cholangiopancreatography (ERCP) ($n = 1,502$, 0.67%) [Table 2].

Of the BCPD core privileges, temporal artery biopsies, as well as varicose vein ligation and management of venous stasis disease are not listed as EPAs [Table 3]. Of the non-core privileges, none of them are EPAs for general surgeons [Table 4].

British Columbia Privileging Dictionary

Based on the BCPD definitions, 202,969 cases (90.98%) performed by BC rural general surgeons were considered to be core procedures, whereas 14,525 (6.51%) were non-core procedures. In the past decade, 5,609 (2.51%) of the procedures performed by BC rural general surgeons were not listed in the BCPD. The most common core procedures performed were similar to the most common procedures associated with an EPA, as shown in Table 1. Table 5 outlines all core procedures performed by BC rural general surgeons.

The total number of procedures done that are not considered core procedures (i.e., 'non-core' and 'not listed' procedures) was 20,134 procedures (9.02%). The most common non-core procedures performed were plastic surgery ($n = 8035$, 39.91%), minor urology procedures ($n = 1,835$, 9.11%), ERCP ($n = 1,502$, 7.46%) and head and neck ($n = 1,076$, 5.34%) [Table 6]. The procedures that were not listed in the BCPD but were performed by BC rural general surgeons include vascular surgery ($n = 3,747$, 18.61%), orthopaedic

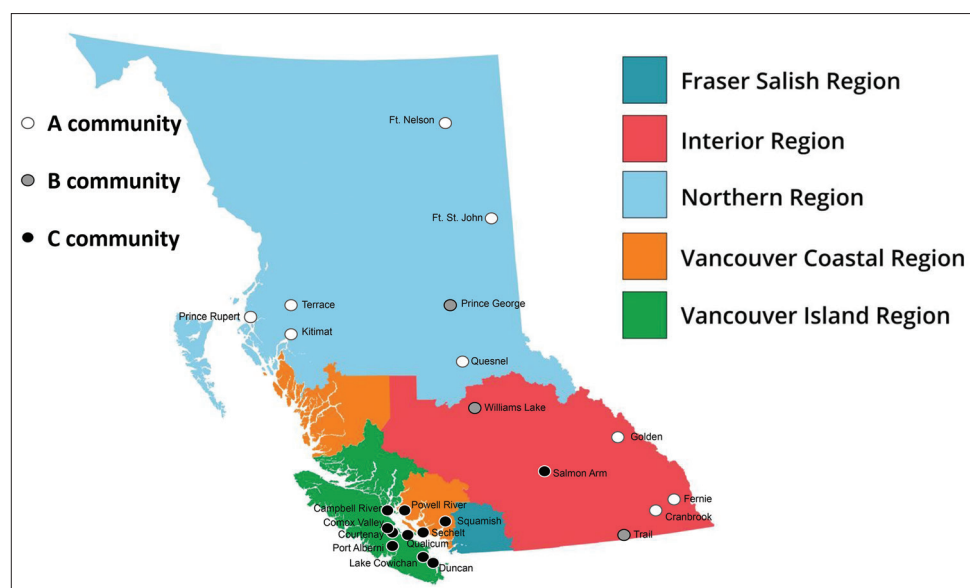


Figure 1: RSA rural community distribution throughout British Columbia.

Table 1: Procedures performed by British Columbia rural general surgeons that are associated with an entrustable professional activity (n=203,949)

Surgical procedure	Sub-category	Total (2011–2021), n (%)
Scopes	Endoscopy	7349 (3.60)
	Colonoscopy	80,453 (39.45)
Abdomen	Colorectal	23,696 (11.62)
	Appendix	6374 (3.12)
	Small bowel	1573 (0.77)
	Gall bladder	13,014 (6.38)
	HPB	522 (0.26)
	Upper GI	3449 (1.69)
	Hernia	20,890 (10.25)
	Trauma	342 (0.17)
	Surgical oncology	2541 (1.25)
	Complications	2491 (1.22)
Breast		9801 (4.81)
Skin/soft tissue	Biopsies	3210 (1.57)
	Wound management	17,966 (8.81)
	Tumour/carcinoma	3539 (1.73)
	Nails	1685 (0.83)
Ports		3444 (1.69)
Head and neck		742 (0.36)
Thoracics		510 (0.25)
Vascular		358 (0.17)
Total		203,949 (100)

HPB: Hepato-pancreato-biliary surgery, GI: Gastroenterology

Table 2: Procedures performed by British Columbia rural general surgeons without an associated entrustable professional activities (n=19,154)

Surgical procedure	Sub-category	Total (2011–2021), n (%)
Abdomen	Colorectal	259 (1.35)
	HPB	37 (0.19)
	Surgical oncology	24 (0.13)
	Upper GI	75 (0.39)
Thoracics		23 (0.12)
Paediatrics		15 (0.08)
Urology	Major procedures	99 (0.52)
	Minor procedures	1835 (9.58)
Orthopaedics	Amputations	500 (2.61)
	Soft tissue	216 (1.13)
	Bones	208 (1.08)
	Injectons	762 (3.98)
Obstetrics/ gynecology	Obstetrics	653 (3.41)
	Gynecology	391 (2.04)
Plastics		8035 (41.95)
Scopes	ERCP	1502 (7.84)
Head and neck		335 (1.75)
Neurosurgery		63 (0.33)
Vascular		3389 (17.69)
Pacemakers		733 (3.83)
Total		19,154 (100)

HPB: Hepato-pancreato-biliary surgery, GI: Gastroenterology, ERCP: Endoscopic retrograde cholangiopancreatography

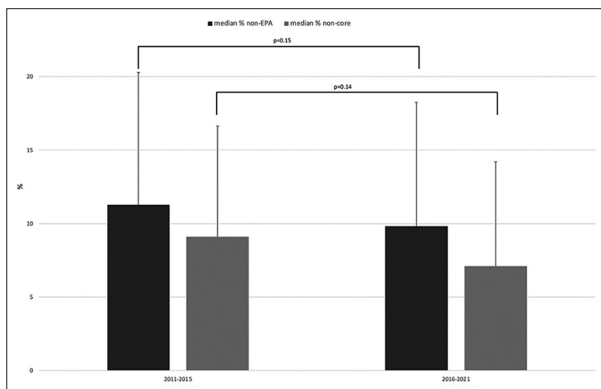


Figure 2: Proportion of non-core and non-entrustable professional activity procedures before and after British Columbia privileging dictionary implementation. EPA: Entrustable professional activity.

surgery ($n = 1,686$, 8.37%), major urology procedures ($n = 99$, 0.49%), neurosurgery ($n = 63$, 0.31%) and thoracic surgery ($n = 14$, 0.07%) [Table 7].

Before the establishment of the BCPD in 2015, 8.2% of the procedures done by BC rural surgeons were non-core. After 2015, this changed to 5.45%.

There was no significant change in the proportion of non-core cases performed before and after establishing the BCPD ($P = 0.14$). When looking at the change in the proportion of EPA-related procedures performed before and after BCPD implementation, there were 10.58% non-EPA cases performed versus 6.96% performed after 2015 ($P = 0.15$) [Figure 2].

With stratification by RSA rurality categorisation, there was no significant difference between the proportion of core versus non-core procedures performed in A, B and C communities ($P = 0.08$). A similar result was also noted when looking at the proportion of EPA procedures performed in RSA A, B and C communities ($P = 0.09$) [Figure 3].

DISCUSSION

In this retrospective observational study, we found that rural general surgeons perform a variety of procedures both within and outside of the classic scope of general surgery. In RSA communities, 20,152 non-conventional general

Table 3: Entrustable professional activities versus core British Columbia Privileging Dictionary procedures

Core privileges	Requirement to request for privileges	EPA?
Head and neck		
Management of benign neck lesions to include biopsy and excision		Performing procedures on the skin and soft tissue
Surgical airway management		Performing procedures for patients with traumatic injuries
	Surgical management of thyroid disease to include cancer	Performing procedures for patients with disorders of the thyroid and/or parathyroid
	Surgical management of parathyroid disease	Performing procedures for patients with disorders of the thyroid and/or parathyroid
Lymph node biopsy		Performing procedures on the lymph nodes
Breast and lymphatics		
Surgical management of benign breast disease		Performing procedures on the breast
Surgical management of breast cancer		Performing procedures on the breast
Sentinel node biopsy		Performing procedures on the lymph nodes
Axillary lymph node dissection		Performing procedures on the lymph nodes
Chest		
	Management of diaphragmatic hernia, excluding children under the age of 24 months	Performing procedures for patients with traumatic injuries
Tube thoracostomy		Performing procedures for patients with traumatic injuries
Abdomen and retroperitoneum		
Upper GI tract		
Surgical management of benign gastro-duodenal disease	Upper GI endoscopy - diagnostic	Performing procedures on the stomach and duodenum
	Upper GI endoscopy - therapeutic - endoscopic management of upper GI bleeding	Performing esophagogastroduodenoscopy
	Antireflux surgery	Performing esophagogastroduodenoscopy
	Surgical management of benign esophageal disease	Performing procedures on the stomach and duodenum
	Hiatal hernia	Performing procedures on the stomach and duodenum
Hepatopancreaticobiliary		
Surgical management of benign biliary disease	Common bile duct exploration	Performing procedures on the hepatobiliary system
Surgical management of distal pancreatic disease		Performing procedures on the pancreas
Liver biopsies, non-segmental liver resections		Performing procedures on the hepatobiliary system
Lower GI (small and large bowel)		
Surgical management of benign and malignant disease		Performing procedures on the small bowel, performing procedures on the appendix and colon
Diagnostic endoscopy		Performing colonoscopies
Therapeutic endoscopy		Performing colonoscopies
Surgical management of splenic disease		Performing procedures on the spleen
Abdominal wall		
Surgical management of groin hernia		Performing procedures on the abdominal wall and hernia

Contd...

Table 3: Contd...

Core privileges	Requirement to request for privileges	EPA?
Surgical management of ventral hernia		Performing procedures on the abdominal wall and hernia
Complex abdominal wall reconstruction		Performing procedures on the abdominal wall and hernia
Pelvis		
Surgical management of benign anal disease		Performing procedures on the appendix and colon
Surgical management of benign rectal disease		Performing procedures on the appendix and colon
Surgical management of malignant rectal disease		Performing procedures on the appendix and colon
Extremities and soft tissue		
Surgical management of benign and malignant skin conditions		Performing procedures on the skin and soft tissue
Surgical management of benign soft tissue conditions		Performing procedures on the skin and soft tissue
	Surgical management of malignant soft tissue masses	Performing procedures on the skin and soft tissue
Vascular		
Vascular access procedures		Performing procedures for patients with traumatic injuries
Temporal artery biopsy	Varicose vein ligation and management of venous stasis disease	
Paediatric surgery		
Appendectomy in children		Performing procedures on the appendix and colon
Umbilical or epigastric hernia repair in children		Performing procedures on the abdominal wall and hernia
Inguinal hernia repair in children		Performing procedures on the abdominal wall and hernia
Laparotomy for acute abdomen in children		Performing procedures for patients with traumatic injuries
Laparotomy for intestinal obstruction in children		Performing procedures on the small bowel
Lymph node biopsy for suspected infection of lymphoma		Performing procedures on the lymph nodes
Incision and drainage of superficial abscesses		Performing procedures on the skin and soft tissue
Excision of benign lesions of the skin and subcutaneous tissue		Performing procedures on the skin and soft tissue
Pilonidal disease		Performing procedures on the appendix and colon
Pyloromyotomy for pyloric stenosis		Performing procedures on the stomach and duodenum
Urology		
Cystotomy repair-minimally invasive procedure		
Cystotomy repair		
Hydrocele repair		
Orchidectomy		
Vasectomy		
Plastic surgery		
Flaps for skin closure -advancement/ Z-plasty		

EPA: Entrustable professional activities, GI: Gastroenterology

Table 4: Entrustable professional activities versus non-core British Columbia Privileging Dictionary procedures

Non-core privileges	EPA?
Paediatric surgery	
Complex paediatric surgery under 2 years of age	-
Head and neck	
Surgical management of aerodigestive tract malignancies	-
Surgical management of salivary gland disease	-
Regional lymph node dissection	-
Adenotonsillectomy	-
Esophageal	
Esophagectomy and other surgical management of malignant esophageal disease	-
Heller myotomy	-
Zenker's diverticulum	-
Advanced endoscopy	
Endoscopic US	-
ERCP	-
Placement of digestive tract stents	-
Hepatopancreaticobiliary	
Surgical management of malignant biliary disease	-
Surgical management of proximal pancreatic disease	-
Liver resection, segmental or greater	-
Colorectal	
Complex anal vaginal/rectovaginal fistula repair	-
Surgical management of fecal incontinence	-
Transanal endoscopic microsurgery for high rectal lesions	-
Transanal total meso-rectal excision	-
Pelvic pouch surgery	-
Surgical management of adrenal disease	-
Plastic surgery	
Carpal tunnel release/dupuytren's contracture/trigger finger/ganglia	-
Tendon repair	-
Full thickness skin grafts	-
Obstetrics and gynecology	
Laparoscopic procedures: ovarian cystectomy/salpingo-oophorectomy/sterilisation/management of ectopic pregnancy	-
Total abdominal hysterectomy: Ovarian cystectomy/salpingo-oophorectomy	-
Dilation and curettage	-
Caesarean section	-
Management of ectopic pregnancy - open gynaecologic procedures	-
Management of post-partum haemorrhage/manual remove of placenta	-
Evacuation of the pregnant uterus: Dilation and curettage up to 14 weeks in size	-
Repair of perineal and vaginal tears (including 3–4 th degree tears and cervical lacerations)	-
Drainage and marsupialisation of bartholin's gland abscess	-
Paracervical block and pudendal block	-
Pacemakers	
Pacemaker generator replacement	-
Pacemaker revision	-
Pacemaker replacement	-
Pacemaker implantation	-
Complex multidisciplinary surgery	
Specific paediatric procedures	-
Complex surgery oncology	-
Bariatric	-
Organ transplantation	-

EPA: Entrustable professional activities, ERCP: Endoscopic retrograde cholangiopancreatography , US: Ultrasound

Table 5: Core procedures performed by British Columbia rural general surgeons according to the British Columbia Privileging Dictionary (n=202,969)

Surgical procedure	Sub-category	Total (2011–2021), n (%)
Scopes	Endoscopy	7349 (3.62)
	Colonoscopy	80,453 (39.64)
Abdomen	Colorectal	23,732 (11.69)
	Appendix	6374 (3.14)
	Small bowel	1573 (0.77)
	Gallbladder	13,014 (6.41)
	HPB	498 (0.24)
	Upper GI	3524 (1.74)
	Hernia	20,890 (10.29)
	Trauma	342 (0.17)
	Surgical oncology	2565 (1.26)
	Complications	2491 (1.23)
Breast	-	9801 (4.83)
Thoracics		519 (0.25)
Ports		3444 (1.70)
Skin/soft tissue	Wound management	17,966 (8.85)
	Biopsies	3210 (1.58)
	Tumour/carcinoma	3539 (1.74)
	Nails	1685 (0.83)
Total		202,969 (100)

HPB: Hepato-pancreato-biliary surgery, GI: Gastroenterology

Table 6: Non-core procedures performed by British Columbia rural general surgeons according to the British Columbia Privileging Dictionary

Surgical procedure	Sub-category	Total, n (%)
Abdomen	Colorectal	223 (1.11)
	HPB	61 (0.30)
Paediatrics		14 (0.07)
Thoracics		2 (0.01)
Urology	Minor procedures	1835 (9.11)
Obstetrics/gynaecology	Obstetrics	653 (3.24)
	Gynecology	391 (1.94)
Plastics		8035 (39.91)
Scopes	ERCP	1502 (7.466)
Head and neck		1076 (5.34)
Pacemakers		733 (3.64)
Total		14,525 (72.14)

Total procedures not considered “core” procedures, n=20,134. ERCP: Endoscopic retrograde cholangiopancreatography, HPB: Hepato-pancreato-biliary surgery

surgery procedures were performed. Of these plastic, vascular and urology surgeries were the most common. Similar findings have been noted from other Canadian studies.⁵ Rural opportunities in general surgery residency have been recognised as a valuable training experience.⁹ Similar to our results, expertise in endoscopy, advanced

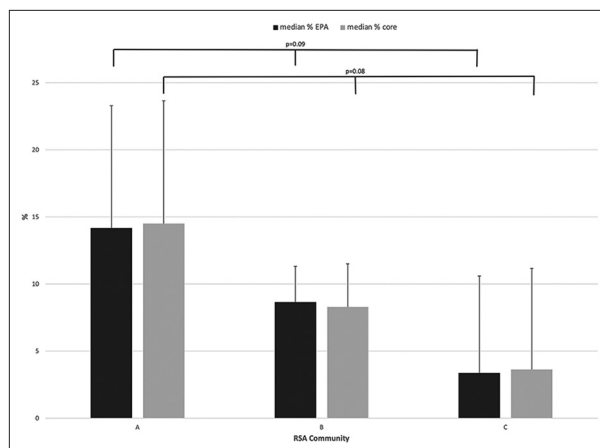


Figure 3: Proportion of non-core and non-entrustable professional activity procedures stratified by RSA classification. EPA: Entrustable professional activity.

laparoscopy and trauma as well as classically non-general surgery procedures including C-section, carpal tunnel release and amputations have been valuable skills to have before entering rural practice.⁹

After the adoption of the BCPD in 2015, there was no significant change in the proportion of non-core general surgery procedures performed in rural communities. This was also true for the proportion of non-EPA procedures performed. Although privileging is important for patient safety, it has been controversial as it may limit access to care for patients in rural and remote communities. In a 2018 survey of BC’s rural physicians, half of the respondents stated that the BCPD negatively impacted the quality of care they could provide.¹⁰ Furthermore, for some doctors, it created a barrier to care for patients, as obtaining and maintaining privileges could be challenging. Specific to surgical care, not only does the surgeon have to either have enhanced training or prove competence for certain privileges, but there also needs to be sufficient allied healthcare support available. For example, for paediatric surgeries, there needs to be appropriate anaesthetic and post-operative care. Furthermore, to perform more complex surgeries, including oncologic and transplant, significant infrastructures must be in place. With this said, a surgeon’s scope is not only dictated by their level of training but also that of their colleagues and health care infrastructures.

The CBD curriculum provides residents the opportunity, if motivated and able, to complete residency in an accelerated fashion if EPAs are

Table 7: Procedures performed by British Columbia rural general surgeons that were not listed in the British Columbia Privileging Dictionary

Surgical procedures	Sub-category	Total, n (%)
Thoracics		14 (0.069)
Orthopaedics	Amputations	500 (2.48)
	Soft tissue	216 (1.07)
	Bones	208 (1.033)
	Injections	762 (3.78)
Urology	Major procedures	99 (0.49)
Vascular		3747 (18.61)
Neurosurgery		63 (0.31)
Total		5609 (27.86)

Total procedures not considered "core" procedures, n=20,134

met before the next promotional period.¹¹ For example, at the University of Toronto, CBD was first launched for orthopaedic residents and was found to reduce the length of training for most residents.¹² In a survey of Canadian general surgery chief residents, <½ of those interested in entering community practice felt that they were prepared to perform non-general surgery procedures.¹³ This sentiment is also reflected in current BC Surgeons' assessments of recent graduates hoping to enter rural practice.² Therefore, for residents interested in rural practice, rearranging blocks in subspecialty general surgery rotations once competence has been achieved may allow these residents to complete off-service blocks to enhance skills in other surgical specialties.

The CBD curriculum, as it defines what general surgery residents must be able to perform independently before entering practice, has a pivotal role in maintaining a broad skill set for general surgeons. The standards for general surgery training and competence are set nationally and, therefore, may not address differences in health care delivery across the country. The scope of general surgery nationally is heterogeneous from academic centres with subspecialist focus to remote surgeons without immediate access to other surgical specialists. The scope of general surgery remains in constant flux with relatively new Royal College specialties, such as vascular surgery and training pathways, such as thoracic surgery, as they evolve. A proportion of those entering community practice ultimately end up in a rural location. With the majority of residency exposure focused in academic centres, these training sites

often have a significant influence on what future general surgeons are trained to do.

As UBC currently has mandatory community rotations for their general surgery residents, other programmes have dedicated rural tracks with formal training rotations in non-general surgery specialties (obstetrics and gynaecology, orthopaedics, urology and ear, nose and throat).^{3,14-16} Residents graduating from these programmes have increased confidence with non-general surgery procedures but also are more likely to pursue a career in rural practice once completed.¹⁷⁻²¹ For example, a rural residency training programme at the Oregon Health and Science University places residents in a rural setting for 1-year, which has increased the likelihood that they will practise general surgery in a similar setting despite initial specialty plans.¹⁷ Exposure to rural general surgical practice and communities allows residents to potentially picture themselves fitting within these positions.

Rural fellowship programmes have been proposed or created to prepare surgeons for rural and broad-based practice.²² With the BCPD, these programmes may be of benefit in BC's circumstances where formal training in non-core general surgery procedures may be obtained to meet community needs. Despite this, it has been a controversial topic as recruitment and retention in rural locations can be challenging and added training creates further barriers to filling these positions.^{23,24} Mentorship programmes have been found to be successful for increasing interest in rural surgery as well as for skill acquisition.^{22,25,26} In BC, mentorship may be obtained through mentorship opportunities at tertiary centres, the reticulum general surgery website, tele-mentoring, rounds and skill enhancement courses.² In a retrospective observational study, Ma noted that most rural general surgeons graduated from medical school before 1998 and that there is a current trend of more Canadian Medical Graduates entering rural surgical practice.²⁷ Mentorship, combined with orchestrated succession plans, may benefit residents who are interested in rural practice to not only familiarise them with the position but also with the skills required to perform in their future position.

The importance of training general surgery graduates who are willing and keen to practise

in rural areas of BC cannot be over-emphasised. A recent study characterised rural general surgery in BC and Canada, which showed that the average year of medical school graduation for rural general surgeons in BC is 1997 (± 12.7 years).²⁷ This implies that a significant proportion of rural general surgeons will be considering retirement within the next 10–15 years. In fact, the authors used a 10-year workforce prediction model that showed approximately 43% of new general surgeons would need to enter rural practice each year to meet the demand created by retiring surgeons, assuming an average career length of 36 years.²⁷

There are many limitations to this project. As the COVID-19 pandemic changed the practice patterns of general surgery in 2020 and 2021 to accommodate resource allocation, there was a decrease in the number of elective surgeries that could be performed. This may have changed what and how many procedures rural general surgeons were performing. Furthermore, BC's rural geopolitical, social and healthcare landscape is distinct, including the definition of a rural community as well as the unique BCPD. Therefore, these results may not be generalisable to other centres. Patient outcomes of the non-conventional procedures performed were beyond the scope of our study, but previous literature has shown that patients, despite knowing poorer outcomes in smaller centres, prefer having their surgical care closer to home.²⁸

CONCLUSION

Rural general surgeons in BC work in unique situations where they are required to perform procedures outside of the conventional practice of a general surgeon to address community needs. Over a 10-year period, we found that 9.03% of procedures performed were non-core procedures as defined by the BCPD. This shows a potential limitation to the BCPD, particularly when it is so critical that these services remain available to under-served communities. The CBD curriculum provides a more flexible residency programme that could be utilised to better prepare new graduates for practice in rural locations. Future endeavours could look at evaluating where there is room for change in the general surgery training curriculum to

adequately train rural general surgeons with a focus on ensuring patient safety and continuing to provide a wide variety of care to these rural communities in BC.

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OPEN CALL FOR ABSTRACTS - RURAL & REMOTE 2025

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Deadline: Extended

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Canadian CT head rule adherence in a rural hospital without in-house computed tomography

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reviewed.

Abstract

Introduction: We sought to determine the difference between Canadian CT Head Rule (CCHR) indicated imaging rates and actual imaging rates for patients with mild traumatic brain injuries (mTBIs) at a rural emergency department (ED) without in-house computed tomography (CT). In addition, we compared CCHR adherence at a hospital without CT to previous publications from centres with CT to determine if rural populations receive less CT imaging for minor head traumas when indicated by the CCHR.

Methods: This retrospective chart review explored individuals who presented to a rural ED (no in-house CT scanner) with a primary diagnosis of mild head injury or concussion between 1 January 2017 and 31 December 2021. Information regarding CCHR criteria, transfer status and patient demographics was collected. Descriptive analyses were completed to determine the percentage of patients who received appropriate transfer for imaging, did not receive transfer for imaging when indicated and received unnecessary transfer.

Results: A total of 124 charts met our inclusion criteria (17 [12.1%] charts excluded), with 25.8% transferred to the nearest hospital for CT imaging. After applying the CCHR criteria to our charts, 62.1% were indicated for CT. Of the 62.1%, only 35.1% were transferred for imaging (51.2% of high-risk and 16.7% of medium-risk).

Conclusion: By exploring CT rates for mTBIs in a rural Canadian ED, we found low transfer rates (35.1%) of CCHR-indicated patients for imaging needed to guide further healthcare decisions. This work highlights a discrepancy within the Canadian healthcare system between rural and urban centres and allows for opportunities to help narrow the gap in health care.

Keywords: Emergency imaging, emergency medicine, head injury, rural medicine

Résumé

Introduction: Nous avons cherché à déterminer la différence entre les taux d'imagerie indiqués par le Canadian CT Head Rule (CCHR, règlement canadien relatif à la tomodensitométrie de la tête) et les taux d'imagerie réels pour les patients souffrant de traumatismes craniocérébraux légers (TCCL) dans un service d'urgence rural ne disposant pas d'une tomographie par ordinateur interne. En outre, nous avons

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comparé l'adhésion au CCHR dans un hôpital sans tomographie par ordinateur à des publications antérieures provenant de centres avec tomographie par ordinateur afin de déterminer si les populations rurales reçoivent moins d'imagerie par tomodensitométrie pour les traumatismes crâniens mineurs lorsque le CCHR l'indique.

Méthodes: Cette étude rétrospective des dossiers a exploré les personnes qui SE sont présentées à une urgence rurale (sans tomodensitomètre interne) avec un diagnostic primaire de traumatisme crânien léger ou de commotion cérébrale entre le 1^{er} janvier 2017 et le 31 décembre 2021. Les informations concernant les critères du CCHR, l'état de transfert et les données démographiques des patients ont été recueillies. Des analyses descriptives ont été réalisées pour déterminer le pourcentage de patients ayant reçu un transfert approprié pour l'imagerie, n'ayant pas reçu de transfert pour l'imagerie quand c'était indiqué et ayant reçu un transfert inutile.

Résultats: Au total, 124 dossiers répondaient à nos critères d'inclusion [17 (12,1%) dossiers exclus], dont 25,8% ont été transférés à l'hôpital le plus proche pour une imagerie par tomodensitométrie. Après avoir appliqué les critères du CCHR à nos dossiers, 62,1% d'entre eux étaient indiqués pour une tomodensitométrie. Sur ces 62,1%, seuls 35,1% ont été transférés pour imagerie (51,2% de haut risque, 16,7% de risque moyen).

Conclusion: En explorant les taux de tomodensitométrie pour les TCCL dans un service d'urgence rural canadien, nous avons constaté de faibles taux de transfert (35,1%) des patients recommandés par le CCHR pour une imagerie nécessaire dans le but de guider les décisions de soins de santé ultérieures. Ce travail met en évidence un écart dans le système de santé canadien entre les centres ruraux et urbains et offre des opportunités pour aider à réduire l'écart dans les soins de santé.

Mots clés: Médecine rurale, Médecine d'urgence, Traumatisme craniocérébral, Imagerie d'urgence

INTRODUCTION

Between 2002 and 2018, more than 5 million emergency department (ED) visits occurred for head injuries in the Canadian provinces of Ontario and Alberta alone.¹ Among patients who visited the emergency department for head injuries, the most common causes were falls in the older population, and sport/recreation-related activities and transportation collisions in adolescents and young adults.¹ To complement clinical acumen and help physicians identify dangerous, potentially life-threatening pathologies associated with head traumas, including vascular, structural and neurological complications, computed tomography (CT) head imaging is commonly used.^{2,3} Given the high level of radiation exposure, cost and general burden that CT imaging of mild traumatic brain injuries (mTBIs) has on the healthcare system, multiple guidelines have been developed to help reduce unnecessary imaging.²⁻⁴ One example is the Canadian CT Head Rule (CCHR), which outlines criteria for head CT in mTBI patients and is used in EDs internationally.⁴ The high-risk criteria outlined in the CCHR are 100% sensitive and 68.7% specific for predicting the need for neurological intervention.⁵ The medium risk criteria have a sensitivity and specificity of 98.4%

and 49.6%, respectively, for predicting clinically important pathology.⁵ The CCHR is a widely adopted screening tool used in mTBI patients; however, its efficacy in rural communities without CT scanners is unknown.^{3,5}

Approximately 20% of Canadians live in rural communities, and 22.5% live over 1 h by car from a Level 1 or 2 trauma centre.⁶ Despite the increased prevalence of outdoor recreation and therefore increased risk of mTBI in rural communities, these communities typically have decreased resources and increased barriers to accessing care (e.g. distance and time).⁶ In 2014, an estimated 71% of British Columbia's rural and small-town EDs were over 300 km from a Level 1 trauma centre, compared to only 42% in Quebec.⁶ Although the number of CT scanners per million people in BC and Quebec is similar (14.0 and 14.8 CT scanners in 2011, respectively), 97% of rural EDs in BC did not have access to 24/7 CT services compared to 27% in Quebec.⁶ Given that rural trauma patients take, on average, 6 h more to arrive at Level 1 trauma centres, delayed detection of advanced pathologies has the potential to produce worse outcomes in these patients.⁶

This study aimed to determine if patients in a rural BC region, without accessible CT imaging, received a lower rate of imaging for mTBIs compared to centres with CT. The primary

objective was to evaluate CCHR-indicated imaging rates versus actual imaging rates for patients with mTBI at a rural hospital without in-house CT.

METHODS

Study design and time period

A retrospective chart review was conducted on head injuries between 1 January 2017 and 31 December 2021. With an estimated 25–30 charts per year meeting CCHR inclusion criteria, our sample size was estimated as 125–150 charts over 5 years.

Study setting

This community has a population of <10,000 people (2021 consensus) and is a tourism hub due to its skiing/snowboarding/mountain-biking terrain and its proximity to a major highway.⁶ This rural ED serves approximately 9000 patients annually, with the majority between 18 and 44 years old (2021/22 statistics).⁷ The nearest CT scanner is located over 100 km away at a Level 2 community hospital.

Population

Our study population included individuals over 16 years old who presented to the rural ED with a primary diagnosis of head injury or concussion. Inclusion criteria included individuals who experienced blunt trauma to the head within 24 h of presenting to the ED resulting in either definite amnesia, witnessed loss of consciousness or disorientation. Individuals must have had a Glasgow Coma Score (GCS) >13 upon ED presentation. Exclusion criteria included obvious penetrating skull injury or depressed skull fracture, acute focal neurological deficits, unstable vitals, seizure before ED assessment, bleeding disorders, anticoagulant use, pregnancy and previous assessment for the same injury.

Outcome measures

Once an ED chart met the initial inclusion criteria, the year of admission, patient age, CCHR information and whether the patient received a transfer for CT imaging were recorded. After data extraction, charts were separated into those

with CT indications, based on the CCHR, with no transfer and those who received interfacility transfer for CT imaging.

Data analysis

Descriptive analyses were used to report the percentage of patients who did not receive interfacility transfer for CT imaging when indicated, those who received transfer and those who received unnecessary transfer. CCHR compliance was evaluated by the number of patients who correctly received transfer for CT and those who were correctly not transferred.

Individual patient consent was not required for this study, as no directly identifiable data were collected. Support for this research project was provided by the rural community hospital's Chief of Staff. This study received approval from the Interior Health and University of British Columbia Clinical Research Ethics Boards (REB: H22-00953).

Ethics approval was granted by the University of British Columbia Human Research Ethics Committee (Project H22-00953).

RESULTS

A total of 141 charts with a primary diagnosis of head injury or concussion were reviewed, with 124 charts meeting the inclusion criteria (12.1% excluded). The median age of patients reviewed was 30 years old and 66.1% of patients were male [Table 1]. Of these patients, 25.8% received a transfer to the nearest hospital for a CT scan [Figure 1]. Of the 124 charts reviewed, 62.1% had indications for head CT based on the CCHR. Of these, 35.1% were transferred for imaging (51.2% high-risk charts and 16.7% medium-risk charts) [Figure 2]. The overall compliance with the CCHR criteria was 55.7%. Five patients without CCHR indication for CT were transferred (10.6%), leading to 25.8% of our sample receiving imaging. Specific transfer rates by CCHR criteria met are outlined in Table 2.

DISCUSSION

Interpretation of findings

The Canadian Head CT rule was identified by physician leadership at our study centre as the

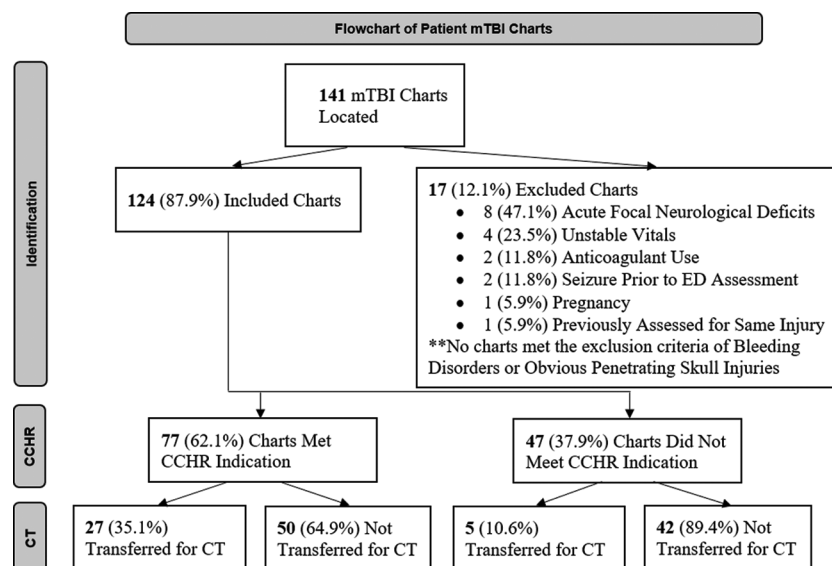


Figure 1: Flowchart of patient mild traumatic brain injury charts. mTBI: Mild traumatic brain injury, CT: Computed tomography, CCHR: Canadian CT head rule, ED: Emergency department.

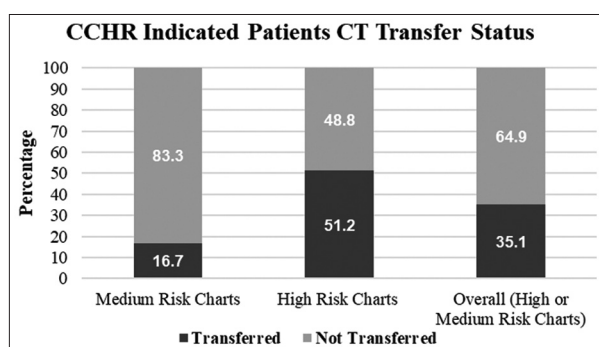


Figure 2: Percentage of Canadian CT head rule indicated patients who received a transfer and those who did not for computed tomography imaging. CT: Computed tomography, CCHR: Canadian CT Head Rule.

standard used to decide which patients require CT imaging of the brain following head trauma. Although this rule was initially created to reduce the amount of unnecessary imaging, based on its high sensitivity and specificity to identify serious neurological pathology associated with mTBI, this tool has been used in previous studies as a marker of appropriate CT rates in mTBI.^{5,8} The data collected from this rural Canadian hospital, without in-house CT, demonstrated that only 35.1% of those patients with indication for CT by this standard were transferred when indicated. This underutilisation of the CCHR criteria may be due to multiple factors, including the logistics of organising patient transfer, transfer time, staffing, cost, weather conditions and road closures. In addition, patient-oriented stressors need to be addressed including the burden

and risk of transportation, along with shared decision-making including family members that may also need to travel.

Many of these factors could result in local ED physicians foregoing indicated imaging due to difficult access to appropriate resources. This pattern of practice has the potential to delay diagnosis or even miss significant and even life-threatening intracranial pathology. Numerous alternative strategies are utilised in rural and remote communities to mitigate this risk. These include additional time in ED for reassessment, admission to hospital and discharge with instructions to represent for reassessment. These are only a few of the strategies used in rural EDs to mitigate the risk of inadequate imaging. Furthermore, managing these patients with serial clinical examinations or admission, instead of imaging, creates significant delays to discharge and puts an additional burden on an already strained system. Patients who initially meet CT criteria, based on the CCHR, but are not transferred for imaging often require prolonged patient monitoring and follow-up which can further impact the efficiency and workflow of these rural EDs. Although clinical outcomes for the patients reviewed in this study were not assessed, prior publications have provided estimates on the positive predictive value (PPV) of the CCHR in mTBI. Most recently, Kavalci *et al.* reported a PPV of 42% for patients with GCS 13 and an overall PPV of 11.1% in their comparison of the

CCHR and New Orleans Criteria.⁹ Analysis of clinical outcomes of mTBI patients presenting to non-CT enabled facilities is a possible area of future research.

Comparison to previous studies

Despite the high sensitivity of the CCHR, facilities with CT on-site report a CCHR compliance rate between 60% and 80%.³ In these tertiary care centres, CCHR compliance is low due to overutilisation of CT when not indicated by the CCHR; however, only a small proportion of patients do not receive imaging when indicated.³ With respect to the proportion of patients indicated for head CT, 85.7% received imaging in a 2018 study from Singapore.³ In Canada specifically, a study out of a large urban hospital in Halifax, Nova Scotia, determined that 86.5% of patients received CT imaging when indicated

by the CCHR.¹⁰ Our study found that only 35.1% of patients at this rural, non-CT enabled site were receiving imaging when indicated. A prior study published in 2017 out of Queenstown, New Zealand, whose hospital has no CT on-site, reported transfer for CT in only 23.6% of patients with CCHR recommendations.⁸ This Queensland hospital also reports using the CCHR as their standard of care for imaging of mTBI patients.⁸ This Queensland study did, however, include skiing/snowboarding and mountain biking in their medium risk criteria as a dangerous mechanism of injury. When our criteria for dangerous mechanisms are expanded to match those used in the New Zealand study, our rate of adherence drops to 31.6%. These findings suggest a large difference in imaging based on CCHR indications between hospitals with and without CT on-site.

Limitations

Limitations for this study include the potential inability to find and screen all patient charts that should be included in our study. Patients with multiple presenting conditions could be labelled under a different primary diagnosis and therefore missed in our data collection. We were limited by the information included in the patient charts to determine whether patients should have received CT imaging. The reasoning for the lack of patient transfer is also not included in our data, limiting our ability to speculate on why the patient did not receive a transfer. Clinical outcomes of the transferred and non-transferred patients are also not reviewed in this study. Finally, this study

Table 1: Characteristics of patient charts

Characteristics	Included charts, n (%)	Transferred charts, n (%)
Total charts pulled	124	32 (25.8)
Median age (IQR)	30 (25–45)	30 (25–60)
Sex		
Male	82 (66.1)	21 (65.6)
Female	42 (33.9)	11 (34.4)
Charts by year		
2017	20 (16.1)	6 (18.8)
2018	20 (16.1)	3 (9.4)
2019	33 (26.6)	9 (28.1)
2020	27 (21.8)	4 (12.5)
2021	24 (19.4)	10 (31.3)

IQR: Interquartile range

Table 2: Canadian computed tomography head rule criteria

Characteristics	Total, n (%)	Transferred, n (%)	Not transferred, n (%)	Per cent transferred (%)
Only medium-risk criteria				
≥30 min of amnesia	6 (14.6)	2 (25.0)	4 (12.1)	33.3
Dangerous mechanism*	35 (85.4)	6 (75.0)	29 (87.9)	17.1
Total	41	8	33	19.5
Total meeting ≥1 medium-risk criteria	36	6	30	16.7
High-risk criteria**				
Age over 65	15 (31.9)	6 (23.1)	9 (42.9)	40.0
GCS <15 2 h post-injury	24 (51.1)	14 (53.8)	10 (47.6)	58.3
≥2 episodes of vomiting	3 (6.4)	1 (3.8)	2 (9.5)	33.3
Signs of basilar skull fracture	5 (10.6)	5 (19.2)	0	100.0
Total	47	26	21	55.3
Total meeting ≥1 high-risk criteria	41	21	20	51.2

*Dangerous mechanism includes struck by the vehicle, ejected from the vehicle or fall from ≥3 feet or ≥5 stairs, **No patients met the suspected open or depressed skull fracture high-risk criteria. GCS: Glasgow Coma Score

only evaluated one ED in a rural community, so the generalisability of this study may be limited as rural communities often encounter unique healthcare challenges and discrepancies.

Clinical implications

Increasing access to CT imaging in rural health centres is an essential step to decrease the discrepancy in healthcare access between rural and urban patient populations. With many complications of head and brain injuries, including those with higher morbidity and mortality (e.g. hematoma, stroke and fracture), time is valuable. More accessibility to CT scanners would help to mitigate the increased cognitive burden placed on rural emergency physicians, potentially improve health outcomes for patients and decrease patient load on EDs by decreasing the need for prolonged observation, admission and repeat assessment of these patients.

CONCLUSION

By exploring CT rates for mTBI patients in a rural Canadian centre, we found that only 35.1% of patients received transfer for CCHR-indicated injuries. Compliance with the CCHR criteria in this rural centre was much lower than previously reported rates out of urban centres with CT on site. This work highlights the imbalance within the Canadian healthcare system between rural and urban centres and allows for opportunities to help narrow the gap in access to healthcare resources.

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Conflicts of interest: This project was funded by a grant from the Rural Coordination Centre of BC (RCCBC). RCCBC was not involved in decisions regarding study design, methodology, data collection, analysis or interpretation.

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Advantages of eliminating the cataract surgery post-operative day 1 appointment in a rural practice

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This article has been peer reviewed.

Abstract

Introduction: We sought to streamline cataract surgery post-operative care when COVID-19 hit by discontinuing the 1-day post-operative visit. We wanted to know if this change was safe and beneficial to our patients by reducing patients' time and transportation burden, opening appointment slots allowing providers to see more patients and reducing greenhouse gas emissions. By minimising intraoperative use of dispersive viscoelastic, increasing irrigation/aspiration time at the end of the surgery and using intraocular pressure (IOP) lowering medications such as carbachol, brimonidine and acetazolamide routinely, we posit that post-operative day 1 IOP spikes can be avoided, thereby eliminating the need for the 1st post-operative day visit. We also sought to show the positive environmental impact of eliminating that 1st day.

Methods: We retrospectively reviewed cataract surgeries performed before COVID-19 to determine the incidence of serious pathology discovered at the post-operative day 1 visit. Subsequently, we examined all the cataract surgeries performed in 2023 by our practice.

Results: One hundred and ninety-three cataract surgeries performed before COVID-19 and 832 performed in 2023 were reviewed. We found that the post-operative day 1 visit after cataract surgery is unnecessary in most routine uncomplicated cases.

Conclusion: By eliminating hundreds of post-operative day 1 visits for a busy rural practice annually, patients, their friends and relatives are spared an extra trip to the office (that can be 100 km each way), the office schedule is open to accommodate more patients, and the patients' carbon footprint of travel to the office is reduced.

Keywords: Carbon footprint, cataract surgery, intraocular pressure spike, post-operative day 1, rural

Résumé

Introduction: Nous avons cherché à rationaliser les soins postopératoires de la chirurgie de la cataracte lors de l'arrivée de la Covid en supprimant la visite postopératoire d'un jour. Nous voulions savoir si ce changement était sécuritaire et bénéfique pour nos patients en réduisant le temps et la charge de transport des patients, en ouvrant des créneaux de rendez-vous permettant aux prestataires

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de voir plus de patients et en réduisant les émissions de gaz à effet de serre. En minimisant l'utilisation peropératoire de viscoélastique dispersif, en augmentant le temps d'irrigation/aspiration à la fin de l'opération et en utilisant systématiquement des médicaments abaissant la PIO, tels que le carbachol, la brimonidine et l'acétazolamide, nous pensons que les PIO postopératoire du premier jour peuvent être évitées, éliminant ainsi la nécessité d'une première visite de jour postopératoire. Nous avons également cherché à démontrer l'impact environnemental positif de l'élimination de ce premier jour.

Méthodes: Nous avons examiné rétrospectivement opérations de la cataracte réalisées avant la Covid afin de déterminer l'incidence des pathologies graves découvertes lors de la visite postopératoire du premier jour. Par la suite, nous avons examiné toutes les opérations de la cataracte réalisées en 2023 par notre cabinet.

Résultats: 193 opérations de la cataracte réalisées avant la Covid et 832 réalisées en 2023 ont été examinées. Nous avons constaté que la visite postopératoire du premier jour après la chirurgie de la cataracte n'est pas nécessaire dans la plupart des cas de routine sans complications.

Conclusion: En éliminant des centaines de visites postopératoires du premier jour dans une région rural, les patients, leurs amis et leurs proches n'ont pas à SE rendre au cabinet (ce qui peut représenter des centaines de kilomètres aller-retour). L'emploi du temps du cabinet est libéré pour accueillir davantage de patients et l'empreinte carbone des patients liée à leur déplacement au cabinet est réduite.

Mots-clés: Chirurgie de la cataracte, jour postopératoire du premier jour, pression intraoculaire, rural, empreinte carbone

INTRODUCTION

The American Academy of Ophthalmology Preferred Practice Pattern recommends that routine cataract surgery patients be seen within 48 h postoperatively.¹ While we do not disagree with this general recommendation, we believe this first post-operative visit is not medically necessary in most routine cases. This paper shall discuss the initial motivating factors for eliminating the 1st post-operative day visit, how we compensated to ensure quality patient care and how these changes have improved the lives of our patients, increased the productivity of our office and reduced the carbon footprint associated with cataract surgery.

Before the coronavirus disease pandemic, our routine was to see cataract surgery patients on post-operative day 1. In March of 2020, our office was closed by government mandate for several months. Once reopened, our hours were limited, also by government mandate. We needed a way to provide care to our patients without increasing their risk of exposure to COVID-19 and find a place in our limited schedule to see them. It was at this point we decided not to examine routine uncomplicated patients on the post-operative day 1 visit (POD 1).

We are not the first to question the need for the POD 1 visit.²⁻⁴

The 1-day visit has been a quick check to make certain that no major problem occurs after surgery.

We feel this is of limited value in uncomplicated surgery.

One day is too soon to determine if endophthalmitis is present. Our major concerns are wound leaks, dangerously high elevated intraocular pressure (IOP)⁵ and toxic anterior segment syndrome (TASS).⁶

METHODS

We retrospectively reviewed the charts of 193 patients before COVID-19 to determine the incidence of post-operative day 1 pressure elevations and other complications such as incision leakage and TASS. A significant IOP spike was defined as an IOP of >30 mmHg.

We then looked at all the cataract surgeries performed in 2023. Our staff called each patient the day after surgery enquiring as to any problems and reviewing their medications. Preoperatively, patients were given a visual acuity chart and at this call, their vision was tested. If patients reported any pain or significant vision loss, they were asked to visit us for an examination that day to check for TASS and severe IOP spike or other pathology. We also asked the patient if they had any concerns.

Any patients with pre-existing glaucoma, high myopia, pseudoexfoliation, trypan blue staining, Malyugin rings, manual small-incision cataract surgery, extension of capsulorhexis, cumulative

dissipated energy >15 s and/or concomitant glaucoma surgery were asked to come in for a post-operative day 1 visit. Of note, none of the patients requiring a Malyugin ring experienced an IOP spike.

To reduce and essentially eliminate post-operative day 1 IOP spikes, we made changes to our surgical technique and our post-operative medication regimen. We switched from using dispersive viscoelastic throughout the case to using both dispersive and cohesive viscoelastics.

The dispersive was used at the beginning of the case and the cohesive to inflate the capsular bag for intraocular lens (IOL) insertion towards completion. It was noted that our rate of post-operative pressure elevation was reduced with this change. Retained dispersive viscoelastic had likely caused the IOP elevations. We resolved to use only the amount of cohesive viscoelastic required to fill the capsular bag thus reducing the retained viscoelastic. An extra 15 s of irrigation/aspiration was used at the end of the case to remove viscoelastic with special attention to the anterior chamber angles and the space posterior to the IOL implant. It has been shown that experienced surgeons encounter fewer IOP spikes than inexperienced surgeons and meticulous viscoelastic removal may be one factor.⁷

Added measures for preventing IOP spikes were to inject carbachol 0.01% at the end of the case, prescribe brimonidine 0.2% twice daily⁸ and one 250 mg tablet of acetazolamide at bedtime on the day of surgery.⁹

RESULTS

We reviewed the charts of 193 patients in 2019 before COVID-19. We found the number of IOP spikes to be four. There were no wound leaks and no cases of TASS. Of note, most patients with a dangerous pressure elevation were symptomatic, experiencing eye pain and/or headache. We decided that post-operative pressure elevation was the most important factor that needed to be controlled if we were to cancel the day-1 visit.

We performed 832 cataract surgeries in the calendar year 2023. Within this total, we did 24 cataracts with endocyclophotocoagulation which were checked on post-operative day 1 and 29 cataracts with iStents, also checked on post-operative day 1. Thirty-four of these surgeries

were seen the next day due to complications, glaucoma or patient concerns as outlined above. The remaining patients did not come on POD 1 but did come to the post-operative week 1 visit.

From the patient's viewpoint, we eliminated travel with its associated expenses and saved time not just for them but also for the family member or friend who often accompanies them. They were very appreciative, particularly during the winter months and bad weather. By evaluating the traveling distance of 50 consecutive cataract patients and determining the average mileage they travelled using Google Maps, the average distance to our office was determined to be 33 km and a round trip was 66 km. According to the US. Department of Energy, the average fuel economy of new cars sold in the United States in 2021 was 9.4 L per 100 km. A round trip of 66 km to our office requires about 6.2 L of fuel to visit us. The 745 patients who no longer need to travel to our office saved about 4619 L of gas. The amount of carbon dioxide emitted per litre of motor gasoline burned is 2.3 kg.¹⁰

Thus, our practice pattern saved the environment 10,624 kg of carbon dioxide from being released into the atmosphere.

From an office practice standpoint, 745 examination slots became available. During COVID-19, reduced office hours increased our ability to see the many patients that needed evaluation. It also increased our practice revenue by replacing no-fee post-operative patients with paying patients.

Our average income per patient seen in 2023 was \$296 (USD). As a result, \$220,520 (USD) was added to the revenue of our practice.

It is usual in rural practices for patients to travel 100 km to the nearest ophthalmologist. In such practices, the annual savings in gasoline could be 20,000 L, corresponding to over 45,000 kg of carbon dioxide prevented from being released into the atmosphere.

DISCUSSION

In a busy cataract practice, providing high-quality compassionate patient care is essential, as is efficient management of time and resources. The need for a POD 1 visit should be evidence-based. We found that if we took prophylactic measures, this visit could be safely eliminated for uncomplicated routine cataract cases.

Older patients tend to have more comorbidities and often see several different healthcare providers. Anything we can do to reduce their transportation burden is appreciated.

Worldwide, there is an active effort to reduce carbon emissions. Every industry is being encouraged to examine their carbon footprint and make efforts towards its minimisation. The healthcare industry should be no exception. Perhaps, our industry is more challenged than others because of the demand for quality of care and price controls. Nonetheless, we should take whatever steps we can to do our part in reducing carbon emissions.

CONCLUSION

Through modifications in cataract surgical technique and the use of multiple IOP lowering medications, the POD 1 visit can be safely eliminated for most routine cataract surgery cases. Reducing the number of office visits benefits the patients and their companions, the providers and the environment.

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Conflicts of interest: There are no conflicts of interest.

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The Occasional tooth avulsion

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INTRODUCTION

Traumatic dental injuries are common and account for 5% of bodily injuries in all ages.¹ Tooth avulsion is 1 type of traumatic dental injury and occurs when a tooth is completely dislodged from its socket. Tooth avulsion accounts for 0.5%–3% of all dental injuries.² Considered a dental emergency, tooth avulsion is one of the most serious dental injuries as prognosis is largely dependent on the actions taken at the time of avulsion.² The best chance at optimal outcome requires reimplantation of the tooth within 60 min.² Traumatic dental injuries can impact multiple facets of a patient's life, including dental health, aesthetics and financial and psychological well-being.³

Rural generalists, emergency medicine physicians and triage nurses must have knowledge of the time-sensitive management of tooth avulsion; prompt care is required for a good outcome. In addition, many Canadians present to the emergency department (ED) for dental pathology due to factors such as lack of access to dental services, affordability or presentation outside of regular dental practice hours.⁴ Despite the prevalence of traumatic dental injury in the ED, many studies have shown that more than 50% of emergency physicians do not have adequate knowledge concerning immediate treatment of

dental avulsion.^{5–8} This article will fill this knowledge gap by discussing the immediate treatment of tooth avulsion, the follow-up interval for patients and the reduction of infection risk.

METHODS

We performed a search using OVID-MEDLINE for studies that described an approach to dental trauma from the years 2013 to 2023. We included 13 unique articles.

Anatomy

In describing traumatic dental injury, it can be helpful to understand tooth anatomy and nomenclature [Figure 1]. During a tooth avulsion, the tooth is completely displaced out of its socket, severing the periodontal ligament.⁹ The periodontal ligament is the connective tissue which connects the tooth to the alveolar bone.⁹ This may be accompanied by a fracture of the alveolar bone.⁹ If the alveolar fracture is identified, it is important to note that it will not change ED management of the tooth avulsion.^{9–12}

Dental trauma assessment

The initial assessment of a patient with dental trauma should include a primary and secondary trauma survey.^{9–12} The dental injury itself is

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not life-threatening, but accompanying intracranial and maxillofacial injuries are present in 11% of ED patients presenting with dental trauma.¹¹ Sequelae from trauma such as bleeding, mandibular and maxillary fracture, facial fracture, head injury, cervical spine injury, soft-tissue swelling of the oropharynx and foreign body must be considered.⁹⁻¹²

The clinical examination should include an evaluation of the facial skeleton, lips, soft-tissue lesions and extraoral and intraoral examination.⁹⁻¹² Radiographic assessment of an injured tooth is limited in the ED as specialised intraoral dental radiographs are best able to assess subtle displacement of tooth in the socket and fractures, and these are not available in EDs.⁹ If head injury, facial fracture or foreign body is suspected, a computed tomography (CT) scan should be considered.⁹ If a patient displays difficulty breathing, chest X-ray and/or CT imaging may be considered to rule out a foreign body in the airway or further pathology.⁹

Once a patient is stabilised, focus can be turned to the traumatic dental injury. First, the patient or parent should be questioned on whether the injured tooth is a primary or permanent tooth, and tetanus status should be determined, and updated, if necessary.⁹⁻¹² The distinction is important as primary teeth should not be reimplanted, whereas permanent teeth should be reimplanted as soon as possible. As many patients may have already lost teeth, it is important to determine their dental baseline.

The extraoral and intraoral examination should include inspection for missing, fractured or misaligned teeth, percussion of teeth and gums for tenderness and mobility and probing of soft-tissue injuries to rule out a foreign body.¹⁰⁻¹² Percussion of teeth and gums can be performed with a gloved finger or with a tongue depressor.¹⁰ Tests of facial mobility should be performed to rule out complex midface fractures.

Once a tooth avulsion has been identified, the primary goal is to reimplant the tooth in an attempt to save the tooth and preserve the bone for future treatment.^{2,9-13}

Please see 'The occasional dental fracture'¹⁴ for assistance if fracture of a tooth is suspected.

Contraindications to tooth reimplantation

An avulsed primary tooth should not be reimplanted as it risks damaging the underlying

tooth bud from which permanent teeth erupt.^{2,4,9,10} If the primary tooth is not found, examination and imaging will be required to ensure that the tooth is not intruded or displaced into the socket.^{2,4,9,10} The site of tooth avulsion should be monitored for adequate healing, and referral to a dentist, ideally same day or next day but maximally within 7–10 days, is necessary.⁹

Other patient populations for which tooth reimplantation should not be considered include patients with higher risk of infection and aspiration such as those with severe dental caries, immunosuppression, mechanical heart valves or unco-operative patients.¹¹

Materials

1. Tongue depressor to perform initial percussion of teeth and gums
2. Clean gloves
3. Physiologic storage media: milk, Hank's balanced salt solution, saline or patient saliva
4. Metal or plastic bowl from a suture kit for tooth storage
5. 250 mL bottle of sterile normal saline
6. Local anaesthetic: 3 mL syringe and 25- or 27-gauge needle (0.5-inch length) or topical Lidocaine 2%
7. 10 mL syringe
8. DeBakey forceps
9. Gauze
10. Scissors
11. Metal nose bridge from an N95 face mask.
In situations where these are not available, adhesive skin closures or nylon fishing wire have been used in some cases¹⁵
12. 2-octyl cyanoacrylate (skin glue).

Immediate treatment of tooth avulsion^{2,4,9-13}

1. Locate the avulsed tooth. Handle the tooth by the crown as handling the tooth by the root can damage cells of the periodontal ligament, decreasing the success of attachment to the alveolar bone
2. Rinse the tooth with a stream of milk/normal saline/patient's saliva using the 10 mL syringe. Remove any clotted blood from the socket
3. Place the tooth in the metal or plastic bowl and cover the tooth in physiologic storage media while gathering materials. Examples from

- most to least favourable include milk, Hank's balanced salt solution and saline/patient saliva
4. Administer local anaesthetic, if necessary. For an isolated tooth avulsion, local anaesthetic will not be required unless the patient's comfort level requires it. Local anaesthetic will be required in cases where patients have gingival lacerations that will require suturing after reimplantation of the avulsed tooth

Contraindications to local anaesthetic use include allergy, cardiac congenital abnormalities and infection over the injection site:

- a. If using topical anaesthetic, use gauze to dab and dry the gum surrounding the affected area. Next, apply 1–3 mL topical Lidocaine 2% to a piece of gauze and have the patient hold this to the labial aspect of the gum surrounding the tooth socket for 2–3 min. After this time, the patient can remove the gauze from their mouth
 - b. If using injected local anaesthetic, draw up 3 mL lidocaine 2% (local anaesthetic without vasoconstrictor is preferred) into your 3 mL syringe. Attach your 25- or 27-gauge needle and insert the needle 2–3 mm into the labial aspect of the gum line. Often 0.2 mL of anaesthetic is required to treat the area adjacent to 1 tooth
 - c. If a patient has multiple concurrent dental injuries, a nerve block may be required [Figures 3-5]. Please see referenced article on local anaesthesia techniques in dentistry for the type of nerve block that will best suit your patient's needs.¹⁶
5. Irrigate the tooth socket using normal saline and the 10 mL syringe
 6. Examine the tooth socket. If there is a fracture of the socket wall, reduce the alveolar bone by applying gentle pinching pressure to the affected edge of the socket with DeBakey forceps
 7. Replant the tooth with light force. Be mindful of replanting in an anatomic position, it can be difficult to differentiate between the lingual (outer) and labial (inner) surface
 - a. The labial aspect of teeth will be broader and flat compared to the lingual aspect, which will taper towards the gum line. Please refer to Figure 2 for the correct position of the teeth. Teeth can be repositioned into the

proper location up to 48 h after avulsion. Rapid referral to dentistry for all patients is required but may be even more pressing if there is uncertainty regarding malrotation of tooth.

8. Apply a flexible splint for up to 2 weeks¹⁷
 - a. Use scissors to cut the metal nose bridge from a face mask to create a splint. Cut the splint so that it spans the length of the patient's replanted tooth and the 2 adjacent teeth
 - b. Use the scissors to round any sharp edges of the splint that may cut the patient [Figure 6]
 - c. Take a piece of gauze and gently dry the labial surface of the replanted tooth and the 2 adjacent teeth
 - d. Use the 2-octyl cyanoacrylate with the thin tip and place a small amount of glue on the labial surface of the replanted tooth and the 2 adjacent teeth
 - e. Apply and bond the splint to the replanted tooth and 2 adjacent teeth. Hold the splint under pressure until the 2-octyl cyanoacrylate begins to dry and the splint is stable (~1–3 min).
9. Administer tetanus toxoid if needed
10. Prescribe amoxicillin 500 mg PO q8h × 7d. In the setting of patient-reported penicillin allergy, the PEN-FAST decision-making tool can be used to assess the probability of penicillin allergy.¹⁸ For patients with penicillin allergy,

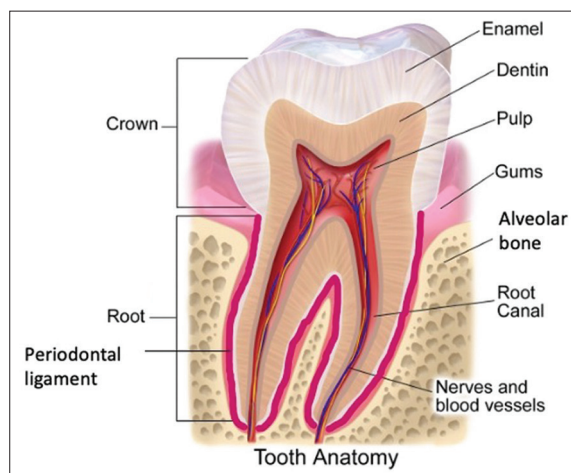


Figure 1: Tooth anatomy. Modified from "Tooth Anatomy" by Blausen Medical 2014. Available from: https://en.wikiversity.org/wiki/WikiJournal_of_Medicine/Medical_gallery_of_Blausen_Medical_2014#/media/File:Blausen_0863_ToothAnatomy_02.png. [Tooth Anatomy].

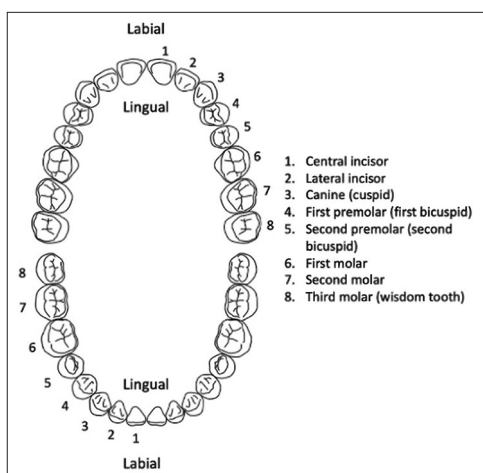


Figure 2: Permanent Teeth Depiction and Nomenclature. Modified from “Human Dental Arches” by Kaligula. Available from: https://commons.wikimedia.org/wiki/File:Human_dental_arches.svg#filelinks [Last accessed on 2023 Dec 20].

azithromycin (loading dose 500 mg PO day 1, followed by 250 mg PO $\times$ 4 days) or clindamycin (300 mg 4 times per day $\times$ 7 days) can be used as an alternative¹⁹

11. Referral to emergent dentistry, same day if possible. The patient will need to be seen within 7–10 days of replantation for follow-up and consideration of root canal treatment.

If the tooth has been replanted before patient’s arrival to the ED, perform the following steps:²

1. Clean the replanted tooth and surrounding region of the oral cavity with water spray, saline or chlorhexidine
2. Verify the normal position of the replanted tooth and adjust if needed. Gentle pressure in the area of the socket can be applied by pinching the ridge after the tooth is implanted.
3. Apply a splint for up to 2 weeks
4. Administer tetanus toxoid if needed
5. Administer amoxicillin 500 mg q8h $\times$ 7 days. In the setting of patient-reported penicillin allergy, the PEN-FAST decision-making tool can be used to assess the probability of penicillin allergy.¹⁸ For patients with penicillin allergy, azithromycin (loading dose 500 mg PO day 1, followed by 250 mg PO $\times$ 4 days) or clindamycin (300 mg 4 times per day $\times$ 7 days) can be used as an alternative¹⁹
6. Refer to the dentist for consideration of root canal treatment and splint removal within 7–10 days

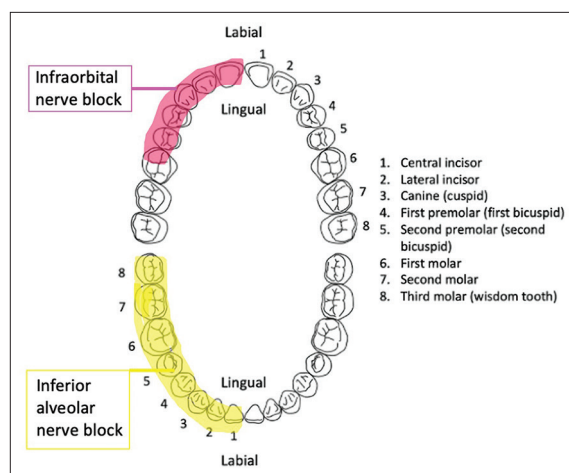


Figure 3: Infra Orbital and Inferior Alveolar Nerve Block Distribution. Modified from “Human Dental Arches” by Kaligula. Available from: https://commons.wikimedia.org/wiki/File:Human_dental_arches.svg#filelinks [Last accessed on 2023 Dec 20].

7. Referral to emergent dentistry, same day if possible. The patient will need to be seen within 7–10 days of replantation for follow-up and consideration of root canal treatment.

Complications

Due to exposure of the pulp of the tooth, patients experiencing tooth avulsion should be started on systemic antibiotics to limit infection risk.¹¹ Despite prophylactic treatment, patients should be cautioned to return to the ED or to seek further medical treatment if any signs or symptoms of infection occur.

Despite reimplantation and splinting of an avulsed tooth, root canal treatment is often required, and tooth discoloration and ankylosis (resorption of tooth root and fusion of tooth to surrounding bone) of the tooth can occur.²⁰

Patient instructions²

Patients should be advised to take the following steps to optimise the healing of the reimplanted tooth:

1. Avoid contact sports
2. Soft diet of liquid or pureed foods for up to 2 weeks
3. Brush teeth with a soft-bristled toothbrush after every meal

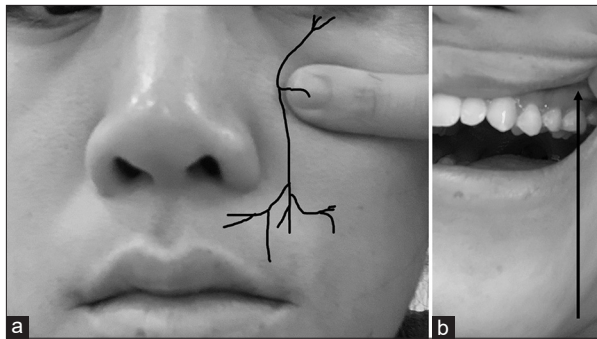


Figure 4: (a) Path of the infraorbital nerve. (b) Infraorbital nerve block. Insert the needle into the mucobuccal fold above the second premolar and advance cephalad.

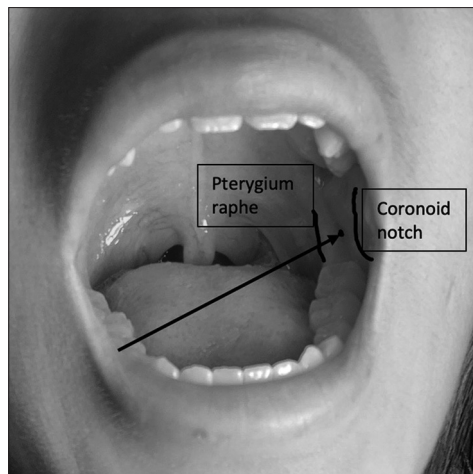


Figure 5: Infra alveolar nerve block. The injection point is between the coronoid notch and pterygomandibular raphe. The angle of entry should be 45 to the insertion point with the barrel of the needle over the contralateral first and second premolars.

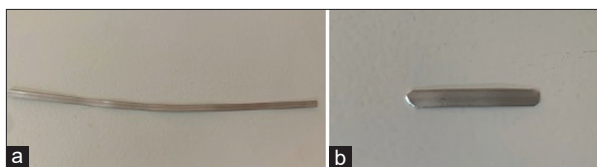


Figure 6: (a) Metal nose piece of face mask after being cut out from face mask. (b) Metal nose piece of face mask fashioned into a splint by cutting to required size and rounding the edges.

4. Use a chlorhexidine (0.1%) mouth rinse twice a day for 1 week.

CONCLUSION

The treatment of tooth avulsion is a time-sensitive dental emergency. The immediate treatment of tooth avulsion can be performed with equipment common to EDs and clinics in

both community and rural settings. The goal of the emergency physician is to provide analgesia, reimplantation of the tooth and stabilisation of the reimplanted tooth. These measures are temporising and emergent dentist referral is required.

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Conflicts of interest: There are no conflicts of interest.

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Taking flight

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Winner of the SRPC
Resident essay contest

There is just one rule – don't touch the controls'.

'I think I can follow that'.

'Now pull the door closed firmly, turn the first latch, and then push the second across. You're in the front so if we crash, you'll need to do all that in the reverse order. Think you can manage it?'

'I certainly hope so!'

We set off to the end of the runway in the tiny single-engine Piper Comanche. Dr. Miles pushes the throttle in, pulls back on the yoke, and we accelerate rapidly. The wheels lift and we are airborne, climbing high over the Northern Alberta landscape.

'Do you want to fly?'

'I thought I wasn't supposed to touch the controls? But I mean, yes, absolutely!'

Dr. Miles just smirks.

'With flying there are three axes – pitch, yaw, and roll. You must aim in this direction and try to keep the plane around 6500ft of altitude'.

I grasp the yoke and try to adjust to the sensation of the additional altitude vector. Initially, I am too aggressive pulling back – 'Did you intend to climb 500ft just now?'

The steering is sensitive but delayed – a slight adjustment tips the wings seconds later and I struggle

to time my recovery. Gradually, it becomes more natural, until we hit an air current that rattles the plane and my confidence. Dr. Miles appears unbothered – he has his phone out and seems to be texting, though I know he is watching closely. The dynamic is much the same as in the OR, a delicate trust as I build my surgical independence but recognise when I need to ask for help.

I wasn't supposed to want to be a surgeon. My medical school years took place in smaller towns in accordance to my plan to become a rural GP. But when I discovered general surgeons could also live and work in such places, I found myself on a different path. Pursuing this came with sacrifices – longer training and having to complete this training in a city chief among them. In my 3rd year, a wonderful opportunity arose. I was permitted to complete a year of residency in the regional centre of Grande Prairie and learn from surgeons with the full-scope practice I hope to have. The surgeons here regularly spend time in other Northern Alberta communities, which is how I found myself flying a plane to High Level for our week of surgery and endoscopy there.

'Pick it up by the snout! No, turn it the other way – no, the other other way'.

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I rotate the grasper and adjust my plane of dissection.

'Better. Yes, continue, see how it is opening up?'

The ever-present frustration in surgical training is knowing that there is a person with you who can do everything you can twice as fast and with more finesse, but the surgeons in Grande Prairie allow me to safely fumble my way forward to competence. From 1 day to the next, I don't notice a difference, but after a year, here I can finally see progress in my skills and confidence. Despite once telling me 'the only emotion a surgeon has is impatience', my mentors here have been endlessly patient while I learn. In the city, training is fragmented – you are shunted between hospitals and services on a near monthly basis. This exposure to different ideas and subspecialties is important, but your advancement is reliant on the trust of the surgeon supervising you, which can be harder to build on short rotations.

In Grande Prairie, I find continuity, not only with my mentors, but with my patients. A patient I scoped comes back for their colectomy; someone I saw in the emergency department is on the elective slate for a cholecystectomy. One of the patients I have seen throughout my time here is admitted – with her consent, I attend her MAID provision. Complications also return. When my patient has a post-operative hematoma, I have to face them and help fix it. Each time I perform that procedure thereafter, I see their face. 'Our hemostasis must be even more meticulous', I tell the surgical assist while justifying my paranoia.

Our landing is tenuous, the ground obscured with thick cloud cover.

'Look down and tell me when you can see trees. There's a factory somewhere near here – we must watch for that too'.

We descend further, the altimeter approaching the 1109ft we set as the local elevation in the

incongruously named town of High Level. Just when I think we will have to abort the landing, the tree tops and snowy ground below come into view: 'I see it! I see the ground!'

Carefully, we make our way to the airstrip through the fog. After circling, we manage to maintain a view of the runway and Dr. Miles lands the plane.

'Are you sure you still want to learn to fly after that?' he asks me.

'Without a doubt'.

The week in High Level is busy as always – long days of surgeries or scoping followed by consults or the odd emergency department wound debridement. But the lively team potlucks and community dinners bring a camaraderie that is so different from urban practice. As I teach one of the local nurses how to apply the endoscopic banding device for a variceal bleed, I am struck by how much I have learned. A year ago, I was struggling through my first colonoscopies and needing help to reach the cecum. Now, with the support of a community and mentors, I have built a foundation of skills to take back to the city for my final year of training. The transition to staff life is still daunting, but my Grande Prairie mentors have trained me well to take the controls. My semi-rural surgical apprenticeship has strengthened my desire to practise in a small town, and to train future surgeons in such places as well. And perhaps 1 day, to teach some of them to fly too....

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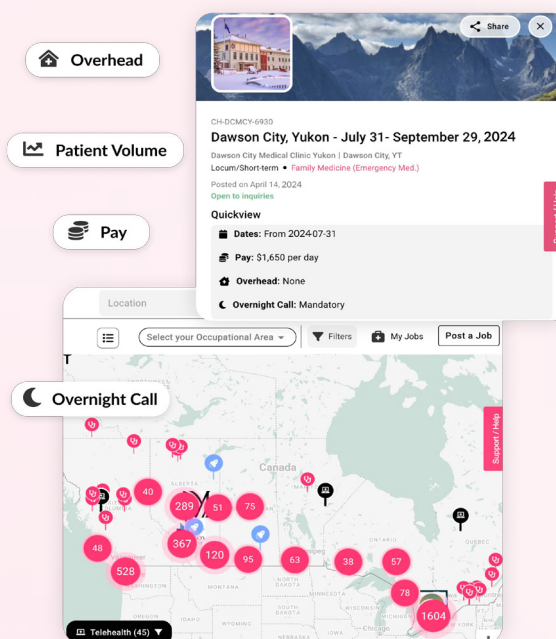
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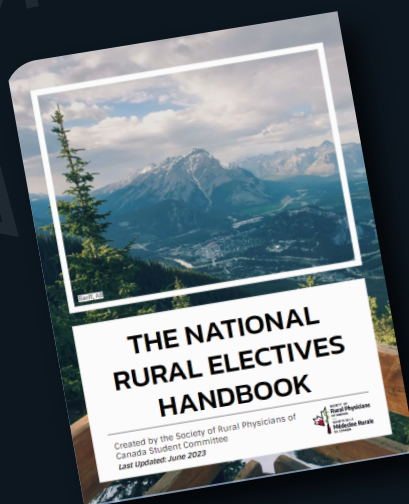
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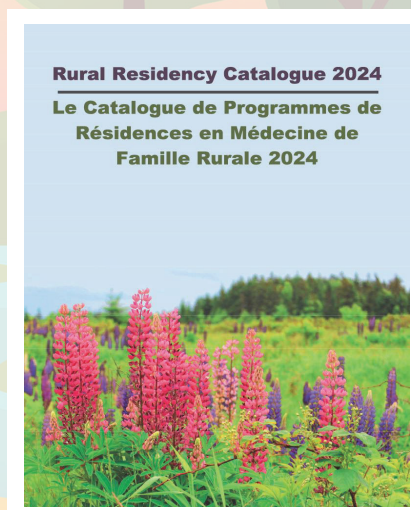
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