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The Rural Integrated Community Clerkship: a vital stretch in the Alberta rural physician workforce pipeline

L'externat communautaire intégré en milieu rural : élément essentiel pour constituer une main-d'œuvre de médecins ruraux en Alberta

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Abstract

Background: Longitudinal integrated clerkships are thought to operate synergistically with factors such as rural background and practice intent to determine medical graduates' practice types and locations—sometimes known as the pipeline effect. We examined the influence of the rural integrated community clerkship (ICC) at the University of Alberta on students choosing family medicine and rural practice.

Methods: We completed a retrospective cohort analysis of graduates from 2009-2016. The cohort was cross-referenced by background, type of clerkship, practice type and practice location. We used $\chi 2$ analyses and risk ratios to measure the relative likelihood that ICC students would settle on rural practice and/or family medicine.

Results: ICC participation had more influence than rural background on students' choice of rural and/or family practice, and both factors were synergistic. Rotation-based clerkship students were least likely to enter family medicine or rural practice.

Conclusions: The ICC is a clerkship model that influences students to become rural and/or family physicians, regardless of their rural/urban origins. The ICC diverts rural-interested students into rural practice and protects rural-origin students from ending up in urban practice. Expanding ICC infrastructure, including sustaining the rural physician workforce, will benefit rural Alberta communities by increasing the numbers of UA graduates in rural practice.

Résumé

Contexte : L'externat longitudinal intégré déterminerait, en synergie avec d'autres facteurs, notamment l'origine rurale et l'intention, le type de pratique et le lieu d'exercice des diplômés en médecine, un rapport appelé parfois « effet de pipeline ». Nous avons examiné dans quelle mesure l'externat communautaire intégré (ECI) en milieu rural à l'Université de l'Alberta incite les étudiants à choisir la médecine familiale ou l'exercice en milieu rural.

Méthodes : Nous avons effectué une analyse de cohorte rétrospective des diplômés de 2009 à 2016. Les données sur la diplomation et celles sur l'origine, le type d'externat, la discipline et le lieu d'exercice ont été croisées. Nous avons utilisé le test du Chi-2 et le rapport de risques pour mesurer la probabilité relative que les étudiants qui ont fait l'ECI choisissent l'exercice en milieu rural et/ou la discipline de la médecine familiale.

Résultats : Le fait d'avoir fait l'ECI a été un facteur plus déterminant que l'origine rurale quant au choix des étudiants d'exercer la médecine familiale ou de travailler en milieu rural, mais les deux facteurs étaient synergiques. Les étudiants ayant fait des stages rotatifs étaient les moins susceptibles d'opter pour la médecine familiale ou le milieu rural.

Conclusions : L'ECC est un modèle d'externat qui incite les étudiants à se diriger vers la médecine familiale ou l'exercice en milieu rural, et ce, quelle que soit leur origine, rurale ou urbaine. Il amène ceux d'entre eux qui éprouvent déjà un intérêt pour l'exercice en milieu rural à concrétiser ce choix et ceux qui sont d'origine rurale à demeurer dans ce milieu pour y exercer leur profession. Le développement de l'infrastructure de l'ECC et le soutien que l'externat apporte à la main-d'œuvre médicale rurale profiteront aux collectivités rurales en dirigeant un plus grand nombre de diplômés de l'Université de l'Alberta vers l'exercice en milieu rural.

Introduction

The Rural Integrated Community Clerkship (ICC) is a Cluster C Longitudinal Integrated Clerkship (LIC), as described by Worley et al (2016).[1] It is a core clerkship offered to a maximum of 25 third-year medical students in the Faculty of Medicine & Dentistry (FoMD) at the University of Alberta (UA), incorporating a 40-week clinical placement in selected rural Alberta communities. Students meet the 3rd year objectives in a learning environment with a horizontally integrated curriculum that affords continuity with patients and teachers. Our LIC differs significantly from urban discipline-specific rotation-based clerkships by helping students learn the objectives of six core disciplines (general surgery, family medicine, pediatrics, internal medicine, psychiatry, and obstetrics & gynecology) in an integrated fashion in a single community.

Since 2007, the program has placed 245 students in 11 participating communities. The program is aligned with recommendations made by the World Health Organization (WHO), identifying the global disparity between the availability of urban and rural physicians. The WHO (2010) urged medical schools to recruit more students from rural areas; to create rural campuses; to implement programs of clinical instruction in rural health care settings; to augment their curricula with specifically rural issues and themes; and to make post-licentiate education available to rural physicians.[2]

We used a retrospective cohort analysis to determine Ithe extent to which the ICC impacted the career decisions of participating students, and to what extent the ICC operates synergistically with their background and with career inclinations prior to clerkship. Our second research aim was to determine if the ICC has influenced more students to enter family practice, irrespective of location, rural or urban.

Background

Two most important factors inform a physician's decision to practice rurally: rural background and practice intention at the outset of medical training.[3-6] Some rural physician recruitment initiatives have focused principally on fostering medical ambitions amongst secondary students in rural communities.[5,7-9] However, medical schools and rotation-based clerkships (RBCs) typically choose large, urban campuses and specialist-led acute care facilities as educational settings, possibly diverting rural-origin or rural-bound students away from their initial career paths. Rural LICs, by contrast, act synergistically with rural background and initial career interest, thus reinforcing rural practice inclinations.[4,10-12,14]

This synergistic effect is consistent with the principles of a rural physician pipeline that begins prior to medical school and extends into professional practice.[1,3,4] Some suggest that learners be allowed to enter the rural pipeline at any point in medical school, affording rural-origin and urban-origin students the agency to decide how to engage in rural-based education.[4,12,13] To date, no conclusive evidence exists about the influence of an LIC in changing the career intentions of students who would otherwise have entered urban practice.

Generalist physicians with comprehensive practices are the predominant preceptors in rural LICs.[14] We hypothesize learners' sustained relationships with these preceptors and their patients influence participants to choose rural career paths. LICs may deliver the ancillary benefit of guiding more students into family practice, providing another rationale for expanding LIC use.[15]

Methods

Aims

This retrospective study of cohort data from UA medical graduates aimed primarily to determine the extent to which the ICC influenced participants' decisions to practice in rural settings, including how the ICC might have interacted synergistically with students' backgrounds and preferences prior to clerkship. The secondary aim was to determine the influence ICC had on students' choice of rural or urban family medicine.

Sample

The study cohort comprised all FoMD graduates from the classes of 2009-2016 who were licensed to practise medicine in Canada (*n* = 1377). Those for whom post-graduation practice data were unavailable (n=26) as well as graduates still undergoing residency training (*n* = 246) were excluded. We sorted the remaining sample (*n* = 1105) into three groups: 1) students who chose and were accepted to the Rural Integrated Community Clerkship (ICC group, *n* = 132, 11.9%); 2) students who chose rotation-based clerkships (RBC group, *n* = 931, 84.3%); and 3) students who chose to apply to the ICC but were not accepted and were subsequently enrolled in the RBC (applied-not-accepted (ANA) group, *n* = 42, 3.8%).

Data collection and analysis

Using lists of graduates and their demographic data (urban or rural background) from 2009-2016, we collected data pertaining to their current practice types and locations from publicly available provincial and national practice registries.

We cross-referenced our sample according to background (rural or urban); clerkship type; practice location (rural or urban); and practice type (family or other specialty). We used SPSS software, version 23 for analysis. We used $\chi 2$ analyses and odds ratios to measure the relative likelihood of each study group (ICC, RBC and ANA) settling on rural practice. We classified practices as either urban or rural using addresses listed in the data sources. The FoMD's Office of Rural & Regional Health defines rural communities as those with less than 20,000 population more than 80 km from a metropolitan centre.

We also used $\chi 2$ analyses and odds ratios to measure the relative likelihood of each group settling on family practice. We classified practice types as family medicine or other specialties according to their listing in at least two of the data sources. As a third metric, we analyzed practice type and practice location together, to measure the relative likelihood of each study group settling on family practice in a rural setting.

This study (Pro00094210) was approved by the UA Health Research Ethics Board. Data supporting this study's findings is available from the corresponding author upon reasonable request.

Results

Relative influence of rural background and ICC on practice type and location

To assess the relative influence of graduates' background (rural vs urban) and type of clerkship (ICC vs RBC), on their eventual choice of discipline and practice location (rural vs urban), we cross-referenced the numbers of graduates from each category (Table 1). Therefore, we included in the ANA group in the RBC group. Of the 1105 FoMD graduates in our sample, 145 students (13.1%) were rural-origin and 132 students (11.9%) took part in the ICC. 195 graduates (17.6%) entered rural practice, 510 graduates (46.2%) entered family practice, and 151 graduates (13.7%) entered both. Of the 195 rural practitioners, 51 (26.2%) were rural-origin and 60 (30.8%) took part in the ICC. Of the 510 family practitioners, 86 (16.9%) were rural-origin and 96 (18.8%) took part in the ICC. Of the 151 graduates who entered both rural practice *and* family medicine, 45 (28.8%) were rural-origin and 56 (37.1%) took part in the ICC. All three measures show that ICC participation was a slightly better indicator of likelihood to enter rural practice, family medicine, or both, compared to rural background. Of the 145 rural-origin graduates, 44 (30.3%) took part in the ICC. Just over half (n = 23, or 52.3%) of this number went on to practice rural family medicine, as opposed to 37.5% urban-origin graduates who took part in the ICC, 21.8% of rural-origin graduates who did not take part in the ICC, and 8.4% of graduates who had neither a rural background nor were ICC participants. Taken together, these measures demonstrate a synergistic effect of rural background and ICC participation on their likelihood to practice rural family medicine.

We investigated the hypothesis that our ICC program had an influence on the graduates' final practice choice and location using a Chi-squared analysis. For family medicine practice, the $\chi 2 = 43.0$ ($N = 931$, $p < .05$); for rural location, the $\chi 2 = 102.6$ ($N = 931$, $p < .05$); and for both family medicine and rural practice the value was $\chi 2 = 46.8$ ($N = 510$, $p = 0.5$). All three of the values support our hypothesis that participation in the ICC correlates with graduates practicing family medicine (both urban and rural) and practicing (either family medicine or a specialty) in a rural location.

We also used a $\chi 2$ analysis to investigate our hypothesis that ICC or RBC participation combined with an urban or rural background affecting students' choice of family medicine practice in a rural location. The two variables exhibit a statistically significant relationship. Rural-background ICC students are more likely to have a rural family medicine practice than rural-background RBC students: $\chi 2 = 4.24$ ($N = 86$, $p = .05$). Urban-background ICC students are more likely to have a rural family medicine practice than urban-background RBC students: $\chi 2 = 32.18$ ($N = 424$, $p = .05$)

72.7% of all ICC students, 62% of all ANA students, and 41.7% of all RBC students chose to practice family medicine. ANA students were 1.5 times more likely to practice family medicine than RBC students, while ICC students were 1.75 times more likely than RBC students. These measures suggest that a desire to take part in the ICC was a strong indicator of an eventual decision to practice family medicine, and participation in the ICC increased the likelihood of making this decision.

Table 1: Breakdown of graduates' post-residency practice types and locations, by background and type of 3rd year clerkship

	Rural Background + Clerkship Type				Urban Background + Clerkship Type			
Practice post Residency	RBC +ANA	%	ICC	%	RBC +ANA	%	ICC	%
Rural Family Medicine	19+3	21.8%	23	52.3%	68+5	8.4%	33	37.5%
Urban Family Medicine	25+4	28.7%	12	27.3%	276+14	32.9%	28	31.8%
Rural Specialty	6+0	5.9%	0	0.0%	32+2	3.8%	4	4.5%
Urban Specialty Practice	42+2	43.6%	9	20.5%	463+12	55.2%	23	26.1%
TOTAL	101		44		872		88	

45% of all ICC students, 23% of all ANA students and 13% of all RBC students chose rural practice in either family medicine or a specialty. ANA students were 1.8 times more likely to choose rural practice than RBC students, while ICC students were 3.4 times more likely than RBC students. These measures suggest a desire to take part in the ICC was a strong indicator of an eventual decision to practice in a rural setting, and participation in the ICC increased the likelihood of making this decision.

Of the graduates in either urban or rural family medicine, 58.3% of all ICC students, 30.8% of all ANA students and 22.4% of all RBC students chose a rural practice location. ANA students were 1.4 times more likely to practice rurally than RBC students, while ICC students were 2.6 times more likely to practice rurally than RBC students. These measures suggest a desire to take part in the ICC is a strong indicator of eventual rural family medicine practice and participation in the ICC increased the likelihood of this (Table 2).

Table 2. Comparative likelihood of choosing practice types and locations

	ICC vs RBC	ANA vs RBC	ANA vs ICC
Likelihood of choosing Family Medicine	OR = 1.75 (95% CI: 2.49 - 5.59)	OR = 1.48 (95% CI: 1.16 - 1.91)	OR = 0.85 (95% CI: 0.66 - 1.10)
Likelihood of choosing Family Medicine with Rural Background	OR = 3.39 (95% CI: 3.63 - 7.99)	OR = 1.77 (95% CI: 1.01 - 3.12)	OR = 0.52 (95% CI: 0.22 - 0.85)
Likelihood of choosing Family Medicine with Urban Background	OR = 2.60 (95% CI: 2.03 - 3.34)	OR = 1.37 (95% CI: 0.75 - 2.51)	OR = 0.53 (95% CI: 0.29 - 0.96)

**All significance levels are ≤ 0.05.*

Discussion

This is one of the first outcome studies to examine the effect of a rural LIC on practice location, regardless of student origin and interest. We corroborate other findings that LICs are a vital means of recruiting and retaining students into eventual rural practice.[10,11,13-15] Taken on its own, a placement of 40 weeks cannot be expected to cement the long-term intentions of medical graduates, any more than their rural background, intentions prior to medical school, or intentions prior to residency.[6-9] Rather, it is the interaction of these factors, and others beyond the scope of our investigation—family status, partner influences, debt-load, and more—that determines where and how graduates settle into their medical careers.[3,4,10-12] The pipeline to rural practice may be entered during medical school, as clerkship students from non-rural backgrounds may be influenced by their time in a rural community,[5,13] but it is also apparent the pipeline may leak at various points, as rural-origin or rural-interested students are siphoned off when educated in larger centers. The protective effects of the ICC on presumed rural-bound students may be as important as its recruitment impact on urban students.

In our sample, the number of students applying to the ICC exceeded available spaces by almost one third, representing a missed opportunity to produce future rural physicians. Recruitment of rural-origin or rural-interested students to medical school is important but insufficient, as these students tended to exit the rural pipeline after being diverted to a rotation-based clerkship. Enhanced undergraduate rural education, post-graduate rural expansion, and workforce retention are key strategies in the entire education-to-workforce rural pathway. Our work suggests that expanding the ICC infrastructure, including stabilizing and supporting the current rural physician

workforce, will benefit rural Alberta communities by increasing the number of UA graduates in rural practice.

Conclusion

This study shows that the context and location of medical education has some influence on career choice. The ICC is one among a number of WHO-recommended strategies available to increase the rural workforce in Alberta. Our results show that the rural pipeline principle works. Our ICC increases the likelihood of both its urban- and rural-origin graduates choosing family medicine and choosing rural practice locations regardless of specialty. These findings ought to inform more robust initiatives to expand the rural medical education pipeline and reinforce against leaks along its entire length.

Conflicts of Interest: The authors have no conflict of interest to declare.
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