

Hospital Costs for Preterm and Small-for-Gestational Age Babies in Canada

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Abstract

In 2006–2007, more than 54,000 (or one in seven) babies across Canada were born preterm or small for their gestational age (SGA). These babies are often at higher risk for morbidity and mortality than are full-term babies with normal birth weight, and account for a disproportionately high percentage of healthcare costs among newborns. This article highlights key findings from a recent report by the Canadian Institute for Health Information, *Too Early, Too Small: A Profile of Small Babies across Canada*, and provides information on the hospital costs among low birth weight, preterm and SGA babies. Birth weight and gestational age were found to be important determinants of hospital costs – as birth weight and gestational age decreased, average in-hospital costs increased. Furthermore, multiple-birth babies had higher hospital costs than did singleton babies. As in other areas of the health system, information relating to costs and spending can inform neonatal and obstetrical health planning and decision-making.

Each year, approximately 350,000 babies are born in Canada. Although most (over 90%) of these babies are born with a normal birth weight (2,500–4,499 grams), about 6% are born with low birth weight (<2,500 grams) (Statistics Canada 2008). Low birth weight may result from a preterm birth (<37 weeks of gestation), intrauterine growth restriction (IUGR) or both (Institute of Health Economics 2007). The diagnosis of IUGR is typically based on a baby being small for gestational age (SGA) – meaning that it is smaller than 90% of babies of the same gestational age and sex. In 2006–2007, more than 54,000 (one in seven) babies across Canada were born preterm or SGA.

Babies who are born preterm or SGA are often at higher risk for morbidity and mortality than are full-term babies with normal birth weight. These differential health consequences can extend far beyond infancy and childhood (Das and Sysyn 2004; Saigal and Doyle 2008) and also impact healthcare costs. Preterm and SGA status account for a disproportionately high percentage of the healthcare costs among all newborns (Russell et al. 2007).

Some researchers have even suggested that economically developed countries should recognize the economic impact of low birth weight on health services planning (Petrou et al. 2003).

This article highlights key findings from a recent report by the Canadian Institute for Health Information (CIHI), *Too Early, Too Small: A Profile of Small Babies across Canada* (CIHI 2009), and provides information on the hospital costs among low birth weight, preterm and SGA babies.

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Variation in Preterm and SGA Rates

Low birth weight has long been used as an indicator of perinatal (about five months before and one week after birth) health due to its association with infant survival, health and development (United Nations Children's Fund and World Health Organization 2004). Associated risks include perinatal or infant death, physical and cognitive disabilities and chronic health problems later in life (Goldenberg and Culhane 2007). However, low birth weight babies are not a homogeneous group, and there are differences in health outcomes associated with babies who are born preterm or SGA. For this reason, these groups are best considered separately.

Preterm births account for 75% of deaths that occur in the perinatal period (Goldenberg et al. 2008) and contribute to both short- and long-term morbidity, including respiratory distress, gastrointestinal complications, temperature instability and neuro-cognitive problems (Hack and Fanaroff 1999; Saigal and Doyle 2008). In Canada, as in many other economically developed countries, the preterm birth rate has increased over the past few decades. In 2006–2007, the Canadian preterm birth rate was 8.1% (CIHI 2009) – up from 6% in the early 1980s (Joseph et al. 1998). However, this rate varied across the provinces, with Alberta and Newfoundland and Labrador having the highest rates (8.7% and 8.6%, respectively) while New Brunswick and

Prince Edward Island had the lowest (both at 7%). Nunavut had the highest preterm birth rate overall at 10.8%.

Unlike preterm birth rates, SGA rates in Canada have decreased over the past few decades – from 11% in the early 1990s (Health Canada 2003) to 8.3% in 2006–2007 (CIHI 2009). This rate also varied across the country: Ontario and Alberta had the highest rates (8.9% and 8.7%, respectively) while Newfoundland and Labrador and Prince Edward Island had the lowest (5.9% and 6.8%, respectively). Although the rates have decreased over time, SGA births remain an important health issue as these babies are a high-risk group; the perinatal mortality rate for growth-restricted infants is 10–20 times higher than that among infants who are not growth restricted (Das and Sysyn 2004).

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Cost Drivers: Birth Weight, Gestational Age and Length of Stay

On average, preterm and SGA babies require special monitoring and care in the first days and weeks of their lives and tend to remain longer in hospital after delivery. Major improvements in

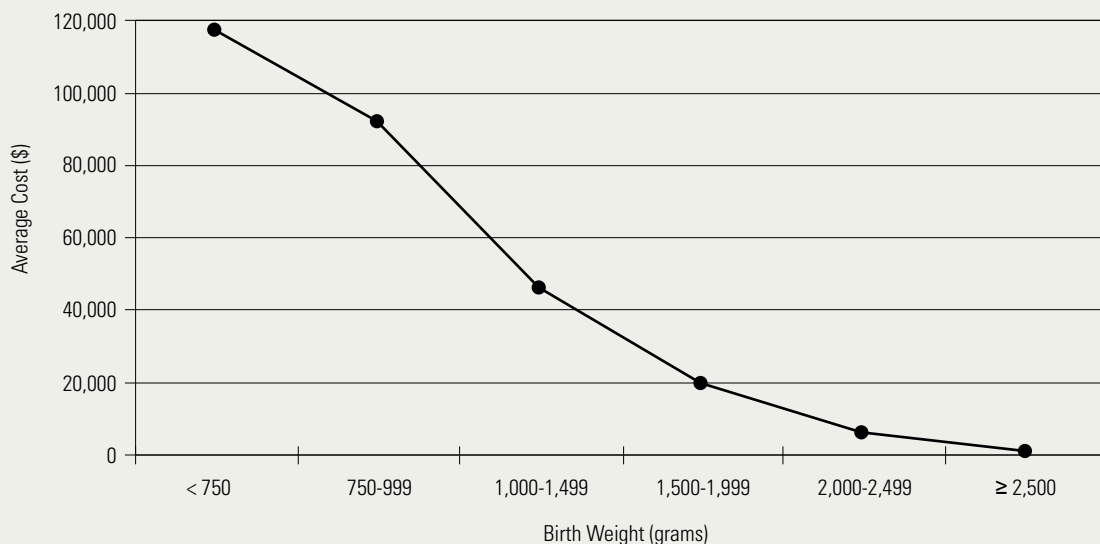
neonatal care have contributed to increased survival for babies born preterm or SGA but are also associated with higher health-care costs.

Preterm infants tend to use more hospital resources than infants who are born full term. Specifically, they often require the use of specialized equipment such as respirators, monitors, intravenous pumps and kidney dialysis equipment, longer lengths of hospital stay and increased healthcare personnel resources (Cuevas et al. 2005). This, in turn, is associated with increased healthcare costs. Moreover, preterm babies are also more likely to be re-hospitalized after the initial discharge (Saigal and Doyle 2008).

Cost estimates presented in this article reflect only the in-patient hospital costs among newborns who received treatment in the hospital in which they were born and discharged (i.e., “typical” newborns). They exclude stillbirths, transfers and patients who stayed longer than the expected length of stay. Further description of the methodology is provided in the report (Canadian Institute for Health Information 2009).

Hospital costs decreased as birth weight increased, with the smallest infants having the highest cost and longest lengths of stay (Figure 1). The average hospital costs per newborn in Canada in 2005–2006 varied widely – ranging from just over \$1,000 for newborns who weighed 2,500 grams or more, to more than \$117,000 for newborns who weighed less than 750

Figure 1. Average hospital cost for “typical” newborns, by birth weight category, 2005–2006



Note: This analysis was restricted to live births discharged from acute care facilities located in Newfoundland and Labrador, Ontario, Manitoba, Saskatchewan, British Columbia and Nunavut.

Sources: Discharge Abstract Database, 2005–2006, and Canadian MIS (Management Information Systems) Database, 2005–2006, Canadian Institute for Health Information.

Table 1. Average hospital costs and length of stay for “typical” newborns by multiple birth and gestational age category, 2005–2006*

Multiple Birth Status by Preterm Status	Total No. Babies	% Typical	Average Cost	Average LOS
Singletons				
Full term (≥ 37 wk)	189,750	97.6	1,050	2.1
Any preterm (< 37 wk)	13,005	79.2	9,233	10.0
Late preterm (34–36 wk)	9,716	89.7	5,047	5.8
Moderate preterm (32–33 wk)	1,428	69.1	19,463	21.2
Very preterm (28–31 wk)	1,099	42.3	43,718	42.6
Extremely preterm (< 28 wk)	762	18.1	84,235	83.1
Total	202,755	96.4	1,482	2.5
Multiples				
Full term (≥ 37 wk)	2,742	95.7	1,871	3.5
Any preterm (< 37 wk)	3,623	70.9	12,479	13.8
Late preterm (34–36 wk)	2,370	85.9	6,494	8.0
Moderate preterm (32–33 wk)	571	57.3	21,388	23.5
Very preterm (28–31 wk)	418	38.0	47,318	46.0
Extremely preterm (< 28 wk)	264	18.2	90,123	91.0
Total	6,365	81.6	7,118	8.6

LOS = length of stay.

*This analysis was limited to live births discharged from acute care facilities located Newfoundland and Labrador, Ontario, Manitoba, Saskatchewan, British Columbia and Nunavut.

Sources: Discharge Abstract Database, 2005–2006, and Canadian MIS (Management Information Systems) Database, 2005–2006, Canadian Institute for Health Information.

grams. Similarly, in analyses not shown here, the average length of hospital stay for typical newborns increased as birth weight decreased – ranging from two days for babies weighing 2,500 grams or more, to 104 days for those less than 750 grams.

In 2005–2006, the average hospital cost for typical singleton newborns was approximately nine times higher for preterm newborns than for those born full-term (Table 1). The average hospital cost and length of stay increased with decreasing gestational age. Singleton newborns born at extremely preterm gestational ages (< 28 weeks) had the highest average cost (\$84,235) and stayed in the hospital an average of 40 times longer than singletons born at full-term.

Preterm multiple-birth babies had a cost approximately seven times higher than the average cost for a full-term multiple-

birth baby. As well, the average hospital cost for multiples was consistently higher than for singletons for each gestational age category. This may reflect the increased likelihood of preterm birth, SGA birth and medical interventions among multiple births (Cassell et al. 2004).

In 2005–2006, the average hospital cost for all singleton SGA infants was approximately 1.6 times higher than for non-SGA infants (\$2,297 versus \$1,407, respectively; Table 2). Poorer health outcomes and subsequent costs associated with SGA babies may vary depending on the underlying mechanism and timing of the growth-restriction onset. Babies who are growth restricted are at an increased risk of fetal distress during labour (Das and Sysyn 2004; Rosenberg 2008) and have higher rates of Cesarean section deliveries and inductions of labour (Cunningham et al. 2005). Note, however, that costs for these interventions were not captured since this analysis did not include maternal costs.

Among singletons, newborns who were born both preterm and SGA had almost twice the average hospital cost compared with costs for normal-growth preterm newborns (\$8,558 versus \$16,244). This suggests that poor growth is an additional risk for poor neonatal outcomes beyond that caused by preterm birth (Gilbert and Danielsen 2003). The higher average cost observed for each gestational age category for SGA infants compared with non-SGA infants may be explained by the increased complexity and severity of the medical problems faced by SGA infants compared with those who had normal growth during pregnancy (Sharma et al. 2004).

Table 2. Average hospital cost and length of stay for “typical” singleton newborns by SGA status and gestational age category, 2005–2006*

SGA Status by Preterm Status	Total No. Babies	% Typical	Average Cost	Average LOS
Not SGA				
Full term (≥ 37 wk)	173,806	97.7	1,011	2.1
Any preterm (< 37 wk)	11,718	80.2	8,558	9.5
Late preterm (34–36 wk)	8,778	90.3	4,383	5.3
Moderate preterm (32–33 wk)	1,307	69.8	18,571	20.3
Very preterm (28–31 wk)	1,006	43.1	41,347	42.0
Extremely preterm (< 28 wk)	627	20.3	85,103	84.4
Total	185,524	96.6	1,407	2.5
SGA				
Full term (≥ 37 wk)	15,920	96.7	1,479	2.4
Any preterm (< 37 wk)	1,215	74.3	16,244	15.0
Late preterm (34–36 wk)	938	84.2	11,704	11.2
Moderate preterm (32–33 wk)	120	62.5	30,309	31.7
Very preterm (28–31 wk)	93	33.3	76,907	52.1
Extremely preterm (< 28 wk)	64	10.9	109,286	99.0
Total	17,135	95.1	2,297	3.1

LOS = length of stay; SGA = small for gestational age.

*This analysis was limited to singleton live births with gestational age between 22 and 43 weeks, who were discharged from acute care facilities located in Newfoundland and Labrador, Ontario, Manitoba, Saskatchewan, British Columbia and Nunavut.

Sources: Discharge Abstract Database, 2005–2006, and Canadian MIS (Management Information Systems) Database, 2005–2006, Canadian Institute for Health Information.

Conclusion

Our analyses show that birth weight and gestational age are important determinants of hospital costs. As birth weight and gestational age decreased, average in-hospital costs increased. Furthermore, multiple-birth babies had higher hospital costs than did singleton babies, and babies who were born preterm or SGA incurred more costs than did babies who were neither. In Canada and many other economically developed countries, rates of low birth weight and preterm births have increased over time. These babies tend to use disproportionately more hospital resources than do normal birth weight babies. As in other areas of the health system, information relating to costs and spending can inform neonatal and obstetrical health planning and decision-making. **HQ**

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