Occurrence of and referral to specialists for pain-related diagnoses in First Nations and non–First Nations children and youth

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ABSTRACT

BACKGROUND: Indigenous youth have higher rates of chronic health conditions interfering with healthy development, including high rates of ear, dental, chest and musculoskeletal pain, as well as headache, arthritis and mental health issues. This study explores differences in pain-related diagnoses in First Nations and non–First Nations children.

METHODS: Data from a study population of age- and sex-matched First Nations and non–First Nations children and youth were accessed from a specific region of Atlantic Canada. The primary objective of the study was to compare diagnosis rates of painful conditions and specialist visits between cohorts. The secondary objective was to determine whether there were correlations between early physical pain exposure and pain in adolescence (physical and mental health).

RESULTS: Although ear- and throat-related diagnoses were more likely in the First Nations group than in the non–First Nations group (ear 67.3% v. 56.8%, p < 0.001; throat 89.3% v. 78.8%, p < 0.001, respectively), children in the First Nations group were less likely to see a relevant specialist (ear 11.8% v. 15.5%, p < 0.001; throat 12.7% v. 16.1%, p < 0.001, respectively). First Nations newborns were more likely to experience an admission to the neonatal intensive care unit (NICU) than non–First Nations newborns (24.4% v. 18.4%, p < 0.001, respectively). Non–First Nations newborns experiencing an NICU admission were more likely to receive a mental health diagnosis in adolescence, but the same was not found with the First Nations group (3.4% v. 5.7%, p < 0.03, respectively). First Nations children with a diagnosis of an ear or urinary tract infection in early childhood were almost twice as likely to have a diagnosis of headache or abdominal pain as adolescents (odds ratio [OR] 1.9, 95% confidence interval [CI] 1.1–3.0, and OR 1.7, 95% CI 1.2–2.3, respectively).

INTERPRETATION: First Nations children were diagnosed with more pain than non–First Nations children, but did not access specific specialists or mental health services, and were not diagnosed with mental health conditions, at the same rate as their non–First Nations counterparts. Discrepancies in pain-related diagnoses and treatment are evident in these specific comparative cohorts. Community-based health care access and treatment inquiries are required to determine ways to improve care delivery for common childhood conditions that affect health and development.
From an Indigenous perspective, well-being and health are conceptualized from 4 dimensions: mental, physical, spiritual and emotional. However, given that health care data capture only physical and mental health diagnoses, these are the dimensions focused on in this study. Both physical pain and mental health conditions, and their relation to each other, are of substantial concern within the Indigenous population, given that Health Canada reports First Nations youth are 5–7 times more likely to commit suicide than non–First Nations youth. There is also evidence of a connection between physical and mental health. For example, Indigenous children who reported having dental pain within the previous month were more likely to report poor mental health (specifically, depression), lower school-attendance rates and learning problems at school. Additional adverse outcomes associated with poorly managed pain and repeated pain exposure include interference with sleep, healthy development and academic performance.

Data are lacking on the proportion of First Nations versus non–First Nations children accessing treatment for pain-related conditions and appropriate follow-up specialist care. The primary objective of this retrospective cohort study was to compare the proportion of First Nations and non–First Nations children and youth who accessed care and specialist treatment for painful conditions over a 17-year period. Our secondary objective was to examine the likelihood of experiencing pain in adolescence (e.g., headache or abdominal pain) or a mental health diagnosis based on early exposure to any of the pain conditions studied.

Methods

Participants
We examined 2 cohorts of participants. A First Nations client linkage registry was used to identify our First Nations study cohort. This registry includes the provincial health card numbers of all individuals who are members of 5 First Nation communities in a specific region of Atlantic Canada. All people born between Apr. 1, 1997, and Mar. 31, 2015, were selected for inclusion in the First Nations cohort. The comparison population was a cohort of individuals who were not in the First Nations registry (i.e., non–First Nations) matched by age and sex and chosen from the same region (identified by postal code) as the 5 included First Nation communities. The non–First Nations group was selected from the Nova Scotia Patient Registry. We used a “greedy” approach to complete exact age or sex matching, whereby the non–First Nations children were ordered randomly within each age or sex grouping and the first observation was selected for each First Nations match.

Data extraction
Data on health care use for both cohorts were extracted from 3 databases: the Discharge Abstract Database (DAD) administered by the Canadian Institute for Health Information, physician billings (i.e., claims) data administered by the Medical Services Insurance program (Medavie Blue Cross), and the Nova Scotia Atlee Perinatal Database (NSAPD), which includes diagnosis and procedure information for newborn admissions.

We used deterministic linkage (i.e., exact matching based on a unique identifier in both data sources) to join all data sets with an encrypted provincial health card number as the linking variable.

Health care use data
We used the term “pain indicator” to refer to either a diagnosis of “pain” or a diagnosis of a common physically painful condition or experience, identified based on a literature review as well as community and pain-expert consultations. The list includes items such as diabetes, fractures, dental conditions, ear infection and neonatal intensive care unit (NICU) admission. Admission to the NICU was a proxy measure for a pain event in early life because newborns admitted to the NICU experience many painful procedures meant to preserve their health and well-being.

An individual was identified as having a pain indicator by scanning all diagnostic variables in the DAD and billings data. International Classification of Diseases (ICD) codes (revisions 9 and 10) were used in both databases to distinguish the health conditions. We established a crosswalk between the versions from an online conversion tool (www.icd10codesearch.com).

An individual was identified as having a mental health condition if they had 1 or more physician visits or hospital admissions for a reason related to mental health within 365 days. This definition is based on Health Canada’s approach, which uses the Canadian Chronic Disease Surveillance System (CCDSS) definition of a mental health condition. This is a stricter definition and excludes those with an initial diagnosis only (i.e., possible condition).

The database accessed for health care use did not include items such as service availability, distance to care, income, housing and family history.

Statistical analysis
We performed χ² tests to compare the proportion of First Nations and non–First Nations children who had a diagnosed pain indicator, mental health condition or saw a specialist. Cohort groups were also stratified by age (childhood: ≤9 yr; adolescence: 10–17 yr) to determine whether there were differences in the proportion of First Nations and non–First Nations youth presenting with early pain indicators and subsequent diagnoses later in life. We ran multivariate logistic regression analyses to determine the associations between pain indicators in early childhood and the presence of a mental health diagnosis in adolescence. To test for associations between early pain indicators and long-term physical symptoms, such as headaches and abdominal pain, we included all indicators in a single model to test for individual effects accounting for other diagnoses. We ran separate models for the First Nations and non–First Nations cohorts. SAS version 9.1.3 SP4 (E9BX01) was used for analysis.

Ethics approval
The First Nations cohort of the study population was drawn from a unique client linkage registry, held in trust by First Nation communities, in keeping with the Ownership, Control, Access and Possession (OCAP) principles. The OCAP principles, developed

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by the First Nations Information Governance Centre, ensure that First Nations maintain ownership, control, access and possession of their data.\textsuperscript{37} Community and hospital ethics approvals, as well as data access and community health director approvals, were obtained.

**Results**

The final study population resulted in 2631 individuals aged 17 years and younger as of fiscal year 2014 in each cohort. A subsample of 2205 observations in each group was linked to the NSAPD.

**Early pain indicators**

Of the 13 physical pain indicators explored, the First Nations cohort (age ≤ 17 yr) had significantly more diagnoses for 10 indicators compared with the non–First Nations cohort (Table 1). The First Nations cohort had significantly fewer mental health diagnoses, however (Table 1). Similar results were found when the groups were stratified by age (Table 2). The proportion of First Nations children in both age ranges diagnosed with diabetes was significantly higher than that of the non–First Nations cohort (≤ 9 yr, First Nations 1.4 v. non–First Nations 0.7, \( p = 0.049 \); 10–17 yr, First Nations 5.3 v. non–First Nations 2.4, \( p = 0.002 \)). One difference in the age-stratified cohort analysis was that, among adolescents, the First Nations cohort had significantly more diagnoses of fractures than the non–First Nations cohort (\( p = 0.03 \)), but no difference was noted between the early childhood cohorts (\( p = 0.1 \)). Overall, 93.6\% of the First Nations cohort experienced at least 1 physical pain indicator compared with 85.5\% of the non–First Nations cohort (\( p < 0.001 \)).

The 4 pain indicators with the highest percentage of diagnoses for both groups were throat, ear, dental and headache. Although throat and ear conditions were diagnosed significantly more in the First Nations cohort, this group was significantly less likely to see a specialist after these diagnoses (12.7\% v. 16.1\% and 11.8\% v. 15.5\%, respectively; \( p < 0.001 \) for both; Table 3). Dental and headache diagnoses, as well as subsequent specialist visits, were both significantly more likely among the First Nations cohort compared with the non–First Nations cohort (Table 3).

For the newborn subsample (\( n = 2205 \) for each cohort), there were no significant differences between First Nations and non–First Nations newborns for 9 of the 11 indicators studied (Table 4). The First Nations cohort was significantly more likely to be admitted to the NICU (24.4\% v. 18.4\%, \( p < 0.001 \)), yet gestational age at birth was not significantly different between the groups (data not shown).

**Prediction of later pain and mental health conditions**

First Nations newborns who experienced an NICU admission were twice as likely as those who did not experience this admission to be diagnosed with a chronic ear condition in childhood or adolescence (6.0\% v. 3.1\%, \( p = 0.002 \)). Non–First Nations newborns who experienced a pain indicator were more likely to receive a mental health diagnosis later in life than those not admitted (3.4\% v. 5.7\%, \( p < 0.03 \)). Non–First Nations children diagnosed with pain or an infection, abdominal pain, arthritis or urinary tract infection at the age of 9 years and younger were significantly more likely than other non–First Nations children without these indicators to receive a mental health diagnosis during adolescence (10–17 yr; Table 5). For First Nations children, the only significant association between early pain experience and a mental health diagnosis in adolescence was for burns; all other indicators were not significant (Table 5).

Associations between an early pain diagnosis (age ≤ 9 yr) and probability of a diagnosis of headache or abdominal pain in adolescence (10–17 yr) was also explored. First Nations children with a diagnosis of an ear or urinary tract infection in early childhood were almost twice as likely to have a diagnosis of headache or abdominal pain as adolescents (odds ratio [OR]

### Table 1: Occurrence of any diagnosed physical pain indicator or mental health condition since birth

| Pain indicator or mental health diagnosis | First Nations, % \( n = 2631 \) | Non–First Nations, % \( n = 2631 \) | \( p \) value* |
|------------------------------------------|-------------------------------|---------------------------------|---------------|
| Diabetes                                 | 2.8                           | 1.3                             | < 0.001       |
| Fracture                                 | 11.5                          | 9.4                             | 0.01          |
| Burn                                     | 6.3                           | 3.5                             | < 0.001       |
| Wound                                    | 21.1                          | 16.2                            | < 0.001       |
| Viral or other intestinal infection       | 25.8                          | 16.7                            | < 0.001       |
| Location of pain                         |                               |                                 |               |
| Abdomen or pelvis                        | 0.7                           | 0.6                             | 0.7           |
| Throat (infection)                       | 89.3                          | 78.8                            | < 0.001       |
| Ear (infection)                          | 67.3                          | 56.8                            | < 0.001       |
| Dental (condition or infection)          | 41.4                          | 23.8                            | < 0.001       |
| Urinary tract (infection)                | 21.6                          | 17.9                            | < 0.001       |
| Head (headache)                          | 32.9                          | 23.6                            | < 0.001       |
| Joints (arthritis)                       | 0.3                           | 0.5                             | 0.4           |
| Nonspecific                              | 2.0                           | 2.6                             | 0.2           |
| Any physical indicator                   | 93.6                          | 85.5                            | < 0.001       |
| NICU admission, \( n = 2205 \)           | 24.4                          | 18.4                            | < 0.001       |
| CCDSS mental health diagnosis            | 2.0                           | 3.7                             | < 0.001       |

Note: CCDSS = Canadian Chronic Disease Surveillance System, NICU = neonatal intensive care unit.

*\( p \) value for difference between each group (logistic).
1.9, 95% confidence interval [CI] 1.1–3.0, and OR 1.7, 95% CI 1.2–2.3, respectively). Non–First Nations adolescents diagnosed with a urinary tract infection in early childhood were also more likely to have headaches or abdominal pain in adolescence compared with those without a urinary tract infection (OR 1.5, 95% CI 1.1–2.2).

Interpretation

Our findings indicate that First Nations newborns, children and youth experience higher amounts of pain than their non–First Nations counterparts as measured by health care use data. A higher proportion of First Nations children sought treatment for 10 of 13 pain indicators, and results were consistent among subsamples of younger and older age groups. Our findings show a higher number of NICU admissions, diagnoses of dental and ear conditions, headache, burns, diabetes, wounds and fractures in the First Nations cohort when compared with an age- and sex-matched non–First Nations cohort. The presence of a physical pain diagnosis in childhood was related to a mental health diagnosis in adolescence, but only in the non–First Nations cohort.

Previous research has reported similar health disparities. From as early as infancy, First Nations children experience substantial exposure to painful events. The current study identified higher rates of NICU admissions among First Nations newborns compared with non–First Nations newborns, and additional research supports this finding. Oster and colleagues found that First Nations newborns were more likely to be admitted to the NICU for hypoglycemia related to maternal diabetes. Research conducted in Canadian NICUs indicates newborns undergo an average of 11 painful procedures per day, and infants with hypoglycemia require frequent blood sampling for glucose monitoring.

High rates of ear and dental condition diagnoses were evident in this study’s First Nations cohort. These findings align with those of other research pertaining to Indigenous children’s health showing high rates of dental conditions, inadequate access to dental care and high rates of chronic ear infections. Lower percentages of visits to ear- and throat-related specialists among the First Nations cohort compared with the non–First Nation cohort was an unexpected result considering the higher percentage of diagnoses for related conditions.

Our data set allowed us to explore the relation between early pain experience and the likelihood of a mental health diagnosis.

| Table 2: Occurrence of any diagnosed physical pain indicator or mental health condition since birth, stratified by age |
|---------------------------------------------------------------|
| Pain indicator or mental health diagnosis | Age ≤ 9 yr | | | Age 10–17 yr | | |
| | First Nations, % | Non–First Nations, % | p value* | First Nations, % | Non–First Nations, % | p value* |
| Diabetes | 1.4 | 0.7 | 0.049 | 5.3 | 2.4 | 0.002 |
| Fracture | 5.5 | 4.4 | 0.1 | 22.5 | 18.6 | 0.03 |
| Burn | 3.6 | 2.3 | 0.03 | 11.1 | 5.5 | < 0.001 |
| Wound | 13.6 | 9.9 | < 0.001 | 35.0 | 27.7 | < 0.001 |
| Viral or other intestinal infection | 22.6 | 13.9 | < 0.001 | 31.7 | 21.9 | < 0.001 |
| Location of pain | | | | | | |
| Abdomen or pelvis | 0.2 | 0.5 | 0.3 | 1.5 | 0.9 | 0.2 |
| Throat (infection) | 84.2 | 72.5 | < 0.001 | 98.6 | 90.4 | < 0.001 |
| Ear (infection) | 57.4 | 48.2 | < 0.001 | 85.8 | 72.5 | < 0.001 |
| Dental (condition or infection) | 32.8 | 18.4 | < 0.001 | 57.3 | 33.9 | < 0.001 |
| Urinary tract (infection) | 16.0 | 13.3 | 0.02 | 31.7 | 26.4 | 0.01 |
| Head (headache) | 23.0 | 14.3 | < 0.001 | 50.7 | 39.9 | < 0.001 |
| Joints (arthritis) | 0.2 | 0.2 | 0.7 | 0.5 | 0.9 | 0.4 |
| Nonspecific | 0.8 | 0.8 | > 0.9 | 4.2 | 5.8 | 0.1 |
| Any physical indicator | 90.6 | 80.9 | < 0.001 | 99.2 | 93.9 | < 0.001 |
| CCDSS mental health diagnosis | 0.6 | 2.0 | < 0.001 | 4.5 | 6.6 | 0.045 |

Note: CCDSS = Canadian Chronic Disease Surveillance System. *Indicates p value for difference between each group (logistic).
in adolescence. We found evidence of an association between these factors only in the non–First Nations cohort, which is in contrast to the literature identifying high rates of mental health conditions and suicide rates among Indigenous youth.5,6,16,45,46 Research has found that Indigenous youth with chronic health conditions; feelings of depression; and a reduced sense of mental, emotional and spiritual balance were 35% less likely to access treatment compared with those without chronic health conditions.5 A connection between early pain experiences and later mental health diagnoses in the First Nations cohort was not found in this study. This is likely due to several external factors known to affect access to mental health services and corresponding diagnoses, including proximity to services and long wait times,47 which in this region average 157 days for youth.48 These are longstanding and known issues requiring meaningful engagement of communities to determine timely and relevant solutions.

Limitations
The study participants could not all be matched to the NSAPD, resulting in a subsample of 2205 participants in each cohort with accessible neonatal health data. This is an expected outcome owing to different administration of data sets, which can lead to the inability to match all identifiers. In addition, the data represent 2 cohorts of retrospective data for a particular region of Atlantic Canada and may not be generalizable to other regions. Limitations also exist regarding the data accessed. Data on health care use provide only information regarding visits to health professionals and do not provide insight into times when individuals choose not to access care or are unable to access care. Covariates such as service availability, distance to care, income, housing and family history were not included in this study.

Conclusion
Our results suggest that First Nations children from this region in Canada are experiencing higher amounts of most pain indicators compared with non–First Nations children, and are often less likely to see associated specialists for the most common conditions. Mental health diagnoses for First Nations children are surprisingly low compared with those of non–First Nations children, leading to questions about timely diagnoses and access to treatment. Given the profound lingering impact of colonization, First Nations newborns, children and youth are a group requiring high-priority designation to create policies to improve access to health services focusing on pain and mental health assessment, management and follow-up. Action should be taken to better
understand how to improve pain care from an Indigenous health perspective, recognizing the structural determinants of health in an effort to reverse the trends of lack of treatment, and to improve the health and developmental outcomes consistent with the standard for non–First Nations children.

References
1. Aboriginal peoples in Canada: key results from the 2016 Census. Ottawa: Statistics Canada; 2017. Available: www150.statcan.gc.ca/n1/daily-quotidien/171025/dq171025a-eng.htm (accessed 2018 Aug. 8).
2. Wilk P, Cooke M, Stranges S, et al. Reducing health disparities among Indigenous populations: the role of collaborative approaches to improve public health systems. Int J Public Health 2018;63:1-12.
3. Greenwood M, de Leeuw S, Lindsay NM, et al., editors. Determinants of Indigenous Peoples' health in Canada: beyond the social. Toronto: Canadian Scholars’ Press Inc.; 2015.
4. An overview of Aboriginal Health in Canada. Prince George (BC): National Collaborating Centre for Aboriginal Health; 2013. Available: www.cnsa-nccah.ca/docs/context/FS-OverviewAboriginalHealth-EN.pdf (accessed 2018 Aug. 8).
5. National report of the First Nations Regional Health Survey: Phase 3 — Volume 1. Akwesasne (ON): First Nations Information Governance Centre; 2018.
6. First Nations Regional Health Survey (RHS) 2008/10: national report on adults, youth and children living in First Nations communities. Akwesasne (ON): First Nations Information Governance Centre; 2012. Available: http://fnigc.ca/sites/default/files/First_Nations_Regional_Health_Survey_2008-10_National_Report.pdf (accessed 2017 Nov. 8).
7. Leake J, Jozzy S, Usowak G. Severe dental caries, impacts and determinants among children 2–6 years of age in Inuvik Region, Northwest Territories, Canada. J Can Dent Assoc 2008;74:519.
8. Rhee H. Racial/ethnic differences in adolescents’ physical symptoms. J Pediatr Nurs 2005;20:153-62.
9. Rhee H. Prevalence and predictors of headaches in US adolescents. Headache 2000;40:529-38.
10. Buchwald D, Goldberg J, Noonan C, et al.; AI-SUPERPFP Team. Relationship between post-traumatic stress disorder and pain in two American Indian Tribes. Pain Med 2005;6:72-9.
11. Mauldin J, Cameron HD, Jeantotte D, et al. Chronic arthritis in children and adolescents in two Indian health service user populations. BMC Musculoskelet Disord 2004;5:30.
12. Schroth RJ, Smith PJ, Whalen JC, et al. Prevalence of caries among preschool-aged children in a northern Manitoba community. J Can Dent Assoc 2005;71:27.
13. The state of knowledge of Aboriginal health: a review of Aboriginal public health in Canada. Prince George (BC): National Collaborating Centre for Aboriginal Health; 2012. Available: www.cnsa-nccah.ca/docs/context/RPT-StateKnowledgeReview-EN.pdf (accessed 2018 Aug. 8).
14. McShane K, Smylie J, Adomako P. Health of First Nations, Inuit and Métis children in Canada. In: Smylie J, Adomako P, editors. Indigenous children’s health report: health assessment in action. Tokyo: Keenan Research Centre, The Centre for Research on Inner City Health and Li Ka Shing Knowledge Institute; 2009.
15. First Nations perspectives on health and wellness. West Vancouver (BC): First Nations Health Authority; 2018. Available: www.fnha.ca/wellness/wellness-and-the-first-nations-health-authority/first-nations-perspective-on-wellness (accessed 2018 Aug. 8).
16. Suicide prevention. Ottawa: Health Canada; modified 2018 Mar. 27. Available: www.canada.ca/en/indigenous-services-canada/services/first-nations-inuit-health-health-promotion/suicide-prevention.html (accessed 2018 Aug. 16).
17. Perquin CW, Hazebroek-Kampschreur AAJM, Hunfeld JAM, et al. Pain in children and adolescents: a common experience. Pain 2006;17:51-8.
18. Haraldstad K, Barum R, Eide H, et al. Pain in children and adolescents: prevalence, impact on daily life, and parents’ perception, a school survey. Scand J Caring Sci 2011;25:27-36.
19. Haraldstad K, Christophersen K-A, Helseth S. Health-related quality of life and pain in children and adolescents: a school survey. BMC Pediatr 2017;17:174.
20. Palermo TM, Kiska R. Subjective sleep disturbances in adolescents with chronic pain: relationship to daily functioning and quality of life. J Pain 2005;6:201-7.
21. Campo JV, Bridge J, Ehmann M, et al. Recurrent abdominal pain, anxiety, and depression in primary care. Pediatrics 2004;113:817-24.
22. van Dijk A, McGrath PA, Pickett W, et al. Pain and self-reported health in Canadian children. Pain Res Manag 2008;13:407-11.
23. Bidadi S, Nejadkazem M, Naderpour M. The relationship between chronic otitis media-induced hearing loss and the acquisition of social skills. Otolaryngol Head Neck Surg 2008;139:655-70.

Table 5: Adolescents with a CCDSS mental health diagnosis (n = 927) with and without a pain indicator diagnosis in early childhood

| Pain indicator | Mental health diagnosis (10–17 yr), % | No diagnosis of pain indicator (≤ 9 yr) | Diagnosis of pain indicator (≤ 9 yr) | p value* |
|----------------|----------------------------------|-------------------------------------|----------------------------------|---------|
| **Non–First Nations** | | | | |
| Diabetes       | 6.0                              | 5.9                                 | > 0.9                            |         |
| Fracture       | 6.0                              | 6.8                                 | 0.8                              |         |
| Burn           | 6.1                              | –1                                  | 0.7                              |         |
| Wound          | 5.3                              | 8.5                                 | 0.08                             |         |
| Viral or other intestinal infection | 4.5                              | 11.8                                | < 0.001                          |         |
| **Location of pain** | | | | |
| Abdomen or pelvis | 5.9                              | 40.0                                | 0.001                            |         |
| Throat (infection) | 2.5                              | 6.6                                 | 0.08                             |         |
| Ear (infection) | 4.7                              | 6.6                                 | 0.3                              |         |
| Dental (condition or infection) | 5.1                              | 8.2                                 | 0.06                             |         |
| Urinary tract (infection) | 5.1                              | 9.0                                 | 0.04                             |         |
| Head (headache) | 5.4                              | 7.6                                 | 0.2                              |         |
| Joints (arthritis) | 5.9                              | 25.0                                | 0.02                             |         |
| Nonspecific    | 5.7                              | 19.2                                | 0.004                            |         |
| **First Nations** | | | | |
| Diabetes       | 3.1                              | 0                                  | 0.3                              |         |
| Fracture       | 3.0                              | 3.2                                 | 0.9                              |         |
| Burn           | 2.9                              | –1                                 | 0.002                            |         |
| Wound          | 3.0                              | 3.1                                 | 0.9                              |         |
| Viral or other intestinal infection | 2.7                              | 3.8                                 | 0.4                              |         |
| **Location of pain** | | | | |
| Abdomen or pelvis | 3.1                              | 0                                  | 0.6                              |         |
| Throat (infection) | 9.1                              | 2.9                                 | 0.09                             |         |
| Ear (infection) | 2.1                              | 3.2                                 | 0.5                              |         |
| Dental (condition or infection) | 2.1                              | 3.8                                 | 0.1                              |         |
| Urinary tract (infection) | 2.5                              | 4.3                                 | 0.2                              |         |
| Head (headache) | 3.4                              | 2.3                                 | 0.3                              |         |
| Joints (arthritis) | 3.0                              | –1                                 | 0.8                              |         |
| Nonspecific    | 3.0                              | 7.1                                 | 0.4                              |         |

Note: CCDSS = Canadian Chronic Disease Surveillance System.
*Indicates signiﬁcant difference between those with and without pain (χ²).
†Suppressed owing to small cell size.
37. Oster RT, King K, Morrish DW, et al. Diabetes in pregnancy among First Nations
34. Latimer M, Jackson P, Johnston C, et al. Examining nurse empathy for infant
32. Chertok IR, McCrone S, Parker D, et al. Review of interventions to reduce stress
31. Valeri BO, Holsti L, Linhares MB. Neonatal pain and developmental outcomes
30. Doheny KK. Long-term consequences of pain and stress in neonates. In: Buonocore
29. Hatfield LA, Meyers MA, Messing TM. A systematic review of the effects of
27. Anand KJ, Coskun V, Thrivikraman KV, et al. Long-term behavioral effects of
25. Ohlsson A, Shah PS. Paracetamol (acetaminophen) for prevention or treatment
24. King S, Chambers CT, Huguet A, et al. The epidemiology of chronic pain in chil-
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38. Rooftoof DW, Simons SH, Anand KJ, et al. Eight years later, are we still hurting
39. Taddio A, Katz J. The effects of early pain experience in full-term and preterm
40. Thornton RB, Kirkham LS, Coscadden KJ, et al. Australian Aboriginal children with
41. Gunasekera H, Morris PS, Daniels J, et al. Management of children with otitis
42. Jeffries-Stokes C, Lehmann D, Johnston J, et al. Aboriginal perspective on mid-
43. Bowd AD. Otitis media: health and social consequences for Aboriginal youth in
44. Langan LA, Sockalingam R, Caissie R, et al. Occurrence of otitis media and
45. First Nations and Inuit health, mental health and wellness. Ottawa: Health Can-
46. Acting on what we know: preventing youth suicide in First Nations. Ottawa: Health
47. Mental health child and adolescent community-based services — Nova Scotia Health
48. Social determinants of health: access to health services as a social determinant
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