

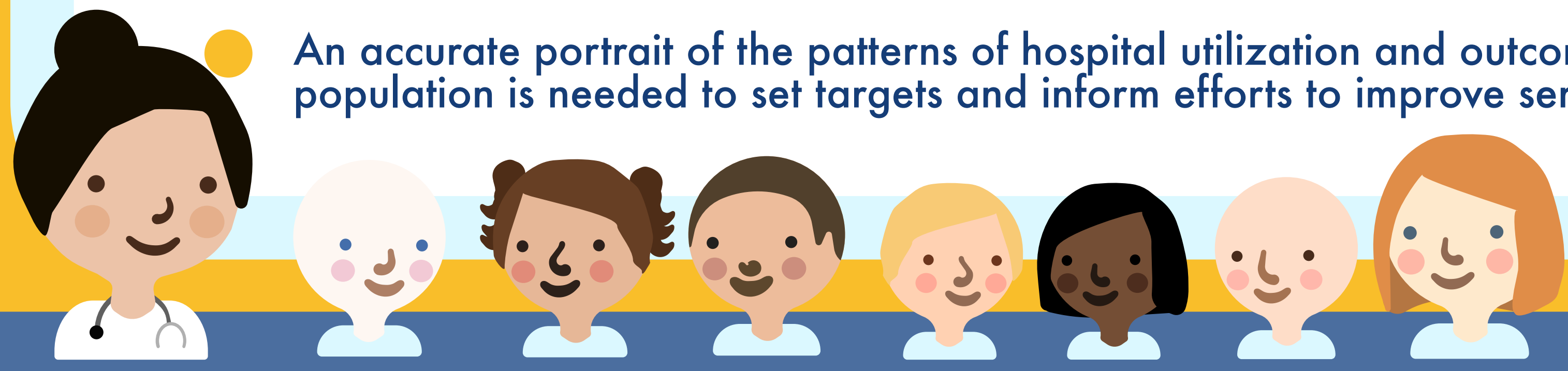
# CHILDREN WITH MEDICAL COMPLEXITY IN HOSPITAL SETTINGS: A POPULATION-BASED COHORT STUDY

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## BACKGROUND

- Children with medical complexity typically require more and different types of health and related services than other children.<sup>1,2</sup>
- There is widespread consensus that improving care for children with medical complexity requires integration of health and social care services.<sup>1,2</sup>
- Hospital care remains a major target of integrated care policy and advocacy initiatives.<sup>3</sup>
- An accurate portrait of the patterns of hospital utilization and outcomes for this population is needed to set targets and inform efforts to improve service delivery.



## PURPOSE

- 1 The purpose of this study was to evaluate hospital utilization among children with medical complexity in a population-based cohort.
- 2 To the best of our knowledge, this is the first pan-Canadian population-based study on hospitalization usage among children with medical complexity.



## METHODS

**Study Design** Population-based cohort study.

**Population** Hospitalized children (aged 0 to 17 years) from all regions in Canada except for Quebec (N = 191,190).

**Data** 2006 Canadian Census of Population confidential Masterfile linked with 2006/2007 to 2008/2009 Discharge Abstract Database (DAD).

- Outcomes**
- In-hospital mortality from any cause
  - 8 to 28 day unplanned readmission
  - Admission to an intensive care unit (ICU) or step down unit
  - Length of stay (LOS)
  - Cost of care

**Exposure:** Pediatric Medical Complexity Algorithm (PMCA 3.0) status.<sup>4,5</sup>

**Non complex:** Children with acute health conditions and children with a chronic condition that is not progressive and may be episodic (e.g., asthma).

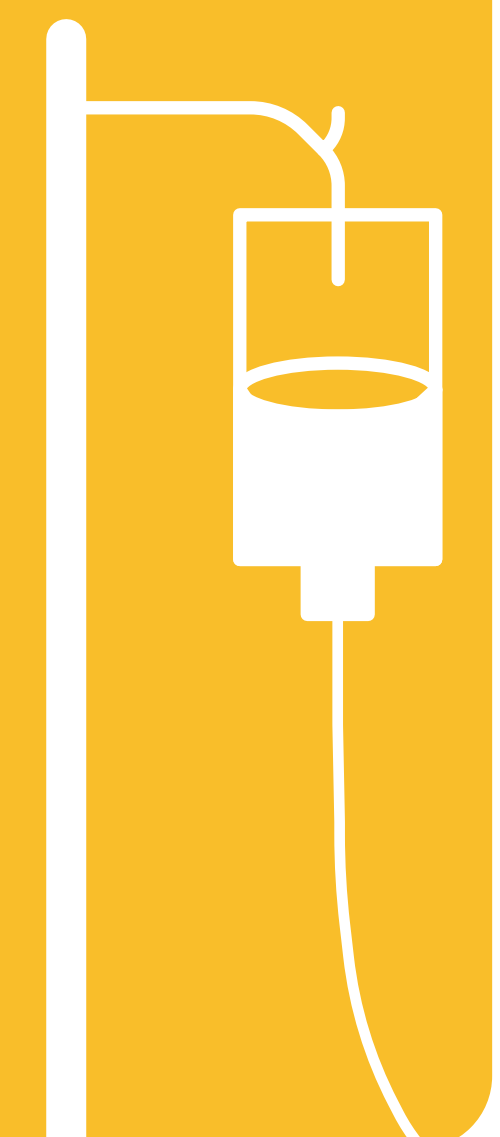
**Medically complex:** Children with either chronic conditions affecting 2 or more organ systems (e.g., cystic fibrosis), a progressive chronic condition (e.g., muscular dystrophy), malignancy, or continuous technology dependence (e.g., dialysis or tracheostomy).

### Controls:

Age, sex, case mix group, from a rural or remote community, housing insecure, inadequate housing, low-income household, from a low-income community, minority group status, parent(s)' and/or caregiver(s)' level of educational attainment, and lone parent/caregiver household.

### Procedure:

- 1 Record linkages were based on probabilistic matching and conducted by Statistics Canada.<sup>3</sup>
- 2 Participants were assigned to 1 of 2 mutually exclusive categories of children with medical complexity for the study period using the Pediatric Medical Complexity Algorithm 3.0 (PMCA 3.0).<sup>4,5</sup>
- 3 Socioeconomic vulnerability was assigned using individual-level sociodemographic data from the Census.
- 4 Bivariate analyses and logistic regression models were estimated to examine the association between PMCA status and outcomes of interest.<sup>4,5</sup> All estimates were computed using robust standard errors.

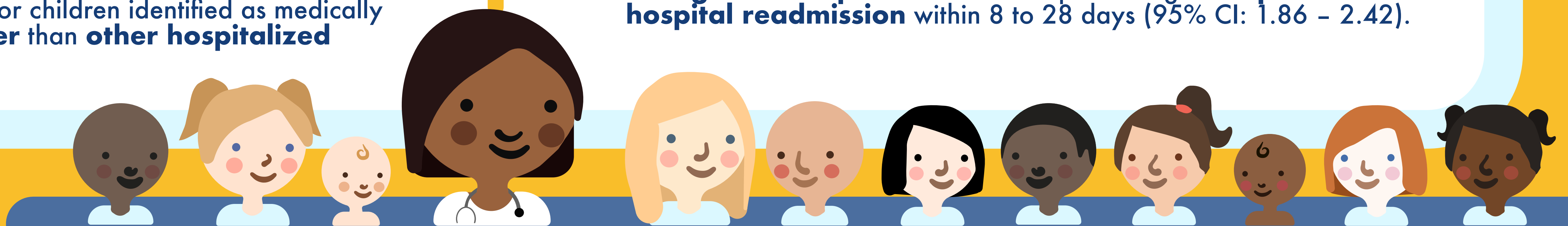


## RESULTS

- **290 children** experienced at least **one acute hospitalization** per **10,000 children** (excluding birth).
- **6.2% of hospitalized children** in Canada were identified as being **medically complex**.
- **Cost of hospitalization** for children identified as medically complex was **3 times higher** on average than for **other hospitalized children**.
- The average **length of stay** for children identified as medically complex was **3.2 times longer** than **other hospitalized children**.

**Multivariate logistic regression** analyses indicated that hospitalized children identified as medically complex have:

- **3.97 greater adjusted odds** of being admitted to an **intensive care unit (ICU)** or step-down unit (95% CI: 3.75 - 4.21).
- **12.88 greater odds** of **dying in the hospital** (95% CI: 10.28-16.14).
- **2.12 greater adjusted odds** of experiencing an **unplanned hospital readmission** within 8 to 28 days (95% CI: 1.86 - 2.42).



## CONCLUSIONS

- 1 Children identified as medically complex account for a disproportionate share of hospital expenditures in Canada.
- 2 Children identified as medically complex are at increased risk for several adverse outcomes including in-hospital mortality, admission to an ICU or step-down unit, longer length of stay, and 28-day unplanned readmission.
- 3 Interventions for children with medical complexity have the potential to result in considerable cost-savings and improvements in overall health and well-being.

### Next steps:

- Robustness and specification checks
- Refinement of risk stratification profiles for children with medical complexity including controlling for measures of functioning and diagnoses
- Validating the Pediatric Medical Complexity Algorithm<sup>3,4</sup>

## LIMITATIONS

- Socio-demographic data drawn from the Census is only for May 16, 2006.
- Hospitalization data is not available for children in Quebec.

The **Pediatric Medical Complexity Algorithm (PMCA)** has not been extensively validated in Canada. However, this **work is currently underway in several provinces**.<sup>2</sup> Early evidence suggests that the PMCA has **excellent sensitivity and specificity**.<sup>4,5</sup>



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