

Hospitalization of Children in Foster Homes: A Canadian Cohort Study

Ashley Quinn, PhD,¹ Nicole Racine, PhD,^{2,3} Nico Trocmé, PhD,⁴ Cindy Blackstock, PhD,^{4,5} Barbara Fallon, PhD,¹ Kofi Antwi-Boasiako, PhD,⁶ Jungwee Park, PhD,⁷ Nick Barrowman, PhD,⁸ Vid Bijelić, PhD,⁸ Doug Manuel, MD,^{9,10} Andrea Evans, MDCM^{3,9,11}

abstract

BACKGROUND AND OBJECTIVES: In Canada, approximately 4% to 7% of children live in a foster home during their childhood. This study reports on hospitalizations of children in foster homes, with the hypothesis that rates of hospitalization are higher for children with foster home experience compared to all other children.

METHODS: We used linked Canadian Census records and health administrative databases. All children <18 years old were included in all provinces and territories except for Quebec. Our exposure was being identified as a “foster child” on Census Day 2011. Our primary outcome was hospitalizations between 2011 and 2017. Survey weights were applied to obtain a sample size representative of the Canadian population.

RESULTS: Our study represented weighted N = 31 595 (unweighted N = 5796) children in foster homes compared to weighted N = 5 317 346 (unweighted N = 1 062 694) children not in a foster home. Indigenous First Nations children were in foster homes at a rate of 50.49 per 1000, compared to 3.28 per 1000 white children (ratio 15.4, 95% CI, 9.27–25.43). Children with foster home experience were more likely to be hospitalized compared to those without (283 per 1000 vs 140 per 1000, relative rate 1.94, 95% CI, 1.69–2.22). The top causes of hospitalization for young adults with foster home experience were mental health, substance use, and complications of reproductive health.

CONCLUSION: Children and young adults with foster home experience have acute health needs that last into their adult years and would benefit from early and accessible mental health and reproductive health services.



¹Factor-Inwentash Faculty of Social Work, University of Toronto, Toronto, Ontario, Canada; ²School of Psychology, Faculty of Social Sciences, University of Ottawa, Ottawa, Ontario, Canada; ³Children's Hospital of Eastern Ontario Research Institute, Ottawa, Ontario, Canada; ⁴School of Social Work, McGill University, Montreal, Quebec, Canada; ⁵First Nations Child and Family Caring Society, Ottawa, Canada; ⁶School of Social Work, King's University College at Western University, London, Ontario, Canada; ⁷Health Analysis Division, Statistics Canada, Ottawa, Canada; ⁸Clinical Research Unit, Children's Hospital of Eastern Ontario Research Institute, Ottawa, Ontario, Canada; ⁹School of Epidemiology and Public Health, University of Ottawa, Ottawa, Ontario, Canada; ¹⁰Department of Family Medicine, University of Ottawa, Ottawa, Ontario, Canada; and ¹¹Department of Pediatrics, Faculty of Medicine, University of Ottawa, Ottawa, Ontario, Canada

Address correspondence to: Andrea Evans, MD, University of Ottawa, 401 Smyth Rd, Ottawa, Ontario, K1H 8L1. a.evans2@uottawa.ca

Drs Quinn and Evans wrote the original draft, contributed to the conception and design of the work, statistical analysis, and interpretation. Drs Blackstock, Racine, Trocmé, Fallon, Antwi-Boasiako, and Manuel contributed to the conception, design of the work, and interpretation of the data. Dr Park contributed to the acquisition and analysis of the data and had access to the databases used to create the study population. Drs Bijelić and Barrowman contributed to the statistical analysis and interpretation. All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

WHAT'S KNOWN ON THIS SUBJECT: Children in foster care face a higher burden of mental health diagnoses; however, little is known about the rates of acute hospitalizations or physical health outcomes in children in foster care.

WHAT THIS STUDY ADDS: Our study shows high rates of acute hospitalizations for reproductive health reasons and complications, physical health, and mental health diagnoses for children in foster homes, illustrating the importance of high-quality healthcare access for this population.

To cite: Quinn A, Racine N, Trocmé Nico, et al. Hospitalization of Children in Foster Homes: A Canadian Cohort Study. *Pediatrics*. 2026;158(3):e2025073643

INTRODUCTION

In Canada, approximately 4% to 7% of children live in a foster home at some point in their childhood.^{1–4} Foster care is a type of out-of-home placement that removes children from their usual home and places them with nonrelative family-based care. Other types of out-of-home care placements are with family relatives (kinship care), community (customary care), staff-run group homes, and other institutional congregate care settings. Definitions of these out-of-home care placements vary by province and territory within Canada.² Children are placed in foster care for several reasons, including abuse and neglect, which can be the result of, or amplified by, various family stressors, including poverty, mental health challenges, and family violence. Once placed in a foster home, children continue to face adversities such as caregiver disruption and fracture of cultural and community connections.⁵ For example, placement of children in foster homes that match their race, Indigeneity, or culture is widely understood to impact stability, cultural continuity, and outcomes such as mental health.^{5,6} As such, ever having been placed in a foster home is to be understood as a marker of exposure to significant childhood adversity, which places children at risk for lifelong physical and mental illness.^{7–9} In Canada, there is a lack of population-based data on the well-being of children in foster care, including their health and health care utilization.¹⁰ Knowing the health outcomes of children in foster care can inform health services that can safeguard their health and well-being.

Canada has a diverse population, and there are well-documented disparities regarding the characteristics of children who are placed in foster care. Due to the ongoing legacy of colonization and discrimination, and documented social and health inequalities, there is a substantial overrepresentation of Indigenous children in the child welfare system.^{1,11} That is, despite being 6% of the population, nearly 50% of children who are under government care within the child welfare system in Canada are Indigenous.¹ There is also an increased likelihood of Black youth being placed in out-of-home care.¹² Quantifying health care use for children who live in foster homes in Canada could inform health care that meets the specific needs of distinct populations and provide a relevant child outcome for use in evaluating policy.¹³

The first objective of this study is to describe the socio-demographic characteristics of individuals identified as children in foster homes in Canada using population-level data. Second, to compare the all-cause and condition-specific rates of hospitalization for children in Canada with foster home experience vs children without foster home experience. We hypothesize that children who have lived in foster homes would exhibit a higher rate of all-cause hospitalization, with young adults being more likely to be hospitalized for a mental health concern.^{11,14–17} Collectively, these findings will contribute to an evidence base to inform

equitable health care services for children who live in foster care.

METHODS

Study Design

This is a multiprovincial and territorial Canadian population-based cohort study on children under the age of 18 in private-dwelling foster homes on the day of the 2011 Canadian Census (May 10th, 2011). Data were obtained from the 2011 Canadian Census Health and Environment Cohorts (CanCHECs) at Statistics Canada (StatCan), a series of population-based cohorts that are linked to socio-demographic and health administrative databases.¹⁸ We followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines.¹⁹

Setting

All provinces and territories, except for Quebec, which does not submit hospitalization data to the Canadian Institute for Health Information, are included in this study. In Canada, there are 3 recognized Indigenous Peoples (First Nations, Métis, and Inuit), of which the most populous (comprising over 600 diverse First Nations communities) are referred to as First Nations.²⁰ All First Nations reserves outside of Quebec were included in the data sources.²¹ Child welfare in Canada is a provincial and territorial responsibility, where each jurisdiction has its own legislation and policies; therefore, rates of foster home placement vary by jurisdiction.²

Data Sources

National Census records linked with health administrative data in the CanCHECs were used. CanCHECs links individual records in the 2011 National Household Survey (NHS), which contains demographic information on individuals and households, with the Canadian Institute for Health Information Discharge Abstract Database (DAD), which contains hospitalization records. CanCHEC linkages are created in the Social Data Linkage Environment at Statistics Canada, which uses data files of the Derived Record Depository (a dynamic relational database that contains personal identifiers) created from birth, death, immigration, and tax files. NHS and DAD data are probabilistically linked to the Derived Record Depository. DAD linkage rates for the applicable years of the CanCHEC ranged from 92.7% to 95.8%.¹⁸ Additional detailed description of the CanCHECs linkage methodology and data quality is published.¹⁸ Overall data quality measures for the NHS²² included the removal of incomplete enumeration of “Indian” reserves and settlements. This occurred for 36 First Nations reserves (out of more than 3000) due to natural disasters or due to permission not being granted. Non-response rates to NHS questions are available,²³ for example, is 3.7% for the

question on Indigeneity, 4.6% to 5.5% for educational attainment questions, 4.8% for mobility status (1 year ago), and 6.8% for mobility status (5 years ago). Rates of imputation for “foster child” on the NHS was 1.6% (direct communication, Health Analysis Division, Statistics Canada).

See Supplemental Table 1 for the content of the NHS and DAD, Supplemental Table 2 for a summary of the data quality evaluation for the NHS, and Supplemental Table 3 for linkage and cohort profile information on the CanCHECs.

Study Population

We included all children under the age of 18 years identified on the 2011 NHS within the CanCHEC cohort in all provinces and territories with the exception of Quebec. We excluded Quebec as the hospitalization outcomes were not available for this province, as they are not provided to Statistics Canada.

Exposure

Our main exposure was living in a foster home on Census Day, as defined by the identification of a child as a “foster child” by the survey respondent.

Outcomes

Our primary outcome was hospitalization over the 6.75 years from March 2011 to December 2017, defined by a hospital encounter in the DAD database. Where hospitalization could occur at the age of under 1 year to 23 years. The study period reflects the availability in the CanCHEC data linkage. Hospitalizations include labor and delivery for healthy livebirths and stillbirths (See Supplemental Table 1).

Child, Household, and Hospitalization Characteristics

The NHS survey respondent reported child and household characteristics on May 10th, 2011 (the day of the Canadian Census). NHS survey questions for variables used in this study are publicly available, and presented in Supplemental Table 1.²² Education and employment data are recorded for children aged 15 to under 18 years. Race and Indigeneity were reported by the NHS survey respondent. Household-child discordance in Indigeneity was determined if a foster child’s Indigeneity (ie, First Nations, Métis, Inuit, other) as identified by the survey respondent was not the same as that of any other adult member of the household. Similarly, discordance in language was determined to exist if the mother tongue of the foster child was not spoken by any adult member of the household.

We described the reason for hospitalization as the condition most responsible for the admission, as recorded in each inpatient encounter by the International Classification of Diseases Revision 10, Canada (ICD-10-CA) diagnostic code. Chapter 15 of ICD-10-CA codes, for example, encompasses complications of pregnancy (pregnancy with abortive

outcome, hypertensive disorders in pregnancy, other maternal disorders related to pregnancy, and delivery problems). Reasons for hospitalization were ranked from most to least prevalent, where prevalence was defined as the proportion of hospital encounters owing to that condition divided by the number of children in the study population over the study period. Hospitalizations of children <18 years at the time of hospitalization were classified using codes from the Pediatric Clinical Classification System.²⁴ We further determined hospitalizations that were ambulatory care sensitive conditions, or conditions for which hospitalization could potentially have been medically prevented, such as for bacterial pneumonia, gastroenteritis, urinary tract infections, etc, using recommended definitions by the Agency for Healthcare Research and Quality (see Supplemental Table 1 for full list of conditions).^{25,26} We describe the number of children with 0, 1, 2, or 3+ hospitalizations, where children with at least 3 hospitalizations were considered high-users of the health care system. Length of stay was defined as the number of days the child or young adult was hospitalized.

Statistical Analysis

Survey weights were applied to the NHS to adjust for response bias and allow the results to reflect the 2011 Canadian population.²⁷ NHS imputation processes for non-responses or inconsistencies were based upon values within the same geographical area. We report weighted numbers, percentages, means, and standard deviations for individual and household characteristics. Differences in baseline covariates between children in foster homes and those not in foster homes were assessed using standardized differences (SDs), with a value greater than 0.10 considered potentially important.²⁸ We provide relative proportions (ratio) of living in foster homes per 1000 across race and Indigeneity subgroups with white children as a reference group, calculated as: Rate per 1000 (subgroup)/Rate per 1000 (white). The relative proportions are expressed with 95% Confidence Intervals of living in a foster home in Canada in 2011, and on a logarithmic scale. Although there is no normative for race, we chose white as a reference group as it represents the majority of the Canadian population.

The overall unadjusted hospitalization rate was calculated using all hospitalization events per 1000 persons and 95% CIs using bootstrap weights. We also report unadjusted rates of children and young adults ever hospitalized (a rate that will not include repeat visits by the same person). We further reported hospitalization rate results by age at the time of the hospitalization event, calculated as the number of hospitalizations divided by the number of children who attained that age during our study timeline. Hospitalization rates were not reported if small cells of unweighted counts required censoring per Statistics

Canada rules to prevent disclosure of confidential information. Weighted results are presented. Bootstrap replicate weights were used to estimate all 95% CIs. All statistical analyses were performed in SAS version 9.4. Ethics was reviewed and approved as exempt by the University of Ottawa's Research Ethics Board (#10397).

RESULTS

Our study represented $N = 31\,595$ (unweighted $N = 5796$) children aged under 18 years in a foster home in 2011, compared to $5\,317\,346$ (unweighted $N = 1\,062\,694$) children not in a foster home. Table 1 outlines the characteristics of children and their households. Children in foster homes overall had an older age distribution with a median of 10.0 years (IQR 5.0 to 14.0 years) compared to 9.0 years (IQR 4.0 to 13.0 years) for children not in foster homes.

The relative proportion of children living in foster homes by race and Indigeneity subgroup compared to white children is shown in Figure 1. First Nations children were 15.4 times more likely than white children to be living in a foster home on the day of the Census. For Indigenous children (First Nations, Métis, or Inuit), household-child discordance in Indigeneity was present for 50% of Indigenous children in foster homes (Table 1).

A greater number of children in foster homes aged 15 to under 18 years are not in employment, education, or training, compared to young adults not in foster homes (weighted $N\,1255$ (17%) vs weighted $N\,88\,384$ (9%), $SD = 0.25$). More foster households were in the lowest income quintile compared to nonfoster Canadian households (weighted $N\,10\,969$ (35%) vs weighted $N\,1\,064\,475$ (20%), $SD = 0.33$). A breakdown of the counts of children in foster homes by province and territory in Canada is provided in Supplemental Table 4.

Children were followed from 2011 until 2017 for hospitalization events; therefore, hospitalization could occur at an age of under 1 year of age to 23 years of age. The rate of children and young adults hospitalized, as well as hospitalization rates using all hospital events, are presented in Table 2. Children with foster home experience had a higher rate of hospitalization per 1000 children (relative rate [RR] 2.02, 95% CI, 1.69–2.22) compared to children without foster home experience. The number of hospitalizations for which hospitalization could potentially have been medically prevented using the Agency for Healthcare Research and Quality definitions was small and similar between children and young adults with vs without foster home experience (3% vs 2%, RR 0.80, 95% CI, 0.50–1.21). Children who had lived in foster homes and were hospitalized more than 3 times over the course of the study period were responsible for 50% of all hospitalizations for that population, whereas the same high-needs group without foster home experience was responsible for 38% of hospitalizations in that population.

Rates of hospitalization for children and young adults in the cohort by age at the time of hospitalization are presented in Figure 2 (corresponding RR of hospitalization are in Supplemental Table 5). The difference in rate of hospitalization was largest for young adults aged 19 to 20 years with foster home experience at a rate of hospitalization of 74.37 per 1000, compared to a rate of hospitalization of 31.50 per 1000 for those without foster home experience (RR 2.36, 95% CI, 1.77–3.14).

Reasons for hospitalization are outlined in Table 3 for females and Table 4 for males. For female children, the most common reason for hospitalization was related to pregnancy and pregnancy complications, where for children aged under 18 years, as well as young adults aged over 18 years, pregnancy complication rates were higher in children with foster home experience, at RR 5.80 (95% CI, 1.90–12.10) and RR 3.71 (95% CI, 2.93–4.54), respectively. For male children with or without foster home experience, mental and behavioral disorders were the most common reasons for hospitalization; the rate was higher for those children with foster home experience (61.13 vs 13.42 per 1000 persons, RR 4.56, 95% CI, 3.15–6.05). None of the top 10 reasons ranked by ICD-10 code for hospitalizations among males or females who were in foster homes had an estimated RR lower than 1.0 compared to children or young adults without foster home exposure. Statistical difference in rates of admission between those with vs without foster home experience was not significant for certain categories, particularly reasons for hospitalization for "Diseases of the Digestive System" (ICD-10 Chapter K00-K93) for females and males (RR 1.63 (95% CI, 0.95–2.21) and RR 0.78 (95% CI, 0.49–1.18) respectively), and certain infectious disease diagnoses (eg, hypertrophy of tonsils and adenoids RR 1.3 [95% CI, 0.30–2.40] among males and urinary tract infections RR 2.30 [95% CI, 0.60–4.00] among females).

DISCUSSION

In this Canadian study, we present rates and the most common reasons for hospitalization of children in private-dwelling foster homes. We show that children with foster home experience are twice as likely to face hospitalization, with rates steadily increasing between 13 and 20 years of age. Both children under 18 and young adults 18 to 24 years of age with foster home experience are hospitalized for reproductive health complications at rates up to $5\times$ higher than children and young adults without foster care experience, indicating the need for low-barrier, wraparound, safe and welcoming, trauma-informed reproductive health care among female children in foster homes.^{29–33} The majority of the top 5 causes of hospitalizations for children aged <18 years who live or lived in foster homes are mental health or substance use-related conditions. Of note, hospitalizations for respiratory conditions

TABLE 1. Characteristics of Children Aged <18 Years and Their Households Across Canada (Excluding the Province of Quebec) on May 10th, 2011, Comparing Children in Private-Dwelling Foster Homes to Those Not in Foster Homes

	Children in Foster Homes	Children Not in Foster Homes	Standardized Difference
Sample size	5796	1 062 694	
Weighted N	31 595	5 317 346	
Child characteristics			
Median age, years (IQR)	10.0 (5.0,14.0)	9.0 (4.0,13.0)	
Age, years			
Less than 1	1329 (4%)	278 079 (5%)	0.05
1 to 4	6104 (19%)	1 144 731 (22%)	0.05
5 to 10	9347 (30%)	1 681 718 (32%)	0.04
11 to 14	7466 (24%)	1 206 090 (23%)	0.02
15 to < 18	7349 (23%)	1 006 728 (19%)	0.11
Male sex	16 373 (52%)	2 737 638 (51%)	0.01
Rural	12 027 (38%)	1 014 882 (19%)	0.43
Immigrant ¹	820 (2.6%)	464 870 (8.7%)	0.53
Moved in the last 1 y ²	9516 (31%)	623 917 (12%)	0.47
Moved in the last 5 y ²	16 214 (67%)	1 577 587 (41%)	0.55
Children 15 to <18 y			
NEET	1255 (17%)	88 384 (9%)	0.25
Income (\$) per year			
No income	5151 (70%)	611 576 (61%)	0.20
1–999	687 (9%)	85 877 (9%)	0.03
1000–2499	624 (9%)	88 705 (9%)	0.01
2500–4999	357 (5%)	93 902 (9%)	0.17
5000 and over	531 (7%)	126 668 (13%)	0.18
Household and child discordance (Indigenous children)⁴			
Language	1476 (9%)		
Indigeneity	8630 (50%)		
Household characteristics			
Total income (\$) per year			
Less than 10 000	2225 (7%)	105 592 (2%)	0.25
10 000–29 999	4660 (15%)	516 011 (10%)	0.15
30 000–69 999	11 980 (38%)	1 493 520 (28%)	0.21
70 000–99 999	6140 (19%)	1 080 955 (20%)	0.02
100 000 and over	6589 (21%)	2 121 268 (40%)	0.42
Income quintile			
1 (lowest)	10 969 (35%)	1 064 475 (20%)	0.33
2	7650 (24%)	1 023 898 (19%)	0.12
3	6095 (19%)	1 033 424 (19%)	0.00
4	4123 (13%)	1 066 512 (20%)	0.19
5 (highest)	2758 (9%)	1 129 038 (21%)	0.36
Home dwelling structure			
Single-detached	25 984 (82%)	3 660 463 (69%)	0.32
Apartment	2523 (8%)	804 075 (15%)	0.22
Other attached dwelling	54 (0%)	6134 (0%)	0.01
Semi-detached or row	2409 (8%)	780 968 (15%)	0.23

(Continued on next page)

TABLE 1. Characteristics of Children Aged <18 Years and Their Households Across Canada (Excluding the Province of Quebec) on May 10th, 2011, Comparing Children in Private-Dwelling Foster Homes to Those Not in Foster Homes (Continued)

	Children in Foster Homes	Children Not in Foster Homes	Standardized Difference
Movable dwelling	626 (2%)	65 707 (1%)	0.06
More than 1 person per room	4265 (14%)	450 903 (9%)	0.16
Not suitable housing ⁵	7616 (24%)	843 831 (16%)	0.21
Major repairs needed ⁶	3976 (13%)	448 796 (8%)	0.14

Abbreviations: NEET, Not in Employment, Education, or Training.

All data are numbers (percentages) unless otherwise indicated.

¹ Immigrant category includes persons who have ever been landed immigrants, persons from another country with a usual place of residence in Canada, those with study permits or claimed refugee status, and those who obtained Canadian citizenship by naturalization.

² If a person's usual place of residence was different than their place of residence 1 or 5 years ago. For relocation in the last 1 year, it does not include children aged <1 year; for relocation in the last 5 years, it does not include children aged <5 years.

³ Language discordance existed if the mother tongue of the child was not spoken by any member of the household.

⁴ Discordance of Indigeneity existed if the child's Indigeneity (ie, First Nations, Métis, Inuit, other) as identified by the survey respondent was not the same as that of any member of the household.

⁵ Not suitable housing was defined as the house having over one bedroom shortfall due to bedroom criteria: including a maximum of 2 persons per bedroom, children aged over 5 years of another sex not sharing a bedroom, and adults aged >18 years have a separate bedroom unless they are spouses or common-law.

⁶ Major repairs needed as defined by the survey respondent, including repairs such as defective plumbing, electrical wiring, and structural repairs to walls, floors, or ceilings.

Race/Indigeneity	In Foster homes	Not In Foster homes	Number per 1,000	Ratio	95% CI
White	11,595	3,514,803	3.28	REF	REF
Indigenous	17,389	420,473	39.71	12.11	7.28-20.05
First Nations	14,477	272,225	50.49	15.39	9.27-25.43
Métis	2,268	121,157	18.37	5.60	3.52-8.87
Inuit	475	18,091	25.57	7.80	4.17-14.50
Multiple /others	170	8,999	18.38	5.60	3.20-9.91
Racialized	2,678	1,387,195	1.93	0.59	0.36-0.95
Black	1,173	222,264	5.25	1.60	0.98-2.62
Filipino	214	150,595	1.42	0.43	0.25-0.76
South Asian	314	401,718	0.78	0.24	0.14-0.41
Southeast Asian	171	58,304	2.93	0.89	0.48-1.65
Others	804	554,314	1.45	0.44	0.26-0.75

REF = Reference group (denominator of ratio)

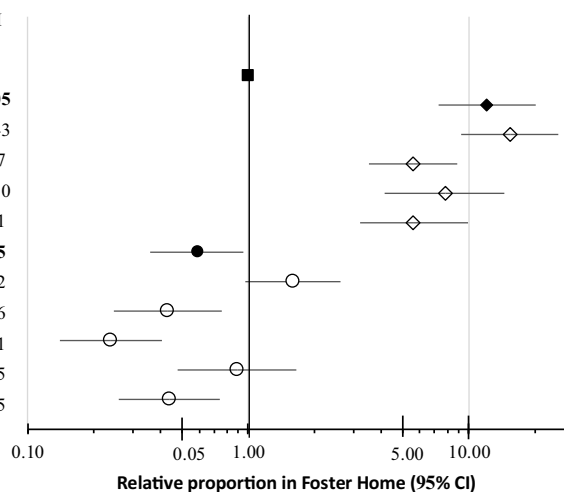


FIGURE 1.

Forest plot illustrating the relative proportion of children living in foster homes per 1000 across race and Indigeneity subgroups, with white children as a reference group. The relative proportion (ratio) of subgroups of populations living in foster homes compared to white children living in foster homes is calculated as: Ratio = Number per 1000 (subgroup)/Number per 1000 (white). Relative proportions are expressed with 95% CIs of living in a foster home in Canada in 2011, and on a logarithmic scale.

were also higher in children with known foster home exposure, compared to those without.

The disparities in our results indicate that factors of childhood adversity and social determinants of health are important for acute physical and mental health outcomes in this population. Factors unique to children in foster care, such as rurality, frequent relocations, health care navigation contingent on a child welfare professional, competing priorities (safety, education, etc), and barriers to accessing past medical records, likely impact health care access and the outcomes in this study.^{6,7} Upon transitioning out of foster

care, competing priorities and trust of institutions continue to be barriers to care, especially if a positive connection to health care was not established during placement.²⁹ As such, foster home placement as well as downstream care factors likely interact to impact the overall health outcomes of the population in this study. In response to these factors, clinicians can recognize children in foster homes as a vulnerable population at risk of experiencing challenges in mental health and sexual health. In recognizing that behavioral and mental health challenges should be identified early, clinicians can routinely provide foster children with

TABLE 2. Hospitalization Rates and Length of Stay for Children and Young Adults With Foster Home Experience Compared to Those Without Foster Home Experience

	Foster Home Experience N = 31 595	No Foster Home Experience N = 5 317 346	Relative Rate (95%CI)
Children hospitalized			
Number of children hospitalized	4535	465 830	
Number of children hospitalized per 1000 children	144	88	1.64 (1.55, 1.73)
Female	2795 (62%)	244 550 (52%)	
Hospitalizations per child			
1	2584 (57%)	349 373 (75%)	
2	952 (21%)	55 900 (12%)	
3+ (high-needs group)	952 (21%)	55 900 (12%)	
Hospitalizations			
Number of hospitalizations	8942	746 115	
Number of hospitalizations per 1000 children	283	140	2.02 (1.69, 2.22)
Hospitalizations due to ambulatory care sensitive condition ^a	210 (2%)	21 395 (3%)	0.80 (0.50,1.21)
Hospitalizations from high-end users	4454 (50%)	284 942 (38%)	
Length of stay per hospitalization			
<24 h	327 (7%)	39 698 (9%)	
1–3 d	2807 (62%)	322 015 (69%)	
4–7 d	824 (18%)	66 571 (14%)	
>7 d	576 (13%)	37 545 (8%)	

All numbers are weighted numbers (percentage).

^a Ambulatory care sensitive conditions were hospitalizations with any of the following most responsible diagnoses: For hospitalizations at age <18 years: bacterial pneumonia, gastroenteritis, urinary tract infection. For hospitalizations at age >18 years: Grand mal status and epileptic convulsions, chronic lower respiratory disease, acute lower respiratory infection with chronic lung disease, asthma, diabetes, heart failure and pulmonary edema, hypertension (see Supplemental Table 1 for codes).

comprehensive developmental assessments upon placement in a new home.^{9,34,35} In recognizing that safe sexual practices, sex trafficking, and discussions around safe adult relationships may not be discussed with foster youth and foster caregivers for multiple reasons, clinicians can seize the opportunity to provide comprehensive sexual health assessments, which include discussions around safe online and offline relationships.³⁶ Clinicians aware of culturally relevant and low-barrier mental and sexual health programs will be more equipped to refer and therefore proactively support youth aging out of care. Medical passports containing key health information such as medical diagnoses, medications, allergies, and referrals would help continuity of care, ensure information is accessible for new providers and hospitals, and can be shared among caregivers and the child welfare professionals.³⁷ Hospitals could provide trauma-informed inpatient care and prioritize low-barrier outpatient follow-up post-hospitalization for youth in foster care. Examples of programs that are low-barrier, safe, and welcoming include nurse navigator programs accessible to youth even after “graduating” from out-of-home placements, wraparound service models, integrated and collaborative models, and culturally grounded programs that offer safe spaces.^{29–33} Youth who have access to integrated and collaborative models have been shown

to engage earlier in care and have reduced mental health care use.^{38–40} For example, a nurse navigator program at one Children’s Aid Society served over 150 youth within 6 months, bridging youth in care to adult services, and is available for ages 18 to 29 years of age.⁴¹ The program noted that although mental health conditions were identified earlier than young adulthood, youth may not be ready to engage until later, making these programs essential to be available when they are older and ready.⁴¹

Rates of living in foster homes in our study are similar to available Canadian estimates, where overall in our population there were 31 595 identified, which is similar to rates of foster home living in available estimates of 33 140 in 2021.² We further describe that First Nations children are 15 times more likely to be in a private-dwelling foster home compared to white children which is largely consistent with other data.^{1,2} The annual count from the Canadian Child Welfare Information System (collected from frontline child welfare staff starting in 2021) was 6.15 per 1000 children living in kinship home and foster home placements across Canada. This is consistent with the cross-sectional count of 4.5 per 1000 of children who were “foster children” across Canada on the 2021 Census. In Canada, the overrepresentation of all Indigenous children in foster care is due to colonial policies such as the Residential School System

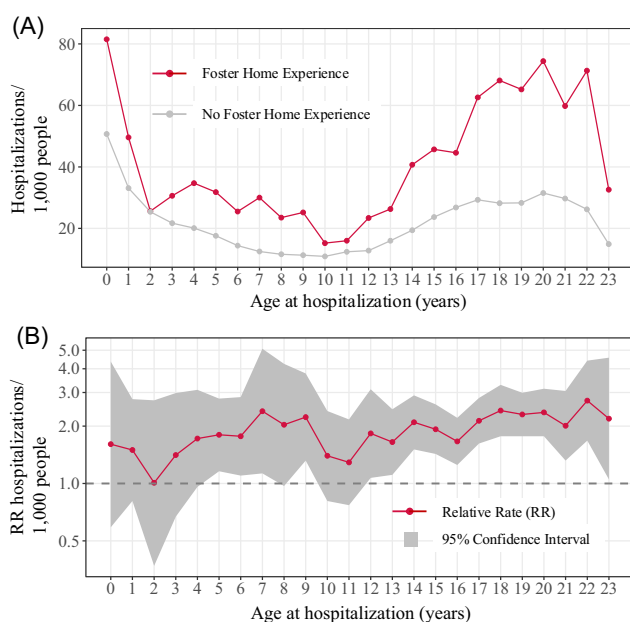


FIGURE 2. (A) Rates of hospitalization events per 1000 people, by age (in years) at the time of hospitalization over the course of 6.75 years from May 2011 to December 2017. (B) RR of hospitalization events per 1000 people with 95% CIs in gray, by age (in years) at the time of hospitalization, on a logarithmic scale. Abbreviation: RR, relative rate.

and the ‘Sixties Scoop,’ which systematically removed Indigenous children from their families and communities.⁴² Our findings reinforce the Calls to Action from the Truth and Reconciliation Commission of Canada, which urge governments to reduce the number of Indigenous children in care.⁴² Moreover, the unique social and economic challenges faced by Indigenous families, coupled with ongoing discrimination within health and child welfare systems, highlight the need for targeted policy responses. For First Nations, Métis, and Inuit children and families, this includes equitable access to health services and supports, enabling them to achieve true health equity. In addition, it includes recognition that cultural connection is important in the pathway from trauma to well-being.⁵ Cultural connection can occur when a foster family identifies with the same cultural and spiritual connection as a foster child. However, in lieu of finding this match, a continued cultural and spirituality connection can also occur with deliberate, appropriate, and safe community and cultural engagement (eg, ensuring a foster child continues to play on their original soccer team with friends from their original community). The overrepresentation of First Nations, Métis, Inuit, and Black groups underscores the need for analyses that explore health outcomes among distinct populations. The stability of foster home living rates in general and also within First Nations, Métis, and Inuit groups from 2011 onward, combined with minimal or no changes to health care access policies for this

population, indicates that although this study uses population data from 2011, the results continue to be applicable.⁴³

Hospitalization rates in this study are comparable to those reported in the United States and Australia.^{14,16,17} For example, observational studies show up to a 4-fold increase in hospitalization events for children in foster care, with the top reasons for hospitalizations being due to mental health concerns^{22,23} and suicide.^{44,45} Our study builds on estimates from the United States that 35 to 50% of female children in foster care become pregnant before 21 years of age by uncovering that for many pregnancies, youth are being hospitalized for complications.^{45–47} Lastly, our observation that a small fraction of children in foster care account for half of all hospital admissions underscores the need to address the unmet or complex health care needs of this vulnerable subgroup.

Limitations

Our study’s strength lies in its population-based approach, the linkage with health records, and the inclusion of individual-level data on race and Indigeneity. However, there are notable limitations due to the reliance on Census-based surveys and administrative data. Children placed in family-based care, such as kinship care with relatives or customary care with trusted community members, may have been misclassified as “foster children” by respondents on the NHS. This misclassification implies that some children in our sample may not have been in formal foster home placements but lived outside their family of origin. This could influence both the ascertainment of exposure and the interpretation of our findings. Similarly, children who lived in institutional care or collective dwellings are not included in the NHS, thus limiting the generalizability of our results to children in group home or institutional care placements. The exposed population in our study has experienced being removed from their usual home, and therefore, the “foster home exposure” is to be understood as a marker of exposure to significant childhood adversity. Our data does not include the population of Quebec; therefore, some caution should be applied when generalizing our results to this province. The province of Quebec represents 20% to 25% of the population of children in foster homes; however, it has rates of foster home placement very similar to the Canadian average, according to available data,² therefore our overall rates may represent the national average. Undercounting of marginalized groups in the Census, including urban First Nations, Métis, and Inuit populations, remains a significant concern.⁴⁸ Such undercounts would likely lead to underestimating the health disparities reported in our results since marginalized groups are likely to have worse acute health outcomes, and therefore undercounting their proportion in our exposure population would lead to an underestimate of the disparities in our measured outcomes.⁴⁹ Census respondents in a foster home

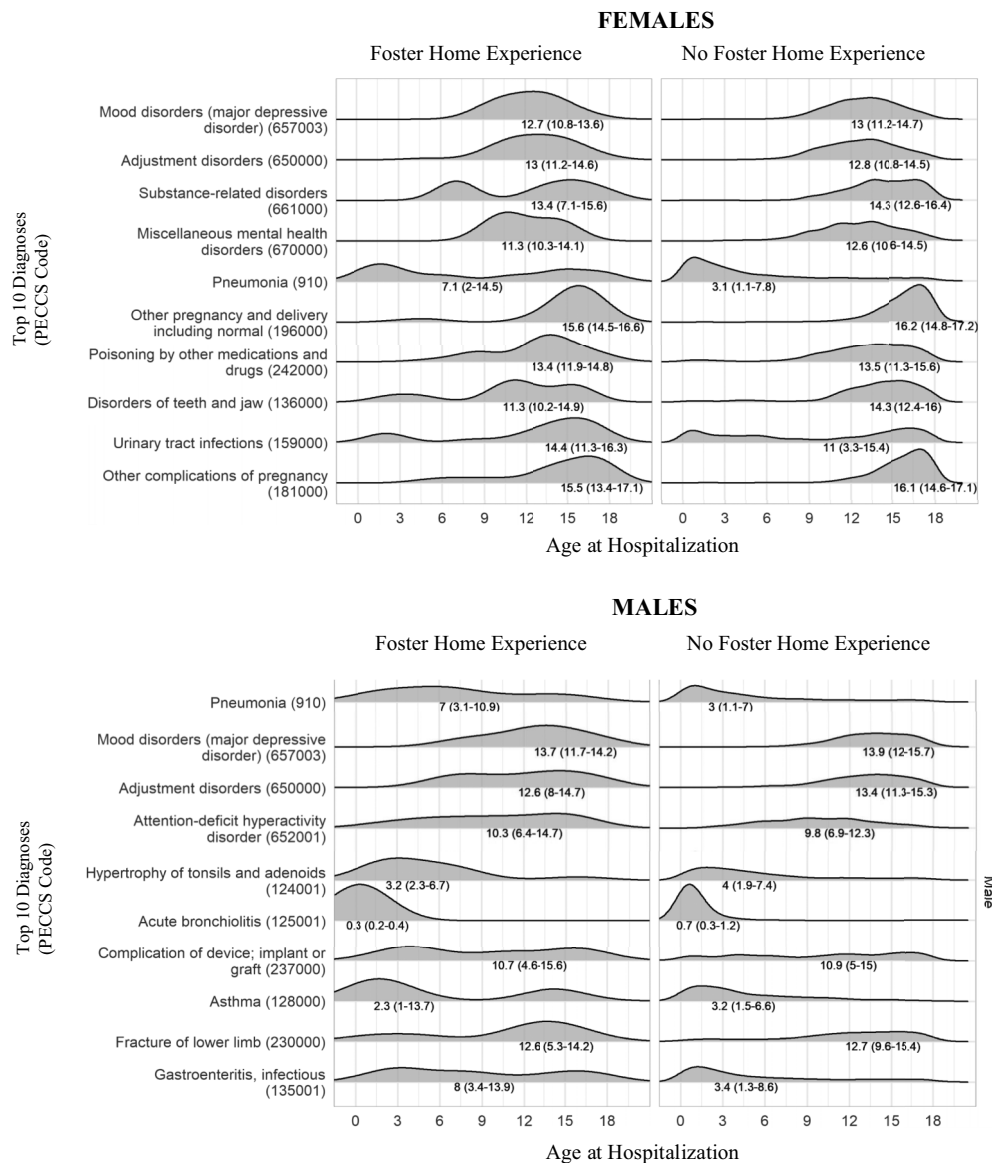


FIGURE 3.

Plots visualizing the age distribution of overall causes of hospitalization for female and male children who were aged under 18 years at the time of hospitalization, with and without foster home experience. Numbers represent the median (interquartile range) of age at the time of hospitalization.

are likely to have information provided by child welfare agencies or the youth themselves on the key demographic questions about the “foster child,” and as such, the imputation rates for the ‘foster child’ population are likely to contain plausible values for basic demographic questions. For the “moved in the last 1 year” or “moved in the last 5 years” variable, however, certain foster caregivers will not know the historical placement or postal code changes of a child placed into their care, especially over 5 years. In this case, the missing data would be imputed and likely underestimated. The cross-sectional study estimates of foster care placement used in this study may have disproportionately

captured children in stable foster arrangements, limiting the generalizability of our findings to those in more unstable or frequently changing placements. Although our study showed rates of hospitalization per child and by age group, the reported hospitalization rates by reason for hospitalization require further analysis to account for recurrent events. Additionally, for the province of Ontario, our data did not include linkage to the Ontario Mental Health Reporting System, which holds information on admissions to adult facilities, therefore underreporting of mental health admissions for up to a quarter of youth in that province. Lastly, this study provides a comparison of overall acute

TABLE 3. Causes of Hospitalization Overall, and by Children Aged <18 Years Old and Adults Aged ≥18 to 24 Years With and Without Foster Home Experience Among Females

	Children With Foster Home Experience			Children Without Foster Home Experience			
	Rank	Weighted N	Rate/1000 People	Rank	Weighted N	Rate/1000 People	Relative Rate (95% CI)
Overall categories (ICD-10-CA chapter) for hospitalization, across all age groups							
Pregnancy, childbirth, and the puerperium (O00-O99)	1	1765	115.81	1	73 965	28.67	4.04 (3.30–4.72)
Mental and behavioral disorders (F00-F99)	2	945	62.20	2	60 365	23.40	2.66 (1.96–3.39)
Factors influencing health status and contact with health services (Z00-Z99)	3	430	28.35	6	26 715	10.36	2.74 (1.29–3.86)
Injury, poisoning, and certain other consequences of external causes (S00-T98)	4	385	25.30	5	38 500	14.93	1.69 (1.00–2.00)
Diseases of the digestive system (K00-K93)	5	385	25.15	3	39 900	15.47	1.63 (0.95–2.21)
Disease of the respiratory system (J00-J99)	6	375	24.78	4	39 130	15.17	1.63 (0.91–2.42)
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified (R00-R99)	7	365	24.08	7	25 200	9.77	2.47 (1.59–3.50)
Diseases of the genitourinary system (N00-N99)	8	215	13.98	9	15 150	5.87	2.38 (0.96–4.01)
Diseases of the nervous system (G00-G99)	9	155	10.15	10	12 415	4.81	2.11 (0.73–3.56)
Congenital malformations, deformations, and chromosomal abnormalities (Q00-Q99)	10	110	7.17	14	6850	2.66	2.70 (1.21–4.31)
Causes of hospitalization, children aged <18 y, ICD-10-CA codes categorized using PECCS ^a							
Mood disorders (major depressive disorder) (657003)	1	165	10.80	1	16 365	6.34	1.70 (1.00–2.50)
Adjustment disorders (650000)	2	145	9.45	5	8035	3.11	3.00 (1.50–4.50)
Substance-related disorders (661000)	3	110	7.24	45	1450	0.56	12.90 (1.00–33.80)
Miscellaneous mental health disorders (670000)	4	105	6.81	13	3910	1.52	4.50 (1.50–7.40)
Other pregnancy and delivery, including normal (196000)	5	100	6.58	40	1530	0.59	11.10 (0.90–19.60)
Poisoning by other medications and drugs (242000)	6	95	6.34	11	4215	1.63	3.90 (1.30–6.40)
Disorders of teeth and jaw (136000)	7	75	4.90	25	2675	1.04	4.70 (1.10–8.30)
Pneumonia (910)	8	70	4.72	2	9480	3.67	1.30 (0.50–2.10)
Urinary tract infections (159000)	9	70	4.61	8	5200	2.02	2.30 (0.60–4.00)
Other complications of pregnancy (181000)	10	65	4.30	34	1905	0.74	5.80 (1.90–12.10)
Causes of hospitalization, for young adults aged ≥18 to 24 y, by ICD-10-CA code							
Complications of labor and delivery (O60-O75)	1	835	131.95	1	32 310	35.61	3.71 (2.93–4.54)
Maternal care related to fetus and amniotic cavity and possible delivery problems (O30-O48)	2	230	36.56	2	15 815	17.43	2.10 (1.25–2.90)
Reproductive health (Z30-Z39)	3	145	23.22	3	7400	8.16	2.85 (1.14–4.48)
Abbreviations: ICD-10-CA, International Classification of Diseases Revision 10, Canada; PECCS, Pediatric Clinical Classification System. The Pediatric Clinical Classification System classifies ICD-10-CA codes, which classify ICD-10 codes into clinically meaningful categories for pediatric conditions and treatments. ^a Further rows suppressed due to small cells.							

health care use by children and young adults with known foster home exposure to children and young adults without foster home exposure, but does not determine the association between distinct diagnoses and the intervention of foster care itself.

CONCLUSION

Our findings have implications for global priorities related to children's rights for healthy development,⁵⁰ and

Canadian policies on the health and well-being of children in foster care. We show that children who faced life circumstances that prevented them from being safe and healthy continue to face serious mental health and reproductive health conditions in the early adolescent period, at a time critical to psychological, behavioral, and social development. The onset and origins of these conditions may have occurred earlier in childhood, pointing to a critical opportunity for integrated and wraparound services that address modifiable risk factors and provide comprehensive

TABLE 4. Causes of Hospitalization Overall, and by Children Aged <18 Years Old and Adults Aged ≥18 to 24 Years With and Without Foster Home Experience Among Males

	Children With Foster Home Experience			Children Without Foster Home Experience			
	Rank	Weighted N	Rate/1000 People	Rank	Weighted N	Rate/1000 People	Relative Rate (95% CI)
Overall categories (ICD-10-CA Chapter) for Hospitalization, across all age groups							
Mental and behavioral disorders (F00-F99)	1	1000	61.13	4	36 740	13.42	4.56 (3.15–6.05)
Disease of the respiratory system (J00-J99)	2	530	32.28	2	51 910	18.96	1.70 (1.07–2.28)
Injury, poisoning, and certain other consequences of external causes (S00-T98)	3	470	28.68	1	57 555	21.02	1.36 (0.89–1.67)
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified (R00-R99)	4	295	18.00	6	21 445	7.83	2.30 (1.10–3.93)
Diseases of the digestive system (K00-K93)	5	215	13.26	3	46 415	16.95	0.78 (0.49–1.18)
Factors influencing health status and contact with health services (Z00-Z99)	6	205	12.66	5	22 105	8.07	1.57 (0.63–2.29)
Diseases of the musculoskeletal system and connective tissue (M00-M99)	7	130	8.09	9	10 940	4.00	2.02 (0.78–3.59)
Certain infections and parasitic diseases (A00-B99)	8	105	6.49	7	16 205	5.92	1.10 (0.46–1.68)
Diseases of the nervous system (G00-G99)	9	95	5.78	8	14 325	5.23	1.10 (0.54–1.83)
Endocrine, nutritional, and metabolic diseases (E00-E89)	10	90	5.38	10	10 855	3.97	1.36 (0.16–2.91)
Causes of hospitalization, children aged <18 y, ICD-10-CA codes categorized using PECCS ^a							
Pneumonia (910)	1	140	8.59	3	10 310	3.77	2.30 (1.00–3.80)
Mood disorders (major depressive disorder) (657003)	2	110	6.81	10	5540	2.02	3.40 (1.10–6.20)
Attention-deficit hyperactivity disorder (652001)	3	105	6.35	19	2700	0.99	6.40 (1.40–12.00)
Adjustment disorders (650000)	4	80	4.83	15	3190	1.17	4.10 (1.20–7.40)
Hypertrophy of tonsils and adenoids (124001)	5	75	4.65	4	9875	3.61	1.30 (0.30–2.40)
Acute bronchiolitis (125001)	6	75	4.51	23	2375	0.87	5.20 (0.20–12.60)
Complication of device; implant or graft (237000)	7	65	3.98	65	955	0.35	11.40 (0.60–27.10)
Asthma (128000)	8	65	3.91	2	10 690	3.90	1.00 (0.10–1.80)
Fracture of lower limb (230000)	9	60	3.65	7	7535	2.75	1.30 (0.40–2.20)
Gastroenteritis, infectious (135001)	10	55	3.42	6	8130	2.97	1.20 (0.30–2.00)
Causes of hospitalization, for young adults aged ≥18 to 24 y, by ICD-10-CA code							
Schizophrenia, schizotypal and delusional disorders (F20-F29)	1	220	33.71	2	3330	3.40	9.91 (1.83–20.09)
Mental and behavioral disorders due to psychoactive substance use (F10-F19)	2	95	14.57	4	2810	2.87	5.07 (1.76–7.98)
Injuries to the knee and lower leg (S80-S89)	3	45	6.87	7	2240	2.29	3.00 (0.38–5.60)
Abbreviations: ICD-10-CA, International Classification of Diseases Revision 10, Canada; PECCS, Pediatric Clinical Classification System. The Pediatric Clinical Classification System classifies ICD-10-CA codes, which classify ICD-10 codes into clinically meaningful categories for pediatric conditions and treatments. ^a Further rows suppressed due to small cells.							

health services. Clinicians can act by identifying children in care as a vulnerable population and, in response, provide early comprehensive developmental assessments, sexual health assessments, care that is tailored (trauma-informed, culturally appropriate), and document in a medical passport. Hospitals could provide trauma-informed inpatient care and prioritize foster children's outpatient follow-up post-hospitalization. Such early, comprehensive, integrated, and coordinated care is needed to safeguard the

safety and health of children in care and their future families.

ACKNOWLEDGMENT

We would like to thank the Advisory Circle for essential discussions and input on this cohort. We would also like to thank Leanne Findlay for her contributions to conceptualizing this study and facilitating data quality information and imputation rates from Statistics Canada.

CONFLICT OF INTEREST DISCLOSURES: Dr Blackstock has a conflict as Executive Director of the First Nations Child and Family Caring Society, which has filed a non-compliance motion on Jordan's Principle at the Human Rights Tribunal of Canada. Jordan's Principle is a legal principle that aims to ensure First Nations children receive the services they need when they need them. The other authors have no conflicts of interest relevant to this article to disclose.

FUNDING: Dr Evans holds a University and CHEO Research Institute Junior Research Chair in Data-Driven Child Health and Policy and holds a CIHR early Career Researcher Grant (#529334) and CIHR Project Grant (#540121). Dr Racine reports holding a Chair in Child and Youth Mental Health at the Children's Hospital of Eastern Ontario Research Institute.

Accepted for Publication Date: June 1, 2026

<https://doi.org/10.1542/peds.2025-073643>

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