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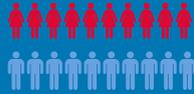
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*Matt's Nice Ride. ©2015  
by Gena LaCoste  
Watercolour and India ink 11X14"  
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*Inspiration for "Matt's Nice Ride"  
was from a day at the Ranch Rodeo in  
Nanton Alberta. In ranch rodeo,  
working cowboys compete using their  
own saddles rather than the stripped  
down specialized saddle used in  
professional rodeo, and there are fewer  
rules. This painting is inspired by the  
great ride of working cowboy/singer-  
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## Rural and Remote 2020

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A few 1000 years ago, in subjective time, rural doctors were letting patients come to their offices, sit in the waiting room, and then were seen face to face. Even in this before time, it was clear that things were changing.

On 12<sup>th</sup> March, Canada had 117 cases of Coronavirus disease 2019 (COVID-19), and projections internal to the society were that the Canadian epidemic would peak in 6 weeks at the end of April, just about the time we would be running our annual conference. The SRPC executive met that day and made the painful decision to cancel rural and remote 2020 in Ottawa.

Life accelerated from there. Our office set up a respiratory clinic away from our regular patients. On 18<sup>th</sup> March, like many of you, it came home to me as I swabbed my first positive COVID patient. Yes, they were young and healthy enough, but they had vulnerable friends and family in the community... in our community. Our local planning accelerated, aided and abetted by the SRPC E-mail list.

The RuralMED listserv grew feral and exploded (what? a 50-post limit!?), we soon learned more about epidemiology, mask design, protected codes, and competing theories about how to best manage COVID patients than I thought possible. Rural health

moved and adjusted quickly, just as the rest of society did. A course cancellation seems a minor thing in the context of all that has happened and is happening, and yet... and yet rural and remote is missed.

While for some rural and remote is admittedly just a conference, for many, many others, it's much more, and it's a homecoming. It's where we rural doctors connect. We learn about what's new, but we are also inspired by what is possible and what could and should be done. We join in a community that is understanding and supportive that celebrates our art and its practitioners. It's where we meet our mentors, colleagues and friends.

To all the people I meet at rural and remote and your families, stay safe. I look forward to seeing you at the rural and remote conference on 22<sup>nd</sup>-24<sup>th</sup> April, 2021, in Niagara Falls, Ontario. I anticipate discussions on how the prospects of national licensure have or have not improved. I look forward to learning about how people managed through all this. However, in a way, I most look forward to impassioned debates on trivial matters such as: Is the East or the West going to win the annual hockey rural and remote hockey game? It's pointless to argue it here. Such weighty discussions can be best held in that safe yearly gathering of our rural family - when we meet again.

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### Conférence 2020 en région

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Il y a quelques milliers d'années, en temps subjectif, les médecins des régions rurales laissaient les patients se présenter à leur bureau, s'asseoir dans la salle d'attente puis être vus face à face. Même durant cette période ancienne, il était clair que les choses étaient en train de changer.

Le 12 mars, le Canada comptait 117 cas de COVID-19, et les projections internes communiquées à la société voulaient que l'épidémie canadienne culmine dans 6 semaines à la fin d'avril, juste au moment où notre conférence annuelle aurait lieu. La direction de la SRMC s'est réunie ce jour-là et a pris la difficile décision d'annuler la Conférence 2020 en région rurale et éloignée à Ottawa.

Depuis, la vie s'est déroulée en accéléré. Notre bureau a mis en place une clinique de pneumologie à l'écart de nos patients réguliers. Le 18 mars, comme beaucoup d'entre vous, j'ai réalisé la gravité de la situation lorsque j'ai écouvillonné mon premier patient ayant obtenu un résultat positif pour la COVID-19. Oui, il était jeune et en bonne santé, mais il avait des amis et des proches vulnérables dans la communauté... dans notre communauté. Notre planification locale s'est alors accélérée, avec l'aide de la liste de courriel de la SRMC.

La liste de diffusion ruralMed a explosé (quoi? une limite de 50 publications!?), et on en a vite appris plus que j'aurais pu le croire possible sur l'épidémiologie, la conception des masques, les codes protégés et les théories contradictoires sur la

meilleure façon de prendre en charge les patients atteints de la COVID-19. La santé en région rurale a bougé et s'est ajustée rapidement, tout comme le reste de la société. L'annulation d'un cours semble bien mineure dans le contexte actuel, et quand même... quand même, la Conférence en région rurale et éloignée nous manque.

Alors que pour certains, la Conférence en région rurale et éloignée est, disons-le juste une conférence, pour beaucoup, beaucoup d'autres, elle est beaucoup plus, elle est des retrouvailles. C'est l'endroit où les médecins des régions rurales SE rencontrent. Nous apprenons ce qu'il y a de nouveau, mais nous sommes aussi inspirés par ce qui est possible et ce qui peut et devrait être fait. Nous faisons partie d'une communauté qui nous comprend et nous soutient; qui célèbre notre art et ses praticiens. C'est l'endroit où nous rencontrons nos mentors, nos confrères et consœurs, et nos amis.

J'aimerais dire à toutes les personnes que j'ai rencontrées à la Conférence en région rurale et éloignée et à leur famille de rester en sécurité. J'ai hâte de vous voir à la Conférence en région rurale et éloignée qui aura lieu du 22 au 24 avril 2021 à Niagara Falls en Ontario. J'ai hâte aux discussions sur les chances, meilleures ou non qu'un permis national d'exercer voit le jour.

Il est inutile d'en discuter ici. La meilleure place pour des débats d'une telle importance est durant la sécuritaire réunion annuelle de notre famille rurale— à la prochaine fois.

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## President's Message. Summer 2020 – Traversing uncertainty

It is my honour to become the president of the Society of Rural Physicians of Canada (SRPC). I am grateful for the confidence placed in me by the Society's membership as we traverse this uncertain time.

The value of rural generalism shined during the lead up and response to the COVID-19 outbreak. Our members displayed their ingenuity, academic prowess, and most of all, their tremendous support for colleagues and communities across the country. During the early days of the pandemic, the RuralMed listserv was a constant source of up-to-date knowledge on COVID-19 and provided a creative and solution-focused platform for helping many of us navigate this new threat.

Even where we were well prepared, the pandemic laid bare many gaps in rural health care. Rural, remote, and northern communities continue to have limited emergency transport options, inequitable access to tertiary care, a dearth of equipment and populations with a high burden of comorbidity. These are longstanding challenges, made all the more urgent by the surge.

I was impressed, though not surprised, by the clinical courage I

witnessed from friends and colleagues who faced these challenges together. As community leaders, rural physicians stepped up to provide care outside of their comfort zone and showed leadership and commitment to ensuring the best outcomes possible.

As in clinics and hospitals, the pandemic also had a big impact on the SRPC as an organisation. In March, the executive and conference organisers made the difficult decision to cancel this year's Rural and Remote Medicine Conference. I want to thank the conference organising committee and staff who put so much work into this year's event. Although we have faced some setbacks, the financial and administrative strength we have gained over the past several years will help carry us through our next conference in 2021!

Rural generalism is well suited to the unsettled nature of the world. We cannot predict the future, but it will likely be difficult and require a lot from us all. As a group, SRPC members deal well with this type of uncertainty, and we are well poised to help our communities endure and thrive in whatever may come.

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# Message du Président. Des temps insensés

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J'ai l'honneur d'avoir été nommé président de la Société de la médecine rurale du Canada (SMRC). Je suis reconnaissant de la confiance que les membres de la Société ont exprimée à mon égard alors que nous traversons une période d'incertitude.

La valeur du généralisme rural a brillé de tous ses feux durant le prélude et la réponse à la pandémie de COVID-19. Nos membres ont fait preuve d'ingéniosité, de prouesses universitaires et surtout, d'un soutien extraordinaire pour aider leurs confrères et consœurs et les communautés du pays. Au début de la pandémie, la liste de diffusion RuralMed s'est avérée être une source constante d'information actualisée sur la COVID-19 et s'est transformée en plateforme créative de solutions pour venir en aide à beaucoup d'entre nous qui devons affronter cette nouvelle menace.

Même là où nous étions fin prêts, la pandémie a mis à nu les nombreuses lacunes des soins de santé en milieu rural. Les communautés rurales, éloignées et du Nord disposent toujours d'options limitées en matière de transport d'urgence, d'un accès inéquitable aux soins tertiaires, et elles font toujours face à une pénurie d'équipement et à des populations qui présentent beaucoup de comorbidités. Ce sont là des difficultés de longue date que l'épidémie a rendues urgentes.

J'ai été impressionné, mais pas du tout surpris, par le courage clinique dont j'ai été témoin, des amis et des confrères et consœurs qui se sont unis pour faire face à ces difficultés. En leur qualité de leaders communautaires, les médecins en région rurale sont montés aux barricades pour dispenser des soins dans des situations inhabituelles et ont fait preuve de leadership et d'engagement pour veiller à obtenir les meilleurs résultats possibles.

Tout comme dans les cliniques et les hôpitaux, la pandémie s'est fortement répercutée sur la SRMC. Au mois de mars, la direction et les organisateurs ont pris la difficile décision d'annuler la mouture 2020 de la Conférence sur la médecine en régions rurales et éloignées. Je tiens à remercier le comité organisateur et le personnel de la conférence qui ont investi beaucoup de travail dans l'organisation de l'événement. Malgré quelques revers, la solidité financière et administrative que nous avons érigée au cours des dernières années nous aidera à naviguer jusqu'à la prochaine conférence en 2021!

Le généralisme rural convient bien à l'instabilité actuelle dans le monde. Il est impossible de prédire l'avenir, mais celui-ci sera probablement ardu et exigera beaucoup de nous tous. Le groupe formé par les membres de la SRMC compose bien avec ce genre d'incertitude, et nous sommes bien placés pour aider nos communautés à subsister et à prospérer, peu importe ce que l'avenir nous réserve.

## Demographics, prevalence and outcomes of diabetes in pregnancy in NW Ontario

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### Abstract

**Introduction:** Diabetes in pregnancy confers increased risk. This study examines the prevalence and birth outcomes of diabetes in pregnancy at the Sioux Lookout Meno Ya Win Health Centre (SLMHC) and other small Ontario hospitals.

**Methods:** This was a retrospective study of maternal profile: age, parity, comorbidities, mode of delivery, neonatal birth weight, APGARS and complications. Data were compared to other Ontario hospitals offering an equivalent level of obstetrical services.

**Results:** Type 2 diabetes mellitus in pregnancy is far more prevalent in mothers who deliver at SLMHC (relative risk [RR]: 20.9, 95% confidence interval [CI]: 16.0–27.2); the rates of gestational diabetes (GDM) are double (RR: 2.0, 95% CI: 1.7–2.3). SLMHC mothers with diabetes were on average 5 years younger and of greater parity with increased substance use. Neonates largely had equivalent outcomes except for increased macrosomia, neonatal hypoglycaemia and hyperbilirubinaemia in GDM pregnancies.

**Conclusion:** Patients with diabetes in pregnancy at SLMHC differ substantially from mothers delivering at Ontario hospitals with a comparable level of service. Programming and resources must meet the service needs of these patients.

**Keywords:** Diabetes, First Nations, pregnancy

### Résumé

**Introduction:** Le diabète durant la grossesse élève le risque. Cette étude s'est penchée sur la prévalence des issues liées à l'accouchement causées par le diabète durant la grossesse au centre de santé SLMHC (Sioux Lookout Meno Ya Win Health Centre) et dans d'autres petits hôpitaux ontariens.

**Méthodologie:** Il s'agissait d'une étude rétrospective du profil de la mère: âge, parité, comorbidités, méthode d'accouchement, poids du bébé à la naissance, score APGAR et complications. Les données ont été comparées à celles d'autres hôpitaux ontariens qui offrent un niveau équivalent de services obstétriques.

**Résultats:** Le diabète de type 2 durant la grossesse est beaucoup plus répandu chez les femmes qui accouchent au SLMHC (risque relatif [RR]: 20,9; intervalle de confiance [CI] à 95 % : 16,0–27,2); le taux de diabète gestationnel est deux fois plus

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élevé (RR: 2,0; IC à 95 %: 1,7–2,3). Les femmes diabétiques ayant accouché au SLMHC étaient en moyenne 5 ans plus jeunes, avaient eu plus de naissances et elles consommaient des drogues en plus grand nombre. L'état des nouveau-nés était grandement équivalent, à l'exception d'un plus grand nombre de macrosomies, d'hypoglycémies néonatales et d'hyperbilirubinémies dans les cas de diabète gestationnel.

**Conclusion:** Les patientes diabétiques durant la grossesse vues au SLMHC diffèrent substantiellement des femmes qui accouchent dans les hôpitaux ontariens offrant un niveau comparable de services. La programmation et les ressources doivent répondre aux besoins en matière de services de ces patientes.

**Mots-clés:** Diabète, Premières Nations, grossesse

## INTRODUCTION

Diabetes in pregnancy increases maternal and neonatal adverse events.<sup>1,2</sup> The high prevalence of type 2 diabetes mellitus (T2DM) in many First Nations populations includes women in their reproductive years, conferring increased risk in pregnancy.<sup>3</sup> Rural obstetrical programmes serving First Nations in Canada operate in this environment of diabetes-related challenges and their programme needs may be unique.

The adverse event risk begins at conception for women with pre-existing T2DM. Hyperglycaemia at conception and during organogenesis increases the risk for stillbirth and congenital anomalies.<sup>4,5</sup> Gestational diabetes (GDM) developing later in pregnancy affects foetal growth, with resultant increases in macrosomia, shoulder dystocia and caesarean section.<sup>6-8</sup> GDM diagnosed in the first trimester is assumed to be newly recognised 'overt', or pre-existing diabetes and these pregnancies share the risk profile associated with T2DM.<sup>9,10</sup>

Rural hospitals serving First Nations populations may encounter higher rates of diabetes in pregnancy compared to other obstetrical programmes. This study examined the demographics, prevalence and outcomes of diabetes in pregnancy for women who delivered at the Sioux Lookout Meno Ya Win Health Centre (SLMHC) in comparison to other Ontario hospitals with a similar level of obstetrical services.

## METHODS

SLMHC has a catchment population of 29,000 living in the town of Sioux Lookout and 26 remote fly-in communities.<sup>11</sup> Obstetrical services are provided by family physicians at the integrated

pregnancy programme (IPP) with an average of 400 annual deliveries. Tertiary level care is available in Thunder Bay, Ontario, or Winnipeg, Manitoba, each over 300 km away, as accessed by air transportation.

This retrospective study compares the maternal and neonatal populations at SLMHC and other Ontario obstetrical programmes, providing a similar level of service, from April 1, 2012, to March 31, 2017. Live birth data from the Better Outcomes Registry and Network (BORN) Ontario was accessed for SLMHC and other maternity level 1B Ontario hospitals.<sup>12</sup> This designation by the Provincial Council for Maternal and Child Health identifies low-risk obstetrical programmes with a minimum standard of C-section availability and family physicians or midwife provision of intrapartum and neonatal care.<sup>13</sup> These 30 comparable provincial hospital programmes averaged 416 deliveries annually; three were rural (Ontario rurality index  $\geq 75$ ).<sup>14</sup>

Maternal data for patients with GDM or T2DM included age, parity, pre-pregnancy weight, comorbidities and mode of delivery. Neonatal variables included gestational age, birth weight, APGAR scores and complications. The study was reviewed and approved by the BORN Indigenous consultant and the local Sioux Lookout First Nations Health Authority and received ethics approval from the SLMHC Research Review and Ethics Committee.

## RESULTS

There were 2,084 live births at SLMHC during the 5-year study period. Diabetic status was available for 2,073 patients. Most patients (1,833; 88%) were non-diabetic; GDM was present in

**Table 1: Characteristics of gestational diabetes mellitus patients at Sioux Lookout Meno Ya Win Health Centre and other Ontario Maternity 1B hospitals, April 1, 2012-March 31, 2017**

	SLMHC	Ontario 1B Hospitals	RR (95% CI)	P
GDM, n (% live births)	164 (8)	2690 (4)	2.0 (1.7-2.3)	<b>&lt;0.001</b>
Maternal				
Age				
Mean±SD	27.5±6.33	32±5.07	N/A	<b>&lt;0.001</b>
<20 (%)	16 (10)	25 (0.9)	10.5 (5.7-19.3)	<b>&lt;0.001</b>
>35 (%)	21 (13)	636 (24)	0.5 (0.4-0.8)	<b>&lt;0.001</b>
Obstetrical history				
Primiparous (%)	30 (18)	947 (35)	0.5 (0.4-0.7)	<b>&lt;0.001</b>
Previous vaginal births	2±2.09	0±1.29	N/A	<b>&lt;0.001</b>
Pre-pregnancy weight	77.6±16.96	74.9±20.29	N/A	0.095
Comorbidities				
Insulin in current pregnancy (%)	37 (23)	868 (33)	0.7 (0.5-0.9)	<b>0.009</b>
Hypertension (%)*	17 (10)	259 (10)	1.1 (0.7-1.7)	0.772
Opioid replacement therapy (%)	17 (10)	24 (0.9)	11.6 (6.3-21.2)	<b>&lt;0.001</b>
Illicit opioids (%)	14 (9)	5 (<0.2)	45.9 (16.7-126.0)	<b>&lt;0.001</b>
Alcohol (%)	30 (19)	56 (2)	8.8 (5.8-13.3)	<b>&lt;0.001</b>
Smoking (%)	86 (52.4)	366 (14)	3.8 (3.2-4.6)	<b>&lt;0.001</b>
Marijuana (%)	9 (6)	20 (1)	7.4 (3.4-15.9)	<b>&lt;0.001</b>
Mode of delivery				
Induced labour (%)	83 (51)	1006 (37)	1.3 (1.1-1.6)	<b>&lt;0.001</b>
Planned C-section (%)	28 (17)	614 (23)	0.7 (0.5-1.1)	0.089
Unplanned C-section (%)	28 (17)	407 (15)	1.1 (0.8-1.6)	0.490
Total C-section (%)	56 (34)	1021 (38)	0.9 (0.7-1.1)	0.332
Neonatal				
Gestational age at delivery				
Mean±SD	38±1.3	39±1.28	N/A	<b>&lt;0.001</b>
<37 weeks (%)	13 (8)	141 (5)	1.5 (0.9)	0.136
37-39 weeks (%)	77 (47)	1145 (43)	1.1 (0.9-1.3)	0.267
39-41 weeks (%)	74 (45)	1396 (52)	0.9 (0.7-1.0)	0.091
>41 weeks (%)	0	8 (0.3)	0.9 (0.1-16.5)	
Newborn outcomes				
5 min APGAR <7 (%)	4 (<4)	49 (2)	1.3 (0.5-3.6)	N/A
Birth weight <2500 g	7 (5)	69 (3)	1.7 (0.8-3.6)	0.107
Birth weight >4000 g	33 (22)	326 (12)	1.7 (1.2-2.3)	<b>&lt;0.001</b>
Resuscitation (%)	26 (16)	317 (12)	1.3 (0.9-1.9)	0.099
Hypoglycaemia (%)	25 (15)	197 (7)	2.1 (1.4-3.1)	<b>&lt;0.001</b>
Hyperbilirubinaemia (%)	13 (8)	117 (4)	1.8 (1.0-3.2)	<b>0.031</b>

Bold=<0.05. RR: Relative risk, GDM: Gestational diabetes mellitus, SLMHC: Sioux Lookout Meno Ya Win Health Centre, CI: Confidence interval, SD: Standard deviation, N/A: Not available, \*Includes Gestational and Pre-Gestational Hypertension

164 (7.9%) and T2DM in 76 (3.7%) patients. Other maternity level 1B hospitals had 69,149 deliveries, 96% of whom were non-diabetic, 4% GDM and 0.24% T2DM.

Women with both classes of diabetes who delivered at SLMHC were on average 5 years younger and of greater parity than at other maternity level 1B hospitals. Increased neonatal macrosomia, hypoglycaemia and hyperbilirubinaemia were identified solely in SLMHC patients with GDM.

Substance exposure (smoking, alcohol and opioids) was substantially more common in the NW Ontario obstetrical population. Labour inductions and delivery before 39 weeks were more common at SLMHC for both classes of diabetes, with equivalent overall C-section rates. Planned C-sections were less common at SLMHC (relative risk [RR]: 0.5, 95% confidence interval [CI]: 0.3–0.9) maternal and neonatal characteristics and birth outcomes are listed for GDM [Table 1] and T2DM [Table 2].

**Table 2: Characteristics of type 2 diabetes mellitus patients in pregnancy at Sioux Lookout Meno Ya Win Health Centre and other Ontario Maternity 1B hospitals, April 2012-March 2017**

	A SLMHC (n=2084)	B Ontario 1B Hospitals (n=69,149)	RR (95%CI)	P
T2DM, n (% live births)	76 (3.7)	168 (0.2)	20.9 (16.0-27.2)	<b>&lt;0.001</b>
Maternal				
Age				
Mean±SD	29.5±5.64	33±5.42	N/A	<b>&lt;0.001</b>
<20 (%)	3	2	3.3 (0.6-19.4)	N/A
>35 (%)	12 (16)	57 (34)	0.5 (0.3-0.8)	<b>0.004</b>
Obstetrical history				
Primiparous (%)	11 (15)	53 (32)	0.5 (0.2-0.8)	<b>0.005</b>
Previous vaginal births	2.5±2.39	0±1.41	N/A	<b>&lt;0.001</b>
Pre-pregnancy weight	86.3±17.01	82±23.94	N/A	<b>&lt;0.001</b>
Comorbidities				
Insulin in current pregnancy (%)	30 (40)	94 (56)	0.7 (0.5-1.0)	<b>0.017</b>
Hypertension (%)*	14 (18)	27 (16)	1.1 (0.6-2.1)	0.645
Opioid replacement therapy (%)	18 (24)	0 (0)	81.2 (5.0-1330.2)	<b>&lt;0.001</b>
Illicit opioids (%)	14 (18)	0 (0)	63 (3.8-1053.3)	<b>&lt;0.001</b>
Alcohol (%)	15 (20)	<6 (<4)	N/A	<b>&lt;0.001</b>
Smoking (%)	49 (65)	30 (18)	3.6 (2.5-5.2)	<b>&lt;0.001</b>
Marijuana (%)	5	4	2.7 (0.7-10.0)	N/A
Mode of delivery				
Induced labour (%)	46 (61)	57 (34)	1.8 (1.3-2.4)	<b>&lt;0.001</b>
Planned C-section (%)	12 (15)	54 (32)	0.5 (0.3-0.9)	0.041
Unplanned C-section (%)	21 (28)	36 (21)	1.3 (0.8-2.0)	<b>&lt;0.001</b>
Total C-section (%)	33 (43)	90 (54)	0.8 (0.6-1.1)	0.138
Neonatal				
Gestational age at delivery				
Mean±SD	38±1.08	38±1.44	N/A	1.0
<37 weeks (%)	<6 (<8)	21 (13)	N/A	<0.289
37-39 weeks (%)	58 (76)	90 (54)	1.4 (1.2-1.7)	<b>&lt;0.001</b>
39-41 weeks (%)	12 (16)	54 (32)	0.5 (0.3-0.9)	<b>&lt;0.001</b>
>41 weeks (%)	<6	<6	N/A	N/A
Newborn outcomes				
5 min APGAR <7 (%)	1	7 (4)	0.32 (0.04-2.5)	0.277
Birth weight <2500 g	0 (0)	<6 (<4)	N/A	<0.095
Birth weight >4000 g	15 (21)	21 (13)	1.6 (0.9-2.9)	0.105
Resuscitation (%)	12 (16)	34 (20)	0.8 (0.4-1.4)	0.424
Hypoglycaemia (%)	20 (26)	30 (18)	1.5 (0.9-2.4)	0.116
Hyperbilirubinaemia (%)	13 (17)	13 (8)	2.2 (1.1-4.5)	<b>0.025</b>

\*Gestational and pre-gestational hypertension. Bold = <0.05. RR: Relative risk, SLMHC: Sioux Lookout Meno Ya Win Health Centre, CI: Confidence interval, SD: Standard deviation, N/A: Not available, T2DM: Type 2 diabetes mellitus

## DISCUSSION

The prevalence of pre-existing T2DM and GDM is much higher at SLMHC compared to other Ontario hospitals with a comparable level of obstetrical services. Associated adverse outcomes were more common: unplanned C-sections, neonatal hypoglycaemia and macrosomia. Total C-section and neonatal resuscitation rates were equivalent.

The substantial difference in the rates of pre-existing T2DM (RR: 20.9, 95% CI: 16.0–27.2)

speaks to the high diabetes prevalence in NW Ontario.<sup>15</sup> It may also reflect the transfer of care of pregnant patients with T2DM to specialists and/or larger facilities in other areas of the province, as the provincial prevalence of T2DM in pregnancy is double (0.4%) in other Ontario maternity 1B hospitals (0.2%).<sup>16</sup>

At SLMHC, both classes of diabetic patients delivered at a mean of 38 weeks and experienced more inductions of labour. This contrasted with comparable hospitals where only T2DM patients

were induced and delivered before 39 weeks. This highlights the clinical decision-making around time of delivery for patients with diabetes, with earlier deliveries occurring at SLMHC. It is not clear if other perceived risks also played a role in these decisions.<sup>8</sup>

Inductions for both classes of diabetes were more common at SLMHC: GDM (RR: 1.3, 95% CI: 1.1–1.6) and T2DM (RR: 1.8, 95% CI: 1.3–2.4). All cohorts had equivalent overall C-section rates, but a different pattern of care is evident for patients at SLMHC when analysing data for T2DM patients. Unfortunately, we cannot distinguish if a planned section was elective or a repeat, but the combination of more inductions and fewer planned C-sections in T2DM patients at SLMHC may indicate a physician and/or patient preference favouring a vaginal delivery.<sup>17</sup> These findings are consistent with the higher trial of labour and vaginal birth after delivery previously documented at SLMHC.<sup>18</sup> While C-section rates for T2DM patients in each cohort are equivalent, it is sobering to see that operative deliveries occur in almost one-half of the deliveries of women with pre-existing T2DM.

All neonates had similar APGAR and resuscitation rates. GDM neonates at SLMHC had increased rates of macrosomia and hypoglycaemia. This may indicate suboptimal glycaemic control during pregnancy; we note a lower rate of insulin use in these patients. At first glance, neonates of T2DM patients at SLMHC seem to have better outcomes, but the small number of patients (76) limits the ability to draw more informed conclusions.

Congenital anomalies and stillbirths are acknowledged adverse events associated with pre-existing T2DM, and neither are included in our data set; BORN suppresses rare event data (<6) in respect of patient confidentiality.

Substance exposure, an order of magnitude higher at SLMHC, is comparable to other First Nations obstetrical populations in Quebec, Manitoba and Alberta.<sup>19–21</sup> The presence of a similar maternal risk profile across geographically distinct First Nations demonstrates the common inherited effects of colonisation and systemic discrimination and their ongoing contribution to health inequities.<sup>22–24</sup>

Youth, parity, diabetes and substance use contribute to the profile of mothers delivering at

SLMHC, which is quite distinct from Ontario hospitals with a comparable level of obstetrical services. Programming needs to address this, and culturally relevant initiatives are developing. The scope of hospital-based IPP includes addiction medicine in prenatal care.<sup>25</sup> SLMHC participates in a 20-week pregnancy support workers' programme and the Sioux Lookout First Nations Health Authority hosts Full Scope Indigenous Doula training.<sup>26,27</sup> Beyond these efforts, the unique context and demographics of the SLMHC obstetrical population highlight the need for broad social and medical programming, including issues not typically associated with maternity care: food security, poverty and culturally appropriate care.<sup>22–24,28</sup> Not all small hospital obstetrical programmes need be created equal.

### Limitation

Data not reliably available from BORN included congenital anomalies and oral hypoglycaemic use in pregnancy; only live births were included.

### CONCLUSION

The SLMHC obstetrical population has higher rates of both gestational and pre-existing diabetes than other Ontario hospitals with a comparable level of service. Diabetic mothers at SLMHC are younger and of greater parity with increased substance use. Programming is required which recognises and accommodates the unique service needs of this population.

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## The impact of the HEART score on the prevalence of cardiac testing and patient outcomes in a rural emergency department

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### Abstract

**Introduction:** This study was conducted to examine the use of the HEART score for risk stratification of chest pain patients presenting to rural Ontario emergency departments (EDs), assessing both its validity in a rural context and its utility in health-care resource management.

**Methods:** This study was a retrospective chart review of adult patients presenting to the ED with chest pain. The HEART score was assessed for its ability to risk-stratify patients (high, moderate and low) in terms of the likelihood of a major adverse cardiac event (MACE) within 6 weeks. The prevalence of follow-up testing for each risk category of patients was then determined such that the potential impact on health resource management was estimated based on the number of tests ordered in low-risk patients.

**Results:** Of the 215 charts included, 24 (11.2%) patients experienced a MACE within 6 weeks. None of the patients with a low HEART score experienced a MACE. In comparison, the incidence of MACE in moderate- and high-risk groups was calculated to be 13.9% (95% confidence interval [CI] [5.91% and 21.89%, respectively]) and 66.7% (95% CI [46.54% and 86.86%, respectively]). Eighteen percent of the low-risk patients received follow-up testing with no positive results suggestive of acute coronary syndrome.

**Conclusion:** Our results provide external validation of the predictive value of the HEART score in determining the risk of MACE in patients presenting to a rural ED with chest pain. Our results also suggest that rates of follow-up testing in low-risk patients may be reduced in communities with limited access to resources.

**Keywords:** Emergency medicine, HEART score, ischemic heart disease, rural medicine

### Résumé

**Introduction:** Examiner le recours au score HEART pour stratifier le risque lié à la douleur thoracique chez les patients qui se présentent aux services d'urgence des régions rurales de l'Ontario, en en évaluant la validité dans un contexte rural et l'utilité dans la gestion des ressources de santé.

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**Méthodologie:** Examen rétrospectif des dossiers de patients adultes s'étant présentés à l'urgence pour une douleur thoracique. Le score HEART a été évalué pour sa capacité de stratifier les patients en fonction du risque (élevé, modéré, faible) d'événement cardiaque indésirable majeur (ÉCIM) dans les 6 semaines suivantes. La prévalence des tests de suivi pour chaque catégorie de risque a ensuite été déterminée afin d'estimer l'impact potentiel sur la gestion des ressources de santé selon le nombre de tests demandés chez les patients à faible risque.

**Résultats:** Sur les 215 dossiers inclus, 24 (11,2 %) patients ont subi un ÉCIM dans les 6 semaines suivantes. Aucun des patients ayant obtenu un faible score HEART n'a subi un ÉCIM. Par ailleurs, l'incidence d'ÉCIM dans les groupes à risque modéré et élevé s'est élevée à respectivement 13,9 % (IC à 95 % [5,91; 21,89 %]) et 66,7 % (IC à 95 % [46,54; 86,86 %]). Dix-huit pour cent des patients à faible risque ont subi un test de suivi sans résultat évoquant un syndrome coronarien aigu.

**Conclusion:** Nos résultats ont validé de façon externe la valeur prédictive du score HEART dans la détermination du risque d'ÉCIM chez les patients qui se présentent à l'urgence rurale pour une douleur thoracique. Nos résultats laissent également croire que le taux de tests de suivi chez les patients à faible risque serait réduit dans les communautés dont l'accès aux ressources est limité.

**Mots-clés:** médecine rurale, médecine d'urgence, maladie cardiaque ischémique, score HEART

## INTRODUCTION

Chest pain is one of the most common presenting complaints to the emergency departments (EDs) in North America.<sup>1,2</sup> These presentations are seldom straightforward and often lead to significant hospital length of stay (LOS), congestion of the ED and invasive testing.<sup>1</sup> While many presentations may be suspicious for acute coronary syndrome (ACS), the majority are the result of benign conditions such as gastroesophageal reflux and musculoskeletal injury.<sup>3,4</sup> Only 15%–20% of patients have true ACS and many of these patients present atypically with symptoms such as anxiety or shortness of breath, masking underlying cardiac pathology.<sup>3</sup> Given this reality, chest pain represents a diagnostic challenge for the ED physician.

Several risk stratification tools have been developed for ACS patients.<sup>4</sup> The GRACE and TIMI scores are commonly applied in the coronary care units for high-risk ACS patients who would benefit from intensive therapy but neither has proven useful in risk-stratifying ED chest pain patients.<sup>5,6</sup> For use in the ED, these tools need to identify low-risk chest pain patients who can be safely discharged and thus reduce hospital admissions and unwarranted testing. To this end, the HEART score was developed in 2007 and has since outperformed other tools, stratifying patients based on the history, age, electrocardiogram (ECG) results, cardiac risk factors and their troponin levels.<sup>7</sup> Retrospective and prospective studies have since validated the score such that patients who are

stratified as low risk can be discharged home safely, with only a 1.7% risk of having a major adverse cardiac event (MACE) within 6 weeks of presentation – defined by all-cause mortality, myocardial infarction or the need for coronary revascularisation.<sup>5,8-12</sup> Those patients stratified as moderate or high risk are followed more closely and undergo further diagnostic and therapeutic testing, as appropriate. Additional benefits of the HEART score have also been studied, including confirmation of prognostic utility up to 5 years and a high degree of interoperator reliability, and two systematic reviews have since determined excellent predictive value for this score.<sup>13-16</sup>

Previously, it has been found that more than 30% of chest pain patients evaluated with the HEART score have been stratified as low risk.<sup>5,8</sup> This presents a significant opportunity to reduce hospital admissions, ED LOS, specialist consultation and ancillary testing, and a previous economic cost-analysis study has predicted savings to the health-care system in the millions.<sup>17-19</sup>

Ischemic heart disease is the leading cause of death in the rural Muskoka region of Ontario, exceeding the provincial average.<sup>20</sup> The community also has a higher prevalence of cardiac risk factors such as obesity, high blood pressure and median age.<sup>20</sup> In addition to increased risk factors for heart disease, Muskoka's communities also rank higher than average in terms of their Rurality Index and due to its geographical location and size Muskoka has limited access to percutaneous coronary intervention (PCI).<sup>21</sup> The nearest referral centre for PCI is at the Southlake

Regional Health Centre in Newmarket, which is a distance of 140 and 180km from the Muskoka towns of Bracebridge and Huntsville, respectively. Given this reality, accurate risk stratification and efficient use of resources are important.

This study sought to validate the HEART score in a rural setting and determine if Muskoka ED physicians are risk-stratifying patients in accordance with the HEART score and the subsequent impact on patient outcomes as measured by the presence or absence of a MACE within 6 weeks of the index ED visit. This information also permitted discussion of the extent and benefit, if any, of testing that was completed in the low-risk group. Further testing in patients already classified as low risk is unlikely to contribute to patient care and may represent an opportunity to reduce the utilisation of ancillary tests.

## METHODS

### Ethics

This was a multicentre retrospective chart review of patients presenting to the ED between September 2015 and September 2016 and was approved by the Northern Ontario School of Medicine Undergraduate Research Ethics Board. Access to patient health information was granted by the Muskoka Algonquin Healthcare (MAHC) Group Manager of Health Information.

### Study design

The review was conducted in the Muskoka region of Northern Ontario at two community hospitals in Bracebridge and Huntsville.

A member of the health records staff searched the MAHC electronic medical record (EMR) system for all patients presenting to the ED in the specified time frame with the primary complaint of 'chest pain'. Eligible patients included those who were  $\geq 18$  years old and had no address within the catchment area of MAHC. Charts were excluded if patients left against medical advice or if they had evidence of an ST-segment elevation myocardial infarction (STEMI). This is congruent with the approach used by Backus *et al.*<sup>5</sup> Charts were also excluded if there were insufficient data to calculate a HEART score, such as those without a documented troponin level or ECG.

Data were extracted by three research assistants into a standardised template and charts were scored as per the HEART criteria. Age, troponin results, risk factors and ECG findings were the objective findings obtained from EMRs. A patient's history relied on the original HEART score description of nonsuspicious versus suspicious factors and was also obtained from the medical records as documented by the ED physician.<sup>22</sup> Characteristics suspicious for ACS included retrosternal pain, perspiration, nausea and response to nitrates, whereas nonsuspicious characteristics included pleuritic or reproducible pain. Patients with scores of 0–3 were categorised as low risk, scores of 4–6 were categorised as moderate risk and scores of 7–10 were deemed high risk.<sup>22</sup>

Follow-up testing (including stress tests, angiography or follow-up with an internal medicine specialist) and any return visits to the ED were noted from the hospital EMR and from family practitioner records for up to 6 weeks following the index visit, as per the previous validation studies.<sup>22</sup> To ensure that the index visit did not represent a 'follow-up' visit from a previous ED presentation, the patient's charts were also reviewed 6 weeks prior to the index visit for any chest pain presentations to the ED. Any uncertainty in analysis or HEART score was flagged for team discussion to mitigate inter-rater reliability. Data were de-identified using the hospital medical record number to ensure patient confidentiality.

### Outcome measures and statistics

Statistical analysis was performed with XL Stat (Version 2017.1). The primary outcomes of this study were to determine: (1) the incidence of a MACE for all risk groups (low, moderate and high), including both point estimates and 95% confidence intervals (CIs), (2) the diagnostic discriminative strength of the HEART score for MACE events by computing the area under the receiver operating characteristic curve and (3) the association between individual components of the HEART score and MACE events using Fisher's exact test.<sup>5,10</sup> Statistical significance was defined as  $P = 0.05$ , two sided. The frequency of additional ancillary testing in each risk category was considered a secondary outcome.

Descriptive statistics were given as average  $\pm$  standard deviation or percentage.

Differences between the groups were assessed by means of the Student *t*-test when normally distributed; for scalar data, we used the Fisher's exact test, or in the case of ordinal data, the Cochran–Armitage trend test was used.

We estimated that a sample size of 354 charts was required for a 5% margin of error with a 95% CI.

## RESULTS

A total of 800 charts were obtained, from which 284 charts were excluded because the patients did not meet the age criteria, did not reside in the MAHC catchment area or left before being seen by a physician. In addition, a small proportion of the charts were mislabelled at triage as 'chest pain' when the patients had actually sought emergency care for a different reason. One hundred and twenty-one charts were extracted from outside the defined time period, and thus, they were excluded from the analysis. Eighteen patients presented with a STEMI and 97 charts did not contain enough data to calculate a HEART score, including an ECG or troponin. The remaining 280 charts were included in the prevalence analysis, but a further 65 charts were lost to follow-up, giving a final sample of 215 charts available for validity analysis [Figure 1], with a margin of error of 6.4%.

Patients' demographics are listed in Table 1, consisting predominantly of older men with several ACS risk factors.

Of the 215 charts included in the validation analysis, 24 (11.2%) patients experienced a MACE, which included NSTEMI, PCI and coronary artery bypass graft within 6 weeks of the index admission. None of the low-risk patients experienced a MACE. Ten patients (13.9%) with a moderate-risk score experienced a MACE, while 14 patients (66.7%) with a high-risk score experienced a MACE. Overall, there was a statistically significant association between the HEART score and the occurrence of MACE events, demonstrated in Figure 2. The relation was close to linear between HEART scores 5 and 9. The calculated C-score was 0.96 (CI 0.93–0.99), confirming an excellent ability to discriminate in this setting.

An analysis of each component of the HEART score and correlation with MACE, as depicted in Table 2, demonstrates history, ECG and troponin which are the most statistically significant independent predictors of MACE ( $P < 0.00001$ ),

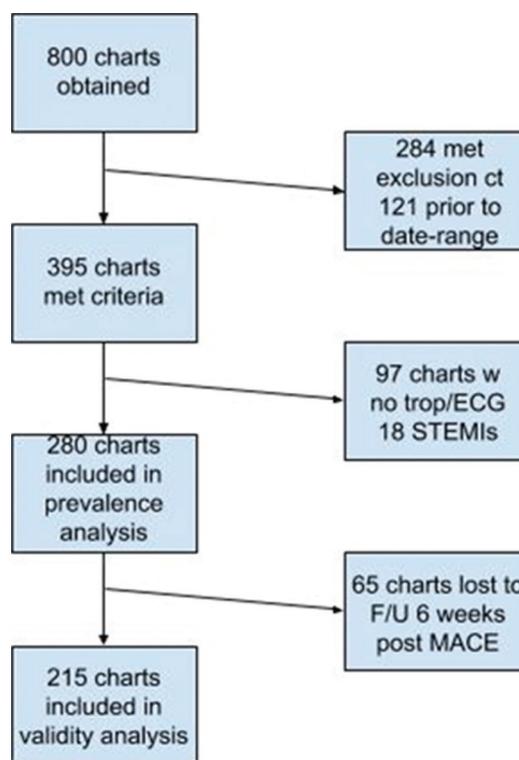


Figure 1: Flowchart depicting chart extraction.

Table 1: Baseline characteristics for Muskoka Algonquin Healthcare group versus Backus, 2010

Characteristic	MAHC	Backus, 2010
Age, mean±SD	58.8±16.9	61.3±15.7
Male, %	57.1	57.3
Hx atherosclerosis	24.6	19.9
Previous MI	6.1	20.5
Hx DLD	24.6	26.0
Hx HTN	33.6	36.5
Smoker	21.4	29.2
Diabetes	12.1	19.9
Fam Hx CAD	3.6	31.9

MAHC: Muskoka Algonquin Healthcare group, SD: Standard deviation, HTN: Hypertension, CAD: Coronary artery disease, DLD: Dyslipidemia, Fam: Family history, Hx: History

correlating to the previous analyses.<sup>25</sup> The average HEART score in the MACE versus without MACE group was 6.9 and 2.8, respectively.

The analysis of the frequency and efficacy of follow-up testing for each risk group is detailed in Table 3. Follow-up testing included any form of stress testing or coronary angiography.

None of the patients in the low-risk category, who had follow-up testing, had positive results or subsequent MACE. In comparison, almost all patients (19/21) in the high-risk group received follow-up testing.

In the moderate-risk group, approximately 60% of the patients received follow-up testing. Over two-thirds of these patients received stress tests, only 6 of which were positive and only one ultimately had positive angiography. An additional 11 patients who received stress testing had an equivocal result, secondary to a new left bundle branch block or inability to complete the testing due to fatigue or pain. Thirteen cases received immediate coronary angiography, without prior stress testing, and all had positive test results.

## DISCUSSION

As the Canadian population ages, the medical community will increasingly require evidence-based tools as clinical adjuncts to

provide high-quality and efficient care to patients. This is particularly true in rural and northern communities where resources are often limited and where patients often have poorer health status.<sup>20</sup> This 'geographical burden' not only affects access to care but patients may also travel large distances and incur significant costs to receive ancillary testing and specialist follow-up.<sup>24</sup>

Our results show a statistically significant association between the HEART score and the occurrence of MACE. This is demonstrated in our study population, given that 67% of the patients who scored as high risk went on to suffer a MACE. As such, any high-risk patients should undergo further testing, as did over 90% of our high-risk group.

The precise nature of follow-up for the moderate-risk patients depended on the individual clinician, but importantly, this risk category suggests uncertainty and that some form of follow-up testing should be completed.<sup>5,8</sup> Our results reflected well on the use of the HEART score criteria in this regard, with approximately 60% of those classified as moderate risk receiving follow-up testing of varying degrees, with 23% having a positive finding.

The analysis of low-risk patients provided the most convincing evidence that the HEART score is effective in risk-stratifying patients and may save valuable health-care resources. None of the

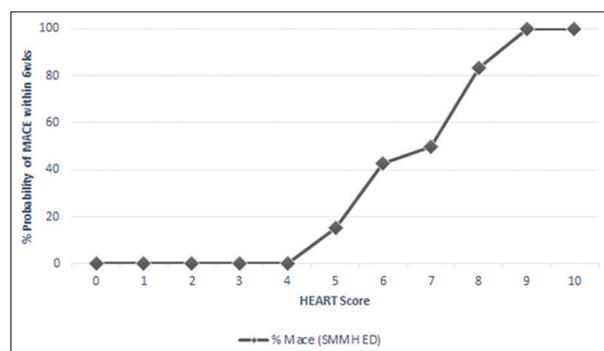


Figure 2: Association between assigned HEART score and probability of subsequent MACE.

Table 2: The relationship between the five predefined elements of the HEART score and the occurrence of major adverse cardiac event and secondary endpoints

	Points						P
	No MACE (n=191)			MACE (n=24)			
	0	1	2	0	1	2	
History	90 (47.1)	79 (41.4)	22 (11.5)	0 (0)	11 (45.8)	13 (54.2)	<0.00001
ECG	144 (75.4)	47 (24.6)	0 (0)	8 (33.3)	12 (50)	4 (16.7)	<0.00001
Age	42 (22)	77 (40.3)	72 (37.7)	2 (8.3)	3 (12.5)	19 (79.2)	<0.001
Troponin	182 (95.3)	6 (3.1)	3 (1.6)	7 (29.2)	6 (25)	11 (45.8)	<0.00001
Risk factors	63 (33)	73 (38.2)	55 (28.8)	2 (8.3)	5 (20.8)	17 (70.8)	<0.001
Heart score (mean±SD)	2.8±1.3			6.9±1.3			

MAHC: Muskoka Algonquin Healthcare group, SD: Standard deviation, ECG: Electrocardiogram

Table 3: Prevalence of follow-up testing and respective outcomes

	Low risk (0-3)	Moderate risk (4-6)	High risk (7-10)
#follow-up tests and percentage cases of respective group	22 (18)	43 (59.7)	18 (85.7)
Normal	19	18	4
Equivocal/unable to complete	3	15	0
Positive	0	10	14

low-risk patients had a MACE or positive results on follow up. In Ontario, remuneration for a single stress test is approximately \$100 according to the Ministry of Health and Long-Term Care Schedule of Benefits for physicians.<sup>25</sup> Each coronary catheterisation with angiography costs a minimum of \$400.<sup>25</sup> Therefore, significant funds may be saved without affecting patient outcomes, which has been proposed by the original authors of the score.<sup>3</sup> These figures underestimate the resource burden, given that they do not account for hospital administrative costs and also do not account for the burden patients experience from travel, missed work, stress and anxiety and adverse health outcomes associated with unnecessary ancillary testing.

Our results suggest that ED physicians in Muskoka are effectively risk-stratifying patients in the high- and moderate-risk categories since all patients who suffered a MACE were already referred for cardiac testing or intervention. However, these same physicians should feel confident that low-risk patients do not require follow-up testing.

### Limitations

Limitations of this retrospective chart review include a small sample size and data extraction from only two small centres. Several factors also contributed to high attrition, including the loss of charts missing a component of the HEART score (such as a documented ECG or troponin) and the inability to follow up with a subset of patients who did not have a designated family physician in the catchment area.

We were also dependent on third-party information. We attempted to minimize this limitation by reviewing medication lists to ensure that the past medical history was properly documented. The score itself also provides some confidence that missing risk factors did not significantly affect our results since the maximum score is reached once a patient has three risk factors or any atherosclerosis.

### CONCLUSION

This study sought to validate the HEART score in a rural setting and to determine what, if any, benefit might arise from adherence to its

recommendations (i.e. early discharge of low-risk patients and fewer tests). Our results suggest that the HEART score criteria proved capable of effectively stratifying patients presenting to a rural ED with chest pain, with minimal adverse outcomes, and a stricter adherence to such a validated risk stratification tool may reduce health-care expenditure and the burdens of follow-up testing without negatively affecting patients' outcomes in the near term.

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## Two cases: Situations for artificial surfactant, beyond prematurity

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reviewed.

### INTRODUCTION

In rural medicine, we often stretch our limits during foul weather, unavailable transport to tertiary care or unusual circumstances. The following two cases exemplify ingenuity and applying treatment principles to situations outside the standard presentation, with life-saving results. Both cases happened during blizzards with delayed transport potential to tertiary care by more than 12 h.

Artificial surfactant has been conventionally used for premature babies displaying respiratory distress that persists despite the use of nasal continuous positive airway pressure (CPAP).

### CASE REPORTS

#### Case report #1

Our first case was an infant delivered by the lead author on Boxing Day by emergency C-section at 39 weeks 2 days, to a G10P4 woman with 2 prior C-sections. She went into spontaneous labour while awaiting an elective repeat C-section. This occurred at the Lake of the Woods District Hospital in Kenora, Ontario,

200 km away from the closest neonatal intensive care unit in Winnipeg, Manitoba. Our hospital has approximately 200 deliveries annually, with family physicians providing both operative obstetrical care and newborn care. There are no obstetricians or paediatricians in our community. We thankfully have the support of our general practitioners, anaesthesia colleagues and respiratory therapists. The fetus had recurrent, prolonged fetal heart rate decelerations down to 60 bpm. Immediately after the delivery of a meconium-stained infant, there was respiratory distress. Despite nasal CPAP at 5 cmH<sub>2</sub>O, oxygen saturation remained at 88% with FiO<sub>2</sub> of 1.0. There was no likelihood of transfer based on poor weather conditions anticipated for a minimum of 12 h. The baby was intubated and ventilated, oxygenation did not improve and ventilation became more difficult over time. The lead author, when the infant was approximately 4 h of age, felt that we needed to alter therapy or face further deterioration and we began researching treatment modalities and discussing them with the closest neonatologist. A decision was made to use bovine lipid extract

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surfactant (BLES), and within hours, the oxygen saturation was 98% on  $\text{FiO}_2$  of 0.3 and 5 cm positive end expiratory pressure (PEEP). The baby was transferred to a tertiary care centre after approximately 18 h, and the following day was on room air with nasal CPAP.

## Case report #2

Our second case was a 4400 g infant, at 41 + weeks gestation delivered by C-section by the second author for labour dystocia during a post-dates induction (in a blizzard). At C-section, a milky white fluid gushed from the amnion incision. Initially, the baby appeared to do well but by 45 min was found to be dusky and hypoxic, and despite nasal CPAP and  $\text{FiO}_2$  of 1.0, oxygen saturation remained 52%. The lead author was asked to come and assist at the resuscitation at this point. There was no significant improvement in oxygenation after intubation. A chest X-ray (CXR) demonstrated a typical ground-glass appearance, worse on the right [Figure 1]. Based on the lead author's previous experience, a decision was made to give BLES. There was transient worsening of hypoxia, as expected, and then improvement. Within hours, the  $\text{FiO}_2$  was dialled down to 0.3 while maintaining oxygen saturation in the range of 88%–94% with 7  $\text{cmH}_2\text{O}$  PEEP. The neonatal transport team arrived approximately 14 h after delivery to take the baby to a tertiary care centre in Winnipeg. The next day, the baby was extubated and was maintaining normal oxygen saturations on room air with nasal CPAP. Before transfer, a

repeat CXR was performed showing the resolution of the ground-glass appearance [Figure 2].

During this resuscitation, the baby was given antibiotics to cover for pneumonia and glucose support. When the orogastric tube was placed to decompress the stomach, milky white fluid was aspirated and sent for culture. Our pathologist later identified the case to us as excessive vernix caseosa syndrome, something he has been waiting for 40 years to see in his career.

## DISCUSSION

Artificial surfactant has been recommended for the treatment of babies exhibiting signs of meconium aspiration syndrome, regardless of gestational age, and exhibiting radiological features and persistent requirements for supplemental oxygen.<sup>1-3</sup> Meconium is thought to inactivate endogenous surfactant by fatty acids in the meconium.<sup>4</sup> The specific product, BLES, is considered safe and effective. Possible side effects include transient worsening of hypoxia or bradycardia during administration and a small risk (approximately 1.5%) of pulmonary haemorrhage. The use of BLES has been shown to reduce the requirement for high-frequency ventilation, extracorporeal membrane oxygenation or nitrous oxide,<sup>4,5</sup> three treatments not available to us or to most rural physicians.

Neonatal aspiration syndrome due to vernix caseosa has been intermittently reported in the literature as a rare condition, hence the dated references.<sup>6-8</sup> A clue to excessive vernix caseosa



Figure 1: Case: 2. Initial chest X-ray before administration of bovine lipid extract surfactant.

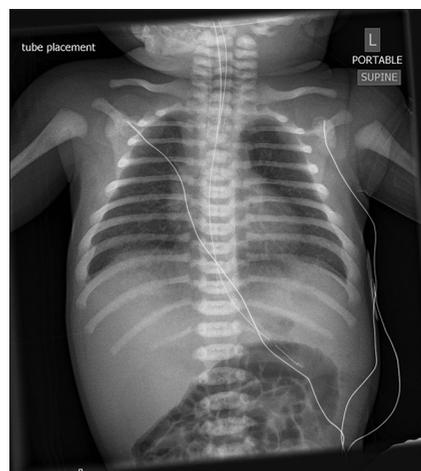


Figure 2: Case 2: Follow-up chest X-ray approximately 12 h after administration of bovine lipid extract surfactant.

antenatally would be a 'snowstorm in the amniotic fluid' on the bedside ultrasound, ironic given the weather conditions outside the womb at the time of birth for this infant.

Our nearest tertiary care centre recommends the use of BLES if the infant has not responded to nasal CPAP of 7 cmH<sub>2</sub>O and requires FiO<sub>2</sub> > 0.3 to maintain oxygen saturation of 88%–92% with radiological or clinical evidence of respiratory distress syndrome.<sup>5</sup> This principle was applied to our second case despite our lack of knowledge of the exact aetiology at the time of resuscitation.

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The SRPC would like to express our support for all of those responding to COVID-19 who are committed to providing safe and quality care to patients across Canada.

We encourage all members to join the RuralMed and or Rural Anesthesia Listservs. A lot of good, detailed COVID-19 information has come from these email lists and has proven to be a great resource.

A working group with representatives from all the provinces and territories that have isolated fly-in communities has been formed to share concerns and offer advice.

We will keep you posted on further initiatives.

Together we can work towards keeping everyone connected, safe, and up to date.

Visit the SRPC.CA home page to find  
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## Country cardiograms case #67

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### QUESTION

A 63-year-old male patient presents to a rural British Columbia emergency room after developing chest pain, epigastric discomfort, nausea and sweating, while riding his all-terrain-vehicle. He has an ashen appearance and looks acutely ill. He has a number of positive risk factors for cardiovascular disease, including a previous stroke, treated hypertension, treated hyperlipidaemia and a pack-a-day smoking history of almost

50 years. Initial pulse rate of 68/min and blood pressure of 166/91 mm Hg are recorded. The chest is clear; there is no evidence of peripheral oedema or distended neck veins. A 12-lead electrocardiogram is immediately performed [Figure 1]. It shows an inferior ST-elevation myocardial infarction (STEMI). What else does it suggest, what further test is required to confirm this and what are the implications for the management?

For the answer, please see page 116

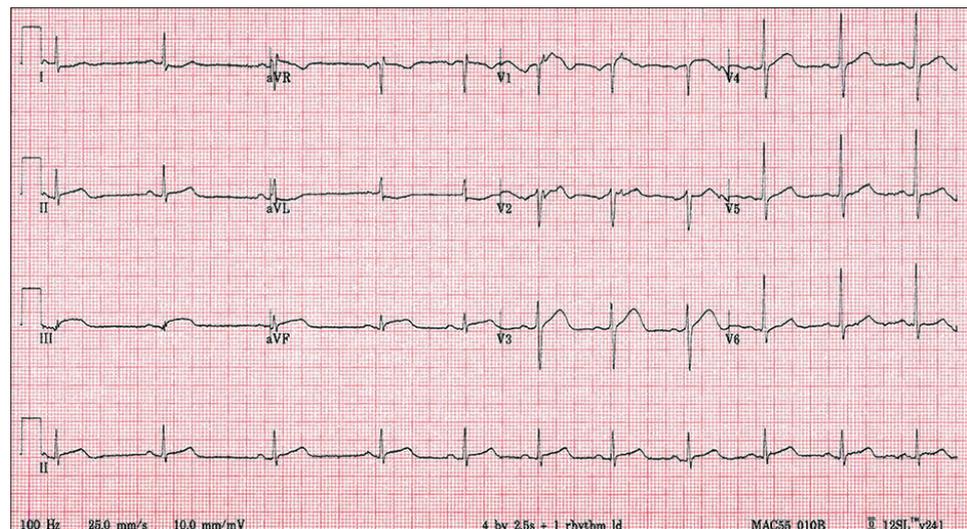


Figure 1: 12-Lead electrocardiogram of a 63-year-old male patient with chest pain.

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## Country cardiograms case #67: Answer

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The electrocardiogram (ECG) shown in Figure 1 displays marked sinus arrhythmia, with a mean rate of 63/min. PR interval is 0.16 s, QRS duration is 0.08 s, QT interval is normal and QRS axis is 35°. P-wave morphology is within the normal limits.

The obvious abnormality lies in the ST–T configuration. Coved ST-segment elevation is evident in the inferior leads, with as much as 2 mm of elevation in leads III and aVF, and about 1 mm of elevation in lead II. Reciprocal ST-segment depression is evident in leads I and aVL. In a patient presenting with severe chest pain, this provides strong evidence of inferior STEMI. In a rural setting, with an anticipated long transfer time to a tertiary centre, a rapid assessment is required to establish that there are no contraindications to thrombolysis, aiming for as short a ‘door-to-drug time’ as possible.

With any inferior myocardial infarction, there are a number of ST–T patterns that should be looked for, which can provide helpful information. ST-segment elevation is often seen in leads V5 and V6 and indicates the involvement of the lateral myocardial wall. ST-segment depression in leads V1–V3 (especially if associated with tall R waves and tall T waves) indicates posterior wall involvement. These patterns are consistent with the anatomy of the right coronary artery, for example, the posterior descending artery supplies the posterior wall of the left ventricle. Another arterial branch supplies the atrioventricular (AV) node and the Bundle of His, and evidence for AV

block should therefore also be sought on the ECG.

In addition, elevation in V1, although not as frequent a finding, can be the only suggestion on the 12-lead ECG of right ventricular myocardial infarction (RVMI), as this lead has the capacity to ‘face’ the right ventricle. In Figure 1, while there is unfortunately some artefact in V1 following the first two QRS complexes, there is nonetheless an impression of ST-segment elevation, and this is clearly evident after the third QRS complex. In all cases of inferior myocardial infarction, a 15-lead ECG is required, mostly to assess the possibility of RVMI in right-sided lead V4R (V8 and V9 are also used and can corroborate the presence of posterior STEMI, although these leads do not usually provide information not already available on the 12-channel ECG).

Attributing this pattern to RVMI in the context of inferior STEMI is much more plausible than suggesting a septal STEMI, which also causes ST-segment elevation in V1: branches of the right coronary artery supply the right ventricle, whereas the intraventricular septum is supplied by the left coronary artery. The presence of simultaneous acute pathology in both left right and left coronary arteries is extremely unlikely.

Figure 2 shows a 15-lead ECG that includes leads V4R, V8 and V9. Lead V4R shows a remarkable degree of ST-segment elevation, as much as 5 mm, providing unequivocal evidence of right ventricular STEMI. Slight ST-segment depression is evident in leads V8 and V9, which is

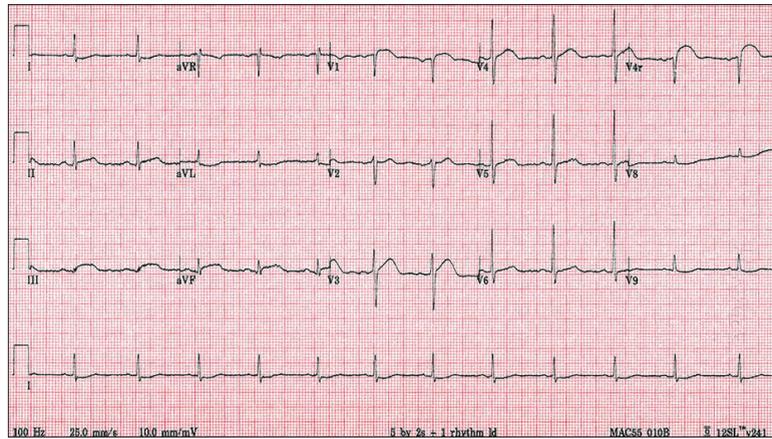


Figure 2: 15-Lead electrocardiogram, with leads V4R, V8 and V9.

essentially a reciprocal change of the ST-segment elevation which is clearly present in V1.

RVMI is an important condition to identify if it is present. In addition to the ECG findings, clinical features should be sought, including the triad of distended neck veins, clear lung fields and hypotension.<sup>1</sup> Its haemodynamic effects can readily be exacerbated by medications which are commonly used in the treatment of ischaemic chest pain, including nitroglycerin, morphine and beta blockers. Sublingual nitroglycerine, in particular, rapidly delivers a large drug dose, and its administration can lead to precipitous hypotension, bradycardia and syncope. The risk of this scenario provides a good rationale for first ensuring a functioning intravenous line. These patients are extremely 'volume sensitive' and respond well to boluses of intravenous fluid; inotropes may be required to treat hypotension.

RVMI occurs in up to 50% of cases of inferior myocardial infarction, although the ECG findings are seldom as dramatic as those shown in Figures 1 and 2.<sup>2</sup> Compared with cases of inferior myocardial infarction without RVMI, there is a 2.6-fold increase in mortality.<sup>3</sup> Every effort should therefore be made to provide definitive management (e.g., percutaneous coronary intervention) as soon as possible. In a rural or remote setting, thrombolysis remains an effective tool before emergency transfer to a facility capable of performing such intervention.

In this case, following prompt diagnosis, thrombolysis was administered. Substantial resolution of the ST-segment changes was observed, and the patient was airlifted to a major tertiary centre. Coronary angiography showed triple-vessel disease, including an 80% occlusion in the right

coronary artery. Three drug-eluting stents were placed. Nicotine replacement therapy was started.

A 15-lead ECG showing ST-segment elevation in V4R is usually considered to be necessary to diagnose RVMI and treat it appropriately, but, as shown in Figure 1, in some cases, RVMI can be diagnosed or strongly suspected on a 12-lead ECG. Depending on which type of ECG machine is used, the extra time taken to record a 15-lead ECG can vary. A rapid diagnosis of RVMI on a 12-channel ECG can therefore aid in avoiding inappropriate treatment and in preparing for the treatment with intravenous fluid boluses. Health care providers in the emergency room need to be familiar with the correct placement of leads for a 15-lead ECG.<sup>4</sup>

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## The occasional temporomandibular joint reduction

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### INTRODUCTION

Although uncommon, temporomandibular joint (TMJ) dislocation is a painful condition that requires prompt reduction due to its potential to compromise the airway, communication and eating. The TMJ is unique because it is the only joint in the human body that can dislocate without external force being applied to the patient. Dislocation of the TMJ can happen while yawning, eating and even kissing. TMJ dislocation is the displacement of the mandibular condyle from the mandibular fossa (also known as the glenoid fossa) so that it is unable to self-reduce.<sup>1</sup> A partial dislocation ('subluxation') of the TMJ often self-reduces.<sup>2</sup> A complete dislocation of TMJ is the sudden inability to close the jaw due to the anterior band of the articular disc mechanically obstructing the posterior translation of an anteriorly displaced condyle into the mandibular fossa.<sup>3</sup> A complete dislocation requires reduction.

### CLASSIFICATION

TMJ dislocation can be classified unilateral or bilateral, but unilateral dis-

locations are far more common.<sup>4</sup> They can be further categorised based on the movement of the mandibular condyle with respect to the mandibular fossa. The translation of the mandibular condyle during a dislocation most often occurs anteriorly,<sup>4,5</sup> and other directions of mandibular condyle translation (medial, lateral, superior and posterior) are rare and commonly associated with trauma.<sup>6,7</sup>

TMJ dislocations can further be described as acute, chronic protracted, or chronic recurrent. The appropriate treatment depends on correctly classifying the type of dislocation. Acute dislocation of the TMJ is a new-onset dislocation which occurs spontaneously or due to trauma,<sup>1</sup> chronic protracted arises from an acute dislocation that goes unrecognised and unreduced for longer than 1 month,<sup>8</sup> and chronic recurrent dislocation is characterised by repeated episodes of dislocation with daily activities over time.<sup>9</sup> Overall, acute unilateral anterior dislocation is the most common type of dislocation.

Figure 1 illustrates the normal structural anatomy of the TMJ (a) and the deviation of the structural

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anatomy present in a unilateral anterior dislocation(b).

### ETIOLOGY

Facial trauma, seizures, medication- induced dystonia and excessive mouth opening during yawning, laughing, vomiting, singing and iatrogenic mechanisms, namely dental procedures, endotracheal intubation, laryngoscopy and bronchoscopy, are classic mechanisms for TMJ dislocation.<sup>1,4,5,9,10</sup> Ehlers–Danlos syndrome, orofacial dystonia, myotonic dystrophy, multiple sclerosis and Marfan syndrome are medical conditions associated with an increased risk for TMJ dislocation<sup>1,4,5,11-15</sup> In many cases, underlying pathological imbalances in neuromuscular function and/or structural deficits can contribute to TMJ dislocation.<sup>1,5</sup> Unfortunately, patients who experience one TMJ dislocation are at risk of recurrence of the condition.

### CLINICAL FEATURES AND DIAGNOSIS

The diagnosis of TMJ dislocation is primarily based on a focused history and comprehensive clinical examination and it is confirmed by imaging studies.

A focused history should determine the duration of symptoms, potential causes and any history of TMJ dislocation or pathology.

The symptoms: severe pain in the pre-auricular region, limited jaw movements, impaired speech, decreased ability to chew and muscle spasms. Patients will often have trouble closing their mouths, drool, have difficulty speaking and may be anxious.

The signs: the mandibular condyle(s) will not be palpable within the mandibular fossa (s) and a preauricular depression or dimpling can often be palpated and visualised. If the dislocation is bilateral, the patient will present with an elongated

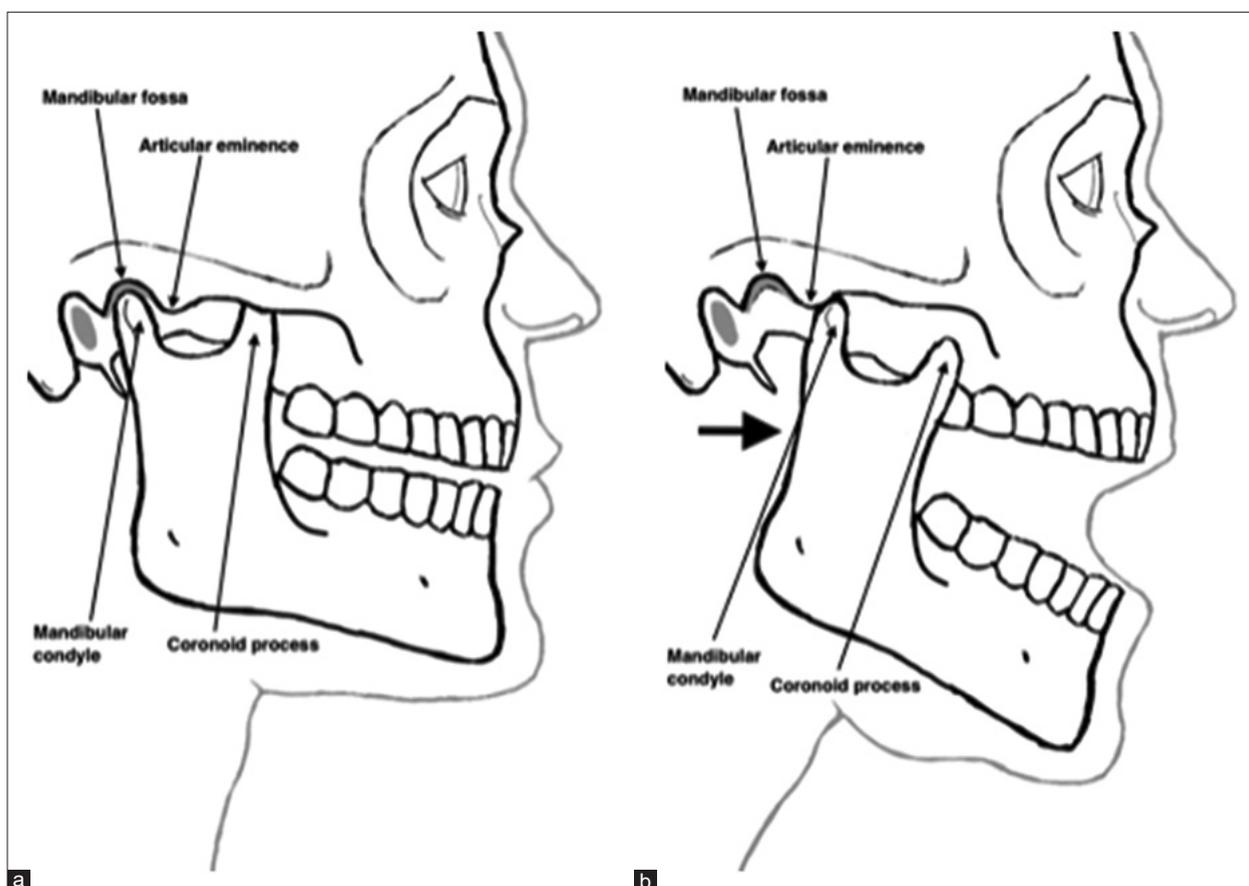


Figure 1: (a) Normal structural anatomy of the temporomandibular joint and (b) deviation of the anatomy present in an anterior unilateral temporomandibular joint dislocation. Adapted from Pendery, L, Mount Sinai Emergency Medicine. The Syringe Technique for TMJ Dislocation. <https://sinaiem.org/the-syringe-technique-for-tmj-dislocations/>. Published 2016. Accessed September 16, 2019.

face and a prognathic profile, with an anterior open bite and a loss of the height of the bite between the back teeth.<sup>16</sup> Patients with unilateral dislocation present with a deviated mandible (contralateral to the dislocated joint) and a crossbite.<sup>16</sup>

### Imaging

A panoramic X-ray can confirm the diagnosis of a dislocated TMJ.<sup>17,18</sup> If panoramic X-ray is unavailable, the following plain x-ray views can confirm the diagnosis: transpharyngeal, transcranial, reverse Towne and submental-vertex.<sup>17,18</sup>

If plain x-rays look normal, but a TMJ dislocation is still highly suspected, patients should be referred to a regional centre for craniofacial computed tomography (CT). A CT scan is the first-line imaging modality in the setting of traumatic dislocation in order to rule out a condylar fracture. A CT scan can also be used to look at degenerative in the TMJ in the setting of chronic dislocations.<sup>17</sup>

Magnetic resonance imaging is used to evaluate patients with persistent symptoms following an acute dislocation, those with chronic recurrent dislocations to evaluate for underlying degenerative changes or internal joint derangement,<sup>17,18</sup> or for those with a suspected open lock.<sup>5</sup>

### MANAGEMENT

Since the majority of clinical TMJ dislocations involve anterior translation of the mandibular condyle, this section will only discuss the management of acute, chronic protracted and chronic recurrent anterior TMJ dislocation. Reduction techniques for unilateral and bilateral TMJ dislocations are the same; for patients with a

bilateral dislocation, it is generally recommended to reduce one joint at a time.<sup>4</sup>

### Acute dislocation

Acute TMJ dislocations caused by trauma can be associated with concomitant injury, including head and cervical spine trauma and thus should not be reduced until the provider is confident that no other injuries (especially c-spine injuries) are present.<sup>6</sup> Although acute anterior TMJ dislocation is a painful condition, it is relatively easy to manage conservatively with analgesia and manual reduction.<sup>4,5</sup> However, the longer the mandible is dislocated, the more difficult it will be to reduce due to muscle spasm and the greater the risk of recurrence;<sup>4</sup> hence, the timely reduction is necessary.

An acute dislocation can be successfully reduced without adjunctive anesthesia or analgesia if there is manageable muscle spasm, pain and anxiety. If necessary, average-sized adult patients can be premedicated with diazepam 5–10 mg IV or midazolam 3–5 mg IV with an opioid such as fentanyl 0.5–1 mcg/kg IV.<sup>19</sup>

Local anesthesia can be administered as an alternative or an adjunct to general anesthesia to reduce pain and muscle spasm and facilitate reduction. A local anaesthetic (e.g. 2-5 mL of 2% lidocaine) can be injected into the affected joint(s) (behind the condylar neck approximately 1 cm below the articulating surface of the condyle to cause a auriculotemporal nerve block)<sup>4</sup> [Figure 2]; this may allow the joint to reduce spontaneously.

Different techniques have been described to manually reduce a TMJ dislocation, including the Hippocratic method, which is the most widely described technique, wrist pivot reduction, interdental block, gag technique.<sup>4,20-22</sup> Successful reduction techniques may vary from patient to patient, so multiple techniques may need to be performed.

Hippocratic method: See Table 1 for equipment needed in these procedures

1. Wrap each thumb with multiple layers of gauze.
2. Stand anterior to the seated patient at the 11 o'clock position. Place gauze-wrapped thumbs on the occlusal surface of the patient's molar or

**Table 1: Equipment needed**

IV diazepam or midazolam drawn up with a needle and syringe
Lidocaine 2%
Non-sterile gloves
Non-sterile 4x4inch gauze
5cc syringe
10cc syringe
tongue depressor
2 tensor bandages and 2 clips

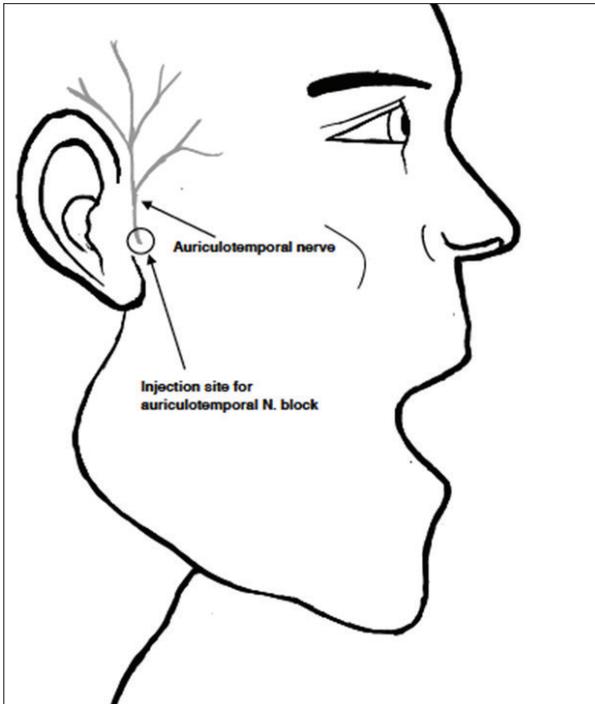


Figure 2: Local anaesthetic injection site for the auriculotemporal nerve block (behind the condylar neck approximately 1 cm below the articulating surface of the condyle to cause a auriculotemporal nerve block).<sup>4</sup>

retro-molar/ascending ramus and wrap fingers around the body of the mandible.

3. Apply a gentle downward constant force with increasing pressure to overcome the spastic muscles and distract the mandibular condyle from the anterior slope of the articular eminence. At the same time elevate the chin with your fingers and apply a constant posterior force to the mandible to reposition the mandibular condyle in the glenoid fossa<sup>4,21</sup> [Figure 3].

Wrist pivot reduction:

1. Stand anterior to the seated patient. Place both thumbs on the patient's chin. Place the second, third and fourth fingers of both hands bilaterally on the lower occlusive surfaces of the patient's molars.
2. While applying a gentle and constant upwards force with your thumbs on the patient's chin, exert a downwards pressure with your fingers on the patient's molars; this will cause a pivoting motion of the patient's mandibular condyle down the anterior slope of the articular eminence into the glenoid fossa<sup>22</sup> [Figure 4].

Syringe Technique:

1. Ensure the patient is seated. If possible, place a 5–10 cc syringe between the patient's upper and lower molars and ask them to bite down gently. The size of syringe depends on the patient's ability to open their mouth.
2. Ask the patient to roll the 5–10 cc syringe between their teeth to create a fulcrum between the syringe and their molars. If they are able to, the patient should continue to roll the syringe for a few minutes or until reduction is achieved; reduction typically occurs in <1 min.<sup>20</sup>

Gag technique:

1. Use a tongue depressor to trigger the patient's gag reflex. The gag reflex relaxes the muscles used to close the mouth, which can potentially allow for spontaneous reduction.<sup>25</sup> This technique is unlikely to be successful if is performed more than 30 min after the dislocation.<sup>24</sup>

Post-reduction management prevents recurrence of the condition and allows for the stretched or ruptured ligaments and capsule to strengthen and heal. If the patient is willing, a Barton bandage can be made out of elastic bandages and worn by the patient for 3–7 days to immobilise the TMJ<sup>4,19</sup> [Figure 5 and Table 1]. Alternatively, a cervical collar can be worn for 1 week to immobilise the TMJ.<sup>25</sup>

Barton bandage application:

1. Ensure the patient is seated. Begin by placing and holding one end of the tensor bandage 2 cm superior to the patient's right temporal fossa. While applying the bandage always ensure there is tension in the bandage.
2. Wrap the tensor bandage clockwise, circumferentially around the patient's head on an angle (so that the bandage angles down towards the patient's occiput and then back up above the left temporal fossa and along the forehead). Do this once.
3. Continue wrapping the bandage clockwise, circumferentially around the patient's head a second time. This time, once you return to the patient's right temporal fossa, proceed by wrapping down the patient's cheek, around the patient's chin and up towards the left temporal fossa along their left cheek.



Figure 3: Hippocratic reduction method for an anterior temporomandibular joint dislocation as described in text.<sup>4</sup>



Figure 4: Wrist pivot reduction method for an anterior temporomandibular joint dislocation as described in text.<sup>22</sup>



Figure 5: Barton bandage post-temporomandibular joint reduction management as described in text.<sup>4,19</sup>

4. Continue applying the bandage overtop of the patient's head towards the back of their right ear, around the base of their occiput, along the left side of their mandible.
5. Continue applying the bandage around the front of the patient's chin and towards the back of their head along the right side of their mandible.
6. To finish, once the bandage has returned to the patient's occiput, arc it anteriorly towards their left temporal fossa and anchor it with clips or tape to the underlying bandage.

The most important post-reduction management factor is for the patient to avoid opening their mouth wide for 1 week.<sup>4</sup> Food should be cut into small pieces to prevent excessive chewing during this time. Furthermore, if the patient anticipates a yawn, they should place a closed fist under their chin to prevent the mouth from opening widely. During the post-reduction phase, the pain medication should be used as needed.

### Chronic protracted dislocation

Muscle and joint fibrosis make a TMJ dislocation that has persisted for 3-4 weeks unlikely to respond to manual reduction.<sup>26</sup> Conservative techniques should, however, be attempted prior to referring the patient for surgery. Thus, the techniques outlined above can be attempted for a chronic protracted TMJ dislocation. Premedication is often required in these clinical situations.<sup>26,27</sup>

If manual reduction is unsuccessful, the patient should be referred to an oral maxillofacial (OMF) surgeon at a regional centre. Private OMF surgery clinics may offer necessary management options, but these may not be covered under provincial/territorial care plans and, thus, for many patients this will not be a feasible option. Many invasive techniques are outlined in the literature (open reduction, midline osteotomy, eminectomy, condylectomy, ramus osteotomies and total joint replacements) and the technique is best chosen by the surgeon.<sup>27,28</sup>

### Chronic recurrent dislocation

Chronic recurrent TMJ dislocations should initially be managed with manual reduction of

the TMJ. Patients whose TMJ dislocations fail to respond to conservative methods should be referred to regional centres to explore minimally invasive techniques (botulinum toxin injection, intermaxillary fixation, autologous blood injection, exogenous sclerosants and prolotherapy).<sup>26,27</sup> Finally, if conservative and minimally invasive techniques do not resolve recurrent dislocations, open surgical treatment may be indicated. Currently, eminectomy procedures are the most promising invasive techniques to manage recurrent TMJ dislocations.<sup>26,29</sup>

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

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**Conflicts of interest:** There are no conflicts of interest.

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## Steady on, Doc\*

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Resident Essay Award

**Y**ou spend your life like a buoy in medical school and residency; sitting atop the waves (perhaps getting submerged by a tall one or two) and letting the big ocean carry you wherever it does. It rolls and rolls, and the small line keeping you tethered stretches and sways, but there you sit.

You canvass a large academic hospital, middle of the day or late at night, and it is hard to feel at home. You rub your eyes, read the books, auscultate a heart and hear stories of those who suffer. You see someone far from your home, the name of their hometown obscure. You do not recognise it; you do not know it. You pack up, move on to another service. See all new people with all new names, new language and new forms. That little tethering line feels so fragile. What connects you, what keeps you steady?

As I packed up my car to travel for an elective far away to Western Newfoundland, I felt a physical pain in my chest. Off I went, from my snug apartment, a beloved pet and people I knew in St. John's. Stretch, stretch. The tether, my tether, stretched to capacity.

Across barrens, through rock cuts, glaringly out of place Micky Ds signs and the reduced speed limit of national parks, I go 800 or so kilometres. My

headlights dim mid trip, and I seek solace in a deserted convenience store. It is something electrical, I'm told by a strapping male who peers into the unknown (to me) parts of my ancient corolla. I'm left flustered. There is no near motel. I'm due to start my rotation tomorrow. 'Depending now on who you belongs to, we might help ya,' I hear from someone who in the end does not know who I belong to, but decides to help out anyhow. I end up sandwiched between the two trucks, and we make our way caravan style across the twisty remaining turns of the journey. I learn about a 'triple triple' at a pit stop and notice that thanking those who believe their generosity is common place is harder than I thought. The trucks salute joyful horns as they head towards the ferry, once we've reached the end, and I turn in for town.

They called it 'mouse island,' a tiny part of Port Aux Basques. A small apartment, two-bedroom. I was alone, front windows like dark eyes reflecting my headlights when I pulled in. I could feel the hum of wind as small snowflakes surrounded me as I pulled my meagre belongings into the cold hallway. There was a bag of salt and a small shovel, heralding weather to come. Stretch, stretch, as I look at the desolate coves from my window and wonder how these 2 months will go.

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I'm broken from my rather mournful reverie with a thump on the door. I imagine there are not enough people in this place for there to be bad seeds on the prowl, so I open it. There is no one there. I do a cursory look, right to left. As I turn, a yeti appears. On closer inspection – a kind middle-aged male with a beard covered in snow smiling from the dark. My inner fear must have betrayed me, as I hear 'steady on, doc, just making sure you're making in alright'. He holds an extra shovel, and asks if I have icers for my shoes, as the lady up the road fractured her wrist last week from a fall. To help, he tells me to park my car close to 'the bridge'.

I feel a bit chastised; not realising my car was wrongly parked. I utter thanks, mentally thinking of where this bridge might be and I close my door. Look around at small sofa, clean kettle and sparse decor. Stretch, stretch. The unfamiliar hurts.

I become familiar with the nearest bridge, which is a 10-min walk. Although there are parking lots along the way, some in front of abandoned buildings, I stay true to the advice. I put my icers on. I see a person twice in 1 week, in clinic and at the grocery store, and find myself wrapped in a hug as they proclaim to curious onlookers at Coleman's that I'm new here. At the pharmacy, I find myself helped with a hairspray (unsolicited) to 'tame those frizzies in front' and someone loans me a quarter so I do not have to break a five dollar bill.

I have started to notice my heart does not hurt as much. The telephone calls home are still hard, and the loneliness seems worse in the night, but there is joy here. Something is happening. Tighten, tighten.

On a cold winter's night, the snow tumbles down. It is stormy, and the wind puts me in the centre of a snow globe. The university is closed; we students are urged to use caution and proceed to work if safe. I get a call from the emergency, 'are you coming?' It's busy, there are people to

see. Taking the little shovel and bag of salt, out I go. After too much time, it's clear I'm stuck. The ol 'put er in neutral and run at er' fails me. I call back, they understand. 'Make it if you can'. I rummage in my trunk; two clean snowshoes surprised to see me are pulled out. It's not a short journey to the health centre, but it's doable. I wade out into the snow, but it's blowing all around. Defeated.

Little orbs of yellow come down the road, and I peer into the snow. It's the Royal Canadian Mounted Police (RCMP) making their way. Then, it hits me. Why not just call the police and see if they could help me? I have the number of a kind officer, could he come fetch me? Not soon after, I hear the friendly beep of the cruiser and find myself in the back for the first (and so far, last) time. I'm asked why my car was so far away. I relate the bridge advice. The officer laughs as he explains that 'bridge' means porch. Good to know several weeks in. Dropped off at the main doors of the hospital, I look around covertly. Imagine, the lady doctor dropped off at the door fresh out of the paddy wagon. Scandalous.

Inside, I meet sore throats, chest pain and delirium. See wet coats and snowy shoes, concerned faces and worry. See names I now recognise, from places I visited on my weekends off. One community of <100 people I had flown into through helicopter for a clinic. The shared joy of knowing where one 'belongs to' is a wondrous thing.

In the morning, the sky is clear and air is cold. I trot home lazily; looking around at all the houses neatly tucked in in their beds of snow. Wave hello to everyone who is out shovelling, stopping briefly to offer a hand but it is declined on all counts, one claiming that 'the day I cannot shovel, take me away'.

I look around at the beautiful place; once unfamiliar. No hurts in my heart. My tethers strong and firmly attached. I'll steady on.

## Could it be COVID-19? Atypical presentations in a pandemic

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Dear Editor,

We write in the midst of the COVID-19 global pandemic to share and stimulate discussion on the diagnostic challenge presented by novel coronavirus. The diverse and atypical symptoms attributed to COVID-19 infections require a high degree of suspicion in almost all patient presentations.<sup>1-3</sup> This clinical ambiguity is amplified in the face of testing limitations,<sup>4</sup> with delays in results and poor sensitivity, as well as atypical presentations of other conditions, as we encountered in this case.

Recently, a patient in their sixties arrived by emergency medical services to our rural hospital. They presented with agitation and delirium of such severity that the administration of both chemical and physical restraint was required for ambulance egress. The patient was febrile (37.9), tachycardic (110), normotensive, normopneic (SpO<sub>2</sub> 96%) with convincing cellulitis of the leg. Collateral history identified no preceding sick contacts or travel, and a history of fibromyalgia with no routine medication use.

After initial assessment in the negative pressure room, the patient was admitted to hospital with (1) droplet precautions, (2) IV fluids and (3) IV antibiotics for cellulitis.

Altered sensorium persisted; head CT was negative. Blood and urine cultures, toxicology, chest X-ray [Figure 1], electrocardiogram and troponin were negative. The delirium lingered 4 days into admission while, interestingly, the fever resolved, and cellulitis, neutrophilia and markedly elevated CRP were decreasing. The possibility of atypical presentation of COVID-19 infection was again considered; nasopharyngeal swab however proved negative.

On day 5, the patient developed a new fever of 38.7 degrees, prompting repeat investigations and a second COVID-19 swab. Chest X-ray [Figure 2] showed new patchy ground-glass left-upper lobe pneumonia. An oral macrolide was added along with salbutamol and tiotropium in light of the patient's 15 pack-a-year smoking history.

The patient's respiratory status declined slightly in the following day with new cough, exertional shortness of breath and decreasing oxygen saturation to 92% on room air. A third chest X-ray [Figure 3] suggested multifocal pneumonia with COVID-19 in the differential. Fortunately, the patient improved over the ensuing 2 days; however, discharge preceded the results of the second COVID-19 swab, which,

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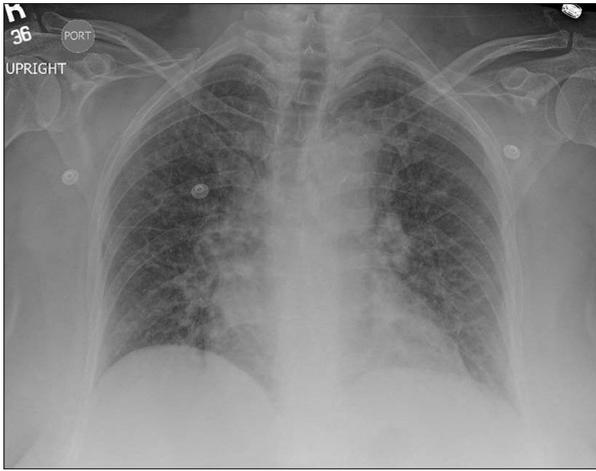


Figure 1: Portable chest X-ray with no focal abnormalities.

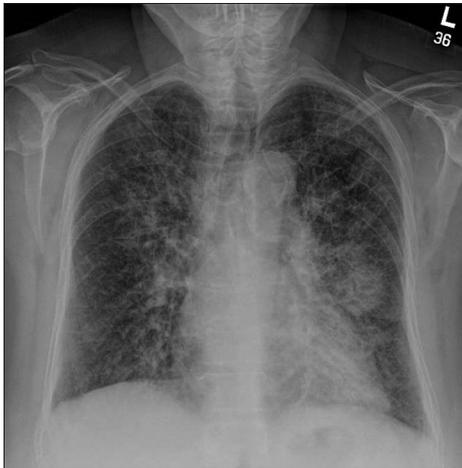


Figure 2: Chest X-ray with evidence of the left upper lobe pneumonia.



Figure 3: Portable chest X-ray with findings of multifocal pneumonia.

ultimately, proved to be negative. Given the clinical possibility of COVID-19 (1) public health was involved in discharge planning and (2) hospital

occupational health was alerted to ensure that staff surveillance occurred if deemed appropriate.

The COVID-19 pandemic has made clinical decision-making challenging. This case demonstrates the importance of a high index of suspicion in admitted non-COVID-19 patients, and repeated appropriate investigations to assist in further clarifying diagnoses. It raises the question of how best to manage patients who, during a pandemic, have clinical findings very suggestive of a contagious disease but have negative and/or pending swabs on discharge, and unconvincing contact or travel history within the context of increasing community spread.

Clinical management in the face of diagnostic uncertainty is something we understand well in rural and remote settings. In the absence of confirmatory testing, treatment decisions during a pandemic must be made that ensure patient and community well-being. In our case, consultation with public health helped guide outpatient management and follow-up of this patient with COVID-19-like atypical pneumonia – at their recommendation, the patient was instructed to remain in self-isolation until 24 h symptom free. It will be important for rural clinicians to share strategies and challenges in this evolving clinical landscape, as COVID-19 considerations continue to permeate most aspects of care.

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## Need for organised human involvement to produce rural physicians

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Dear Editor,

In the review recently published by Asghari *et al.*,<sup>1</sup> the factors influencing the recruitment and retention of rural physicians were divided into three categories: personal background, medical training and practical conditions. These factors were also each divided into an additional three categories: pre-medical school, medical school and post-medical school stages.<sup>1</sup> Our University, Jichi Medical University (JMU), Japan, was established in 1972 to improve the health and well-being among medically underserved areas. JMU has produced rural physicians and dispatched them nation-wide.<sup>2,3</sup> While the students who enter JMU take out medical school loans to cover their studies, they are exempt from repaying the loans provided they work for public medical institutions, including those in rural/remote areas, in their home prefectures for 9 years (the period required for repayment). Almost all physicians (approximately 97% of 3203 physicians) graduating from JMU fulfil their obligatory work assignment during the required period.

The factors categorised by Asghari *et al.*<sup>1</sup> are felt to be well arrayed, and

indeed, JMU follows most of the categorised factors of medical training in medical school and post-medical school stages, as well as parts of the categorised factors, regarding the practical conditions (i.e. generalism, work and community environment and loan payment).

We would like to add our comments concerning a potentially important factor of the medical and post-medical school stages in our experience, as the factor was not much described in the review (as one of the practical conditions).<sup>1</sup> According to the unique system of JMU, a few students enter the school's program from their home prefecture and return to the prefecture after graduating as a physician.<sup>2</sup> In the medical school stage, all students live in dormitories. In the residential organisation, students not only form a network of comrades but also have associations between junior and senior students in the same home prefecture. At the post-medical school stage, they work with those associations in the same prefecture. Moreover, they systematically discuss their carrier paths and receive mentoring from administrative officers of their home prefecture governments, as well as from tutorial teachers of

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JMU assigned to each prefecture. The officers and tutorial teachers occasionally hold meetings with the prefecture and JMU. Based on JMU's history, the efforts of not only individuals, but also various types of organised human involvement, can be used as a factor to increase the number of students/physicians working in medically underserved areas.

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## FELLOWSHIP OF RURAL AND REMOTE MEDICINE OF THE SRPC

For more details about SRPC rural awards visit <https://srpc.ca/awards>

# Canadian Military Families Need Your Help!



## Did You Know?

Canadian military families are not eligible to access health care through the Department of National Defence.

Military families move frequently and are required to find a family doctor in their new community on their own.

Join the Military Family Doctor Network for a chance to give back to those who serve and protect our country.

We are in particular need  
of family doctors in:  
Greenwood, NS

Call: 1-877-633-7722 x 550  
Email: [mfdn@primacy.ca](mailto:mfdn@primacy.ca)



# JOIN US

ON ZOOM  
EVERY OTHER  
SUNDAY NIGHT

## SRPC KITCHEN PARTY



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