



Characterizing Respiratory Syncytial Virus-Related Pediatric Disease Severity in Canada.

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Introduction

- In 2019, **respiratory syncytial virus (RSV)** was associated with 33 million lower respiratory tract infection episodes, 4 million hospital admissions, 30,000 in-patient deaths and 100,000 deaths **globally** in children under 5 years of age.
- In Canada, RSV is a leading cause of **hospitalization** for children under 5 years of age. From 2005-2013, incidence of RSV associated hospitalization in Canadian children under 1 year was **10.2 per 1000**. About 16.3% of those hospitalized had one or more risk factors for severe infections.
- RSV hospitalization in infancy is associated with 3-fold increased risk of asthma by the age of 5-12 years.
- RSV hospitalization in Canada is associated with substantial costs and the only current medical intervention to prevent severe RSV disease is monthly administration of palivizumab prophylaxis available for high-risk infants with chronic heart or lung conditions or those who are born premature.
- The RSV prevention landscape is radically changing with several vaccine candidates at different stages of regulatory review, including long-acting monoclonal antibody passive immunization for all infants and RSV vaccines for pregnant women.

Aim

To evaluate disease severity in laboratory confirmed RSV hospitalizations in Canadian children, particularly young infants.

Methodology

- This prospective study included **patients aged 0-16 years** residing in Canada admitted to 13 tertiary care **IMPACT (Canadian Immunization Monitoring Program Active)** hospitals with laboratory confirmed RSV infection in any of the five **RSV seasons (November 2017- June 2022)**.
- Ethics approval was obtained from IMPACT hospitals. Consent was not required as this is secondary data.
- Nurse monitors actively collected and verified data at these tertiary care hospitals on admission date, discharge date, age, intensive care unit (ICU) admission, and mortality.
- Hospital length of stay (LOS) was estimated from admission and discharge date.
- A descriptive analysis is presented on disease severity by age group (Overall, 0-5 months, 6-11 months, 12-23 months, 2-4 years, 5-9 years, and 10-16 years).

Acknowledgements

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Results

Table 1. Cohort characteristics of laboratory confirmed RSV hospitalizations and outcomes from 2017/18-2021/22 seasons at IMPACT hospitals

	2017-2018 (N=2,427)	2018-2019 (N=2,500)	2019-2020 (N=2,641)	2020-2021 (N=58)	2021-2022 (N=3,388)	Total (N=11,014)
Age (months)						
Mean (SD)	16.6 (28.6)	16.5 (28.3)	16.1 (25.9)	13.7 (26.1)	15.9 (25.4)	16.2 (26.9)
Median [Q1, Q3]	6 [1, 19]	6 [1, 20]	6 [1, 20]	4 [1, 16]	5 [1, 22]	6 [1, 20]
Sex						
Female, N (%)	1,105 (45.5%)	1,126 (45.0%)	1,196 (45.3%)	23 (39.7%)	1,527 (45.1%)	4,977 (45.2%)
Male, N (%)	1,322 (54.5%)	1,373 (54.9%)	1,445 (54.7%)	35 (60.3%)	1,860 (54.9%)	6,035 (54.8%)
Age Groups						
0-5 months, N (%)	1,200 (49.4%)	1,241 (49.6%)	1,265 (47.9%)	32 (55.2%)	1,750 (51.7%)	5,488 (49.8%)
6-11 months, N (%)	309 (12.7%)	284 (11.4%)	336 (12.7%)	<10 (10.3%)	314 (9.3%)	1,249 (11.3%)
12-23 months, N (%)	416 (17.1%)	443 (17.7%)	471 (17.8%)	12 (20.7%)	546 (16.1%)	1,888 (17.1%)
2-4 years, N (%)	345 (14.2%)	393 (15.7%)	433 (16.4%)	<10 (10.3%)	593 (17.5%)	1,770 (16.1%)
5-9 years, N (%)	108 (4.5%)	88 (3.5%)	98 (3.7%)	<10 (1.7%)	134 (4.0%)	429 (3.9%)
10-16 years, N (%)	47 (1.9%)	51 (2.0%)	38 (1.4%)	<10 (1.7%)	51 (1.5%)	188 (1.7%)
Outcomes						
ICU Admission (N, %)	565 (23.3%)	577 (23.1%)	635 (24.0%)	13 (22.4%)	804 (23.7%)	2,594 (23.6%)
LOS > 7 days (N, %)	544 (22.4%)	525 (21.0%)	599 (22.7%)	11 (19.0%)	668 (19.7%)	2,347 (21.3%)
Death (N, %)	<10 (0.1%)	<10 (0.3%)	<10 (0.3%)	<10 (0.0%)	11 (0.3%)	29 (0.3%)

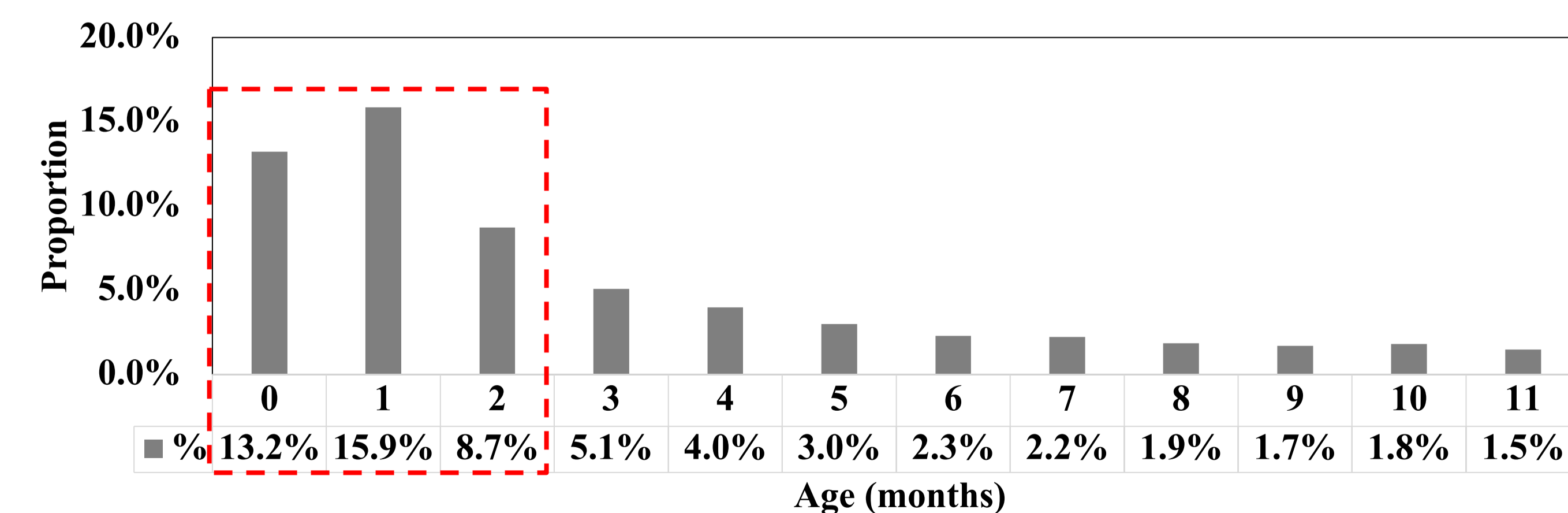
- Mean length of hospital stay ranged from 5.1 to 6.3 days.
- Median length of stay ranged from 3 to 4 days with IQR: 2-6 days.

Figure 1. Proportion of hospitalization related to RSV in specific age groups compared with all RSV hospitalizations at IMPACT hospitals, 2017-2022.

A: ≤1-16 years



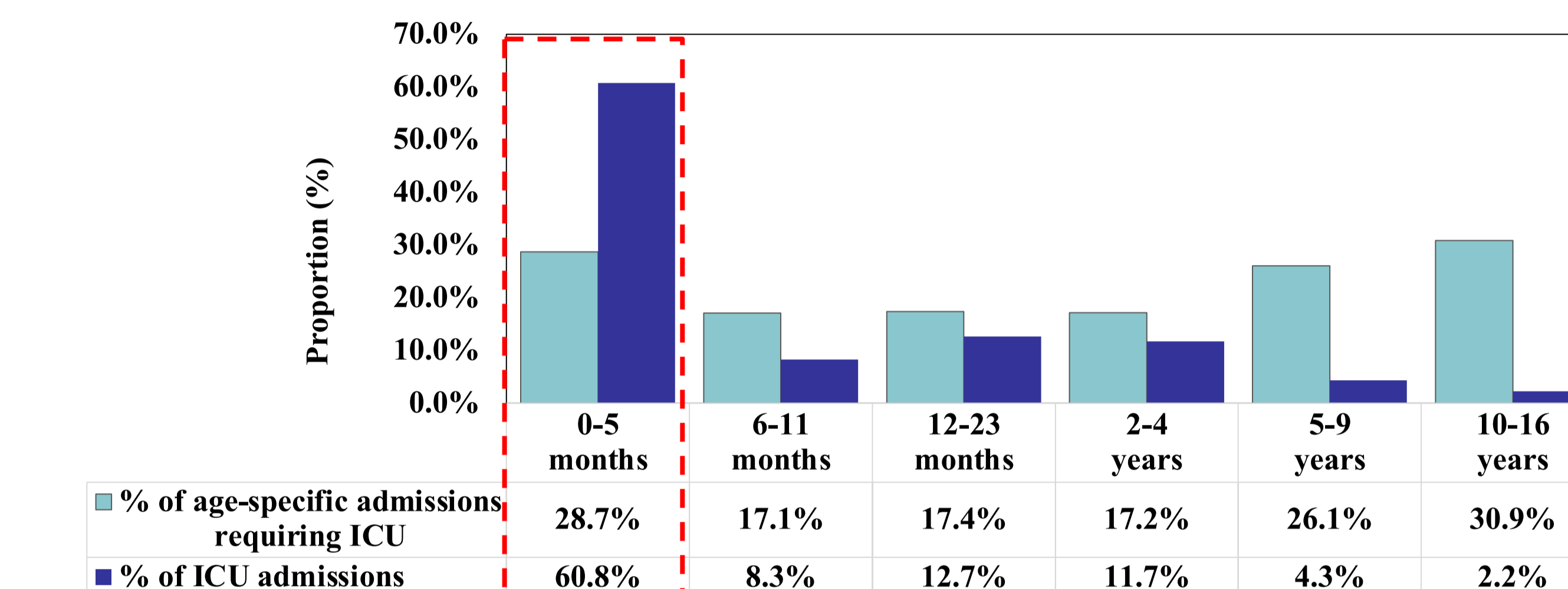
B: 0-11 Months



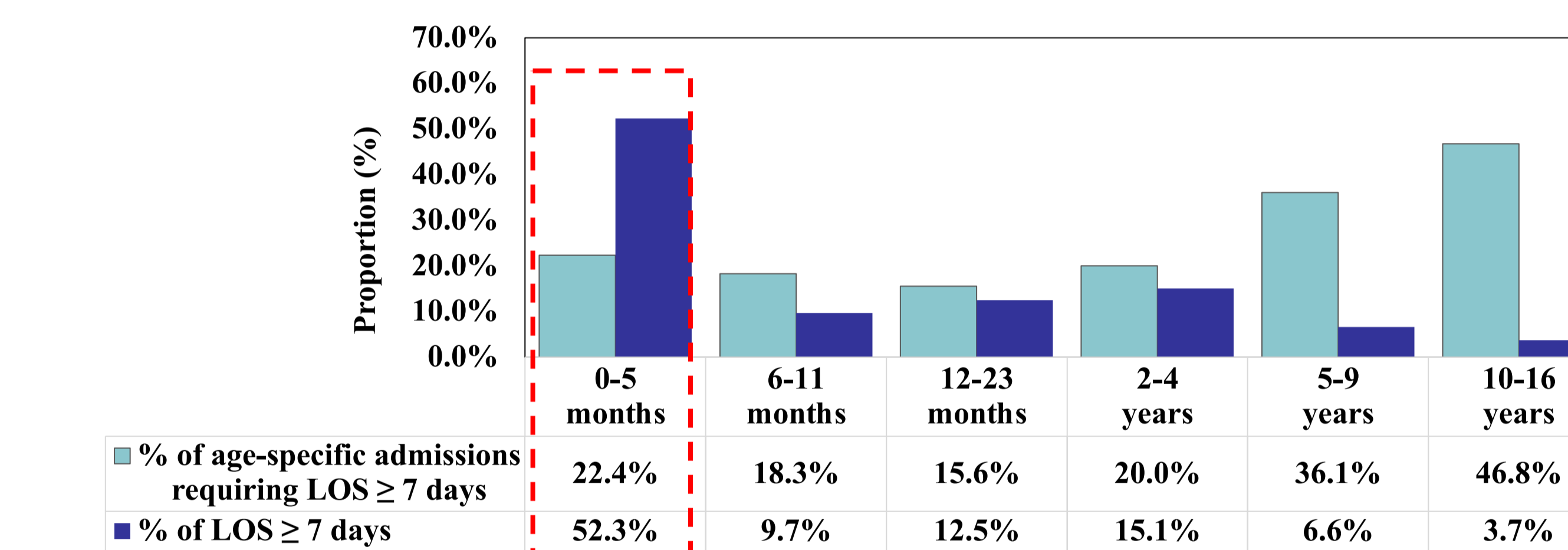
- 63%** of all RSV associated hospital admissions were in children aged 1 year or under as shown in red box on *Figure 1A*.
- Among children under 1 year of age, those aged 0-2 had highest proportion (~40%) of hospital admissions as shown in red box on *Figure 1B*.

Figure 2. RSV associated outcomes by age group at IMPACT hospitals for combined data from 2017-2022

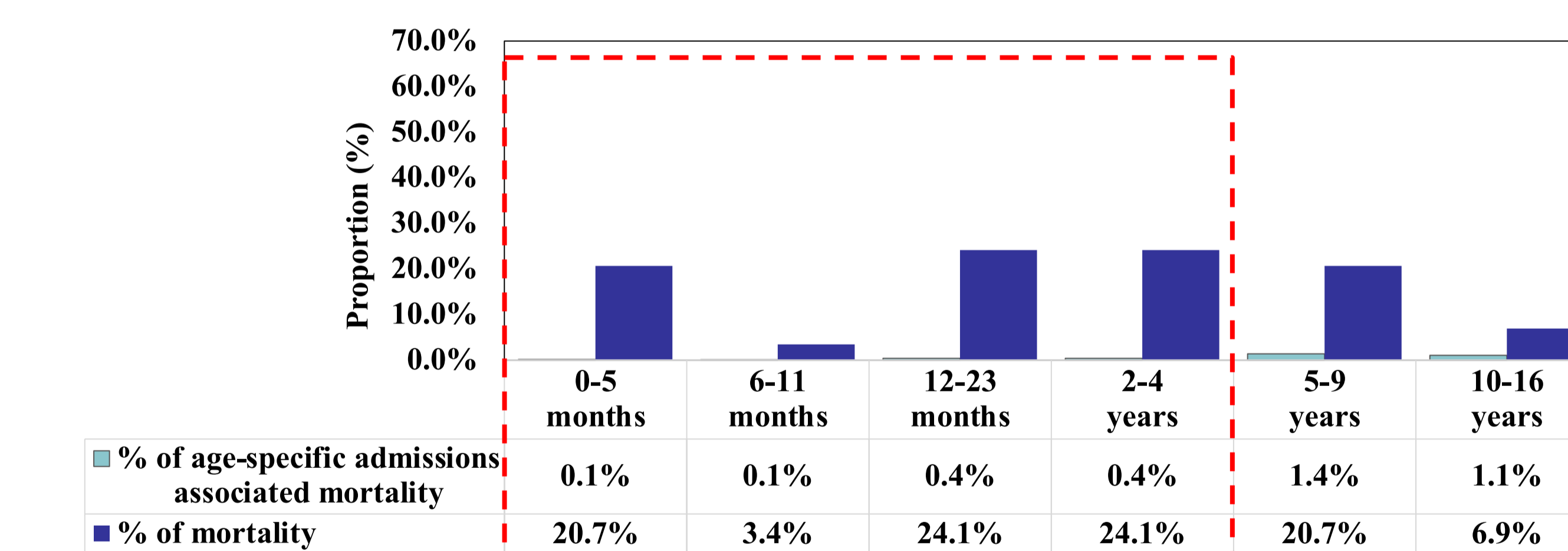
A: ICU admissions



B: Length of stay ≥ 7 days



C: Mortality



- 1 in 4 infants aged 0-5 months hospitalized with RSV have ICU admissions and length of hospital stay 7 days or more.
- Of 29 total RSV associated deaths, **21 (72.4%)** were observed in children under 5 years of age.

Conclusion

- RSV hospitalizations in Canada are frequent and approximately half of those are among children under 6 months of age.
- Those aged 0-5 months are more likely to have severe disease from RSV requiring ICU admission or have longer than 7 days of hospital stay, although mortality is rare.
- Consequently, young infants needs to be prioritized for RSV prevention public health program.