



# Injury Insight

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## The Cost of Burns Among Young Children

### Background

Burns, including scalds, are a leading cause of emergency department visits and hospitalizations among children aged 0 to 4 years in Canada.<sup>1</sup> Young children under 5 years of age are particularly vulnerable to burns and scalds as a result of contact with hot surfaces, liquids, or food (contact burns). They also have the highest rates of both hospitalization and mortality from burns, compared to older children, youth, and adults.<sup>2,3</sup>

In addition to being extremely painful, these injuries often require intensive medical therapy and can result in long-term impairments. This can place a high burden on both the child and their family, and translate to significant economic costs to the health care system and to society.

A [research study](#) was conducted to calculate the costs of burns among young children seen at BC Children’s Hospital (BCCH).<sup>4</sup> Costs were calculated by percent total burn surface area (%TBSA), which is the proportion of the body that was affected by the injury. The higher the percentage, the more severe the burn injury. The more severe the burn injury, the higher the cost per patient.

### Overview

342 children aged 0 to 4 years were treated for a burn injury at BCCH between January 1, 2014 and March 15, 2018. Over half were boys (59%), and ages ranged from 2½ months to 4 years & 11 months. The average was 22 months of age.

The total costs of burns and scalds to young children aged 0 to 4 years in BC for the year 2016 was estimated to be \$1,818,671. This is \$1.9M in 2020 dollars.

A breakdown of the average direct costs to the health care system and total costs including indirect costs to the family are available in Tables 1 and 2.\*

In 2016, burn injuries to children ages 0 to 4 cost British Columbians

**\$1.9 million**  
(in 2020 dollars)



Table 1: Average direct cost of burns among young children, by percent total burn surface area (% TBSA)\*

	Cost per child for injuries	% TBSA
Direct costs	\$2,427	1-5
	\$11,190	6-10
	\$17,368	11-20
	\$100,519	>20

Table 2: Average total cost of burns among young children, by percent total burn surface area (% TBSA)\*

	Cost per child for injuries	% TBSA
Total costs	\$3,339	1-5
	\$13,460	6-10
	\$20,229	11-20
	\$109,881	>20

\* Direct costs are those directly related to patient care, such as physician, medication, care, and service costs.

Additional indirect costs are those experienced by the family, such as caregiver productivity loss if a parent is unable to work while the child is recovering, or transportation and accommodation costs that the family incurs while seeking health care.

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## The challenges of calculating the cost of burns

Estimating the cost of burns is challenging, as treatments vary depending on the type and severity of the burn.<sup>1</sup> Advances in technologies and treatments have also introduced new dressing options and increased outpatient treatment not requiring overnight stay in-hospital, which have significantly influenced the cost of burn care in recent years.

Traditionally, studies determining the costs of treating burns among young children have included a limited number of patients and focused only on inpatient treatment and complication costs.<sup>5-9</sup> This approach has resulted in a limited understanding of the full economic burden, as most young children with contact burns and scalds do not require hospital admission, but do need sustained outpatient care in both the short- and long-term. In order to be comprehensive, determining the costs of burns among young children must include the costs associated with outpatient care, long-term scar management care and psychosocial support, as well as costs borne by the family such as transportation and caregivers' loss of productivity.<sup>10</sup>

## The tool: how the costs of burns were calculated

### Step 1: Micro-costing

*“Micro-costing is a cost estimation method that allows for precise assessment of the economic costs of health interventions.”<sup>11</sup>*

First, a micro-costing approach was used to identify the typical cost of treating young children with varying degrees of burns, categorized by the proportion of total body surface area affected (%TBSA). Children aged 0 to 4 years who sustained a burn injury between January 2014 and March 2018 were identified and followed until December 31, 2018. This study did not include burns from inhalation, electricity, or chemicals, as they occur less often than contact burns and scalds and require different care and treatment.

This approach included assessing the costs for each patient related to:

1. The emergency department visit
2. Treatment as an inpatient in hospital
3. Day surgery procedures
4. Outpatient burn-baths
5. Outpatient dressing changes
6. Burn clinic visits/Outpatient scar management (pressure garments, splints, casts)

7. Caregiver productivity loss
8. Transportation
9. Accommodation

### Care costs:

- Care costs were multiplied by the number of minutes a patient was registered under the respective department, with the exception of outpatient dressing change visits.
- Care costs per day were applied for outpatient dressing changes due to a lack of precision in the time patients spent having their dressings changed. Dressing change costs were estimated by senior nurses by calculating the medical supplies and dressings required according to %TBSA.

### Services costs:

- Physician costs were based on 2018 provincial fee-for-service assessment and procedural fees. Plastic surgeon costs were estimated for inpatient care, outpatient dressing changes, day surgery, and follow up clinic visits.
- Anesthesiologist costs were applied to outpatient burn-baths, day surgery, and inpatient care in the case of burn-baths or surgery.
- Medical imagery, pharmaceutical drugs, laboratory tests, and healthcare professional services costs, including occupational therapist, physiotherapist, psychologist, and social workers, were identified individually for each patient.

### Caregiver productivity loss:

- Caregivers' wage and/or household production loss were estimated by the hospital length-of-stay and number of outpatient visits, applying the median daily wage with benefits for individuals 15-years and over.

### Transportation and accommodation costs:

- Transportation by ground/air ambulance or private/public vehicle was identified for each visit. Ambulance services were assigned a cost, and private transportation assigned an average cost assuming a 50 km round-trip drive and considered parking fees.
- Accommodation costs for families were estimated if the patient stayed overnight and was not local, identified by using inpatient length of stay and patients' postal code of residence.

## Step 2: Population-level costing

After determining the average per-child cost of a burn by severity, a population-level approach was used to calculate the total provincial cost of burns among young children.

The average burn injury cost per %TBSA category estimated from the micro-costing approach was applied to the number of children aged 0 to 4 years old who were treated for a burn injury in BC in 2016.

Since data on burn severity from other hospitals were limited, the ratio of children with burns of each %TBSA category observed at BCCH was applied to children treated elsewhere in the province.

## Limitation

Direct and indirect costs of burn injuries for children who required treatment for scar management beyond 2018 were not captured in this study.

## Conclusion

This study highlights opportunities for policymakers and clinicians to invest in pediatric burn prevention programs.

Preventing even a few severe burns among children, or multiple minor burns, will have a considerable economic impact on society and allow for the reallocation of health care funds towards other priorities.

Burn prevention programs, such as the BC-based “Too Hot for Tots” program, may prove to be cost-effective in reducing the economic burden of burns and scalds among young children.

The study also found that outpatient care costs accounted for the largest proportion of the total costs for 1-20 %TBSA burns, emphasizing the need to capture these data in order to determine the full burden of burn injuries, and to inform injury prevention priorities and investments.

## Resources

- For more information on how to prevent burns among young children: [BCIRPU Injury Insight: Burns in Young Children](#)
- For more information on burn prevention and *Too Hot for Tots!*: <https://burnfund.org/prevention-and-education/too-hot-for-tots/>

## Too Hot for Tots! (THFT!)<sup>12</sup>

- The program was initially designed as an in-person workshop for parents and caregivers focusing on burn prevention among young children aged 0 to 4 years. Now, to ensure the learning of THFT is available province-wide, the Burn Fund is in the development stages of evolving the training to an e-learning platform.
- THFT! was launched in 2012 out of BC Children’s Hospital in partnership with the BC Professional Fire Fighters’ Burn Fund, thanks to a partnership spearheaded by THFT founder and Children’s Hospital nurse Frances MacDougall.
- THFT! is informed by recent, relevant, and reliable evidence-based health information and research and has been evaluated.
- Visit the BC Professional Fire Fighters’ Burn Fund to learn more about the THFT program: <http://burnfund.org/prevention-and-education/too-hot-for-tots/>

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