‘I fell off and landed badly’: Children’s experiences of forearm fracture and injury prevention

Joanie Sims-Gould^{1,2}, Douglas Race^{1,3}, Lynsey Hamilton⁴, Heather MacDonald^{1,3,5}, Kishore Mulpuri⁶, and Heather McKay^{1,2,3}

¹Centre for Hip Health and Mobility, Vancouver Coastal Health Research Institute, Vancouver, British Columbia, Canada

²Department of Family Practice, University of British Columbia, Vancouver, British Columbia, Canada

³Department of Orthopaedics, University of British Columbia, Vancouver, British Columbia, Canada

⁴Rick Hansen Institute, Vancouver, British Columbia, Canada

⁵Child and Family Research Institute, Vancouver, British Columbia, Canada

⁶Department of Orthopaedic Surgery, British Columbia Children’s Hospital, Vancouver, British Columbia, Canada

Abstract

Forearm fractures are one of the most common injuries sustained by children. Our descriptive study addressed, from the perspective of a child, the following research objectives: (1) to describe their fracture experience and (2) to describe how fractures might be prevented. Photovoice is a unique research strategy by which people create and discuss photographs. This technique has been used to elicit the perspectives of those whose voices are often ‘not heard’ in research, like children. Participants were recruited from a larger three-year prospective trial and included 10 boys (12.3 ± 1.6 years) and 7 girls (11.3 ± 1.6 years). We asked participants to take pictures to explain where their injury occurred (place), what they were doing at the time (context) and how the fracture had happened (mechanism). We also used semi-structured interview techniques. The following key themes emerged from our interviews: (1) the built environment as a key factor that ‘caused’ their fracture, (2) the fracture experienced as a journey not an event and (3) strategies to prevent fractures. A simple clinical step to potentially reduce subsequent fractures will be for clinicians to have a brief conversation with their young patients and to listen to the child’s personal preventive strategies.

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Corresponding author: Joanie Sims-Gould, Department of Family Practice, University of British Columbia, Centre for Hip Health and Mobility, 2635 Laurel Street, Vancouver, British Columbia V5A 1S6, Canada. joanie.sims-gould@hiphealth.ca.

Conflict of Interest

The authors have no conflicts of interest to disclose.

Keywords

Accidents; action research; qualitative approaches

Introduction

Every year, greater than 20% of children (boys and girls between the ages of 5 and 17) seek medical attention due to injury; the highest emergency department attendance rate is for those aged 10–15 years (Walsh et al., 1996). Forearm fractures are one of the most common injuries sustained by children and account for 10–25% of all paediatric traumas. The incidence of fracture is increasing, in sharp contrast to the decrease in the overall rates of childhood injuries (Khosla et al., 2003; Landin, 1983; Lyons et al., 1999). An estimated 40% of boys and 30% of girls will have sustained at least one fracture by the age of 16 (Landin, 1983). Children experience almost twice the annual fracture rate of adults; one of every three or four paediatric fractures affects the distal forearm. It has been suggested that fractures are no accident and sustaining one fracture significantly increases the likelihood of a child experiencing another (Goulding et al., 2005). Thus, it seems imperative to better understand why children fracture and how to prevent fractures.

An abundance of epidemiologic evidence describes how (Rennie et al., 2007; Ryan et al., 2010), where (Lyons et al., 1999; Morrison et al., 1999; Mytton et al., 2009) and in what populations (Cheng and Shen, 1993; Cooper et al., 2004; Jones et al., 2002; Lyons et al., 1999; Rennie et al., 2007) forearm fractures occur in children. Certain personality traits (such as judgement of consequences) that increase exposure to potential injury risk have also been described (Hillier and Morrongiello, 1998; Morrongiello, 1997; Morrongiello and Rennie, 1998). Other studies explored children's experience with more serious health-related events such as hospitalization (Clift et al., 2007; Ford, 2011; Jensen et al., 2012), chronic illness (Carlsson et al., 2008; Sällfors et al., 2002; Taylor et al., 2008) and pain and pain management (Franck et al., 2008; Kortessluoma et al., 2008; Kortessluoma and Nikkonen, 2006). However, to the best of our knowledge no studies describe the experience of fracture from the perspective of the children who sustained one. Therefore, we used a novel approach called 'photovoice' (Wang and Burris, 1994; Wang et al., 1998) to capture the perspectives of children who experienced a forearm fracture so as to view the fracture experience through the lens of a child and to gather suggestions as to how to best prevent future injury. These insights may provide a means for clinicians, educators and parents to better understand how and why fractures occur and potentially provide solutions that will prevent future fractures. Our descriptive study addressed, from the perspective of a child, the following research objectives:

1. To describe the fracture experience (e.g. What was the child doing? At what geographical location did the fracture occur? Why did it happen?).
2. To describe how fractures might be prevented (e.g. What could the child do differently to prevent a future fracture? What advice would they offer other children to prevent them being injured?).

Methods and patients

Photovoice is a unique research strategy ‘by which people create and discuss photographs as a means of catalyzing personal change’ (Wang et al., 1998, p. 75). This technique has been used to elicit the perspectives of those whose voices are often ‘not heard’ in research (Frohmann, 2005; Moffitt and Vollman, 2004; Wang et al., 1996). Photovoice is not only a method of research but also a tool for action. Participants are given cameras and asked to photograph, reflect upon, depict and create a dialogue around their personal experiences. The resultant photographs are a powerful visual representation of one’s personal experience and perceptions. In our study, we focussed our photovoice project upon children who sustained a forearm fracture to capture the event through their eyes and their further reflection on injury prevention.

Patients

Risk-taking behaviour and fracture study (Fracture study)—Photovoice participants were recruited from a larger three-year prospective trial (risk-taking behaviour and fracture study (Fracture study). The Fracture study is an ongoing observational, double-cohort study that aims to characterize risk factors that contribute to distal radius fractures. Fracture study participants represent two cohorts: (i) never fractured – healthy boys aged 9–15 years and healthy girls aged 8–13 years and (ii) fractured – same aged healthy boys and girls who sustained at least one distal radius fracture. For the larger study, we identified children who presented with a distal radius fracture at the fracture clinic in the Division of Pediatric Orthopedics at British Columbia Children’s Hospital and provided them and their parents with details of the study. Non-fracture participants from the local community were also invited to participate. Three hundred and nineteen children ($n = 146$ never fractured; $n = 173$ fractured) enrolled. Parents signed informed consent for their children to participate in the Fracture study; children also signed the informed consent. We obtained ethics approval from both the University and Health Authority Clinical Research Ethics Boards to conduct our studies.

Photovoice study – recruitment and participants—Photovoice study participants were a subset of the eligible participants ($n = 173$) from the ‘fractured’ group in the larger Fracture study. We approached participants (and their parents) of the Fracture study after they had completed baseline measurement and invited them to participate in the Photovoice study. Children who volunteered to participate ($n = 33$) and their parents signed an informed consent and were given a disposable camera. All eligible children were invited to participate until data saturation was achieved (Guest et al., 2006). Data saturation was defined as reaching the point in thematic analysis where no new data emerged. Once the researchers determined that data saturation had been reached, participants were no longer invited to participate.

Participants were asked to take pictures that represented where their injury occurred (place), what they were doing at the time (activity) and how the fracture had happened (mechanism) and to take any other photos they felt described their experience. Of the 33 participants who were provided a camera, 17 returned them after taking photos. Participants were 10 boys

(12.3 $\pm$ 1.6 years) and 7 girls (11.3 $\pm$ 1.6 years). After two weeks, participants were invited back to view and discuss their photographs. We used semi-structured interview techniques to provide participants the opportunity to 'tell the story' of their fracture incident. Two research assistants who were trained in qualitative interview methodologies discussed each one of the individual photographs with the participants. Participants took between 1 and 26 photographs (9 photographs per participant, on average). Interviews were digitally recorded and interview times ranged from 6 minutes to 20 minutes (10 minutes, on average). To enhance accuracy, this information was compared with a Fracture History Questionnaire that was completed at the hospital at the time of the fracture incident.

Data analysis

All interviews were transcribed verbatim using a professional transcription service. We reviewed the transcripts and photographs using a framework analysis (Pope et al., 2000; Rabiee, 2004) that included four stages, namely familiarization, thematic identification, charting and interpretation. We used a number of strategies to establish rigour in our study. These included engaging with the research team for peer debriefing (via team meetings and through smaller focused discussion groups to develop themes), memo writing throughout the analysis process and by recording an audit trail of decisions made throughout data collection and analysis (Cutcliffe and McKenna, 2004; Koch, 2006).

Results

Thirteen participants took their photographs at the exact location where the injury occurred. Four participants whose injury occurred at a hard to reach location (i.e. ski hill) took photographs in which they 'posed' to recreate the fracture incident. Based on our visual interpretation of the photos and the verbal description of the fracture incident provided by the participant during the interview, we used the International Classification of External Causes of Injuries (ICECI) coding structure (ICECI Coordination and Maintenance Group, 2004) to describe where and how the fracture happened and what the participant was doing at the time of fracture (Table 1).

Boys in our study (more commonly) took part in board sports and ball sports at the time of fracture than did girls. Girls' activities were more likely to include games played at school and cycling. In addition to findings on the nature of the injuries, the following three key themes emerged from our interviews: (1) the built environment was a key factor that 'caused' their fracture, (2) an understanding of their fracture as a journey, not an event and (3) whether or not the fracture was preventable.

The built environment as a 'root' cause

Photographs and interview narratives quite clearly underscored the built environment as playing a key role in the participant's fracture experiences. The participants photographed and discussed features such as uneven sidewalks (used as jumps for bikes/skateboards), soft shoulders on roads and high bars over hard surfaces as the cause of their injury (see Figure 1).

Fracture as a journey not an event

Many of our participants described their fracture incident as a story with a beginning, middle and end. Several participants took photographs along the pathway of their journey that led ultimately to the location where the fracture was sustained. During the interviews, participants took care to align and position their photographs so as to demonstrate the direction of travel and pointed out any built environment features (such as inclines) that were not obvious from the photograph. Most participants described the fracture incident as part of a larger journey rather than as a stand-alone event. One girl described her fall by making large waving and rolling gestures with her arms to demonstrate her fall from her bike (see Figure 2):

My bike was shimmying like this and then it started doing big swerves. And then it flew me off on the left side of the road and it tipped left. 'Cause I put out my left arm to save myself, broke it. And then my shoulder hit, and then my head ... and I did end over end into the ditch, like, halfway down.

Participants also discussed sharing their fracture story with friends at school. During their interview, they described in detail how they relayed their journey to their peers, focusing upon a series of events that culminated in a fracture. Participants also expressed how they were keen to see the response of their peers.

Whether or not the fracture was preventable

Several participants insisted that there was nothing they could have done to prevent their fracture. Three boys (no girls) described the fracture incident as a 'fluke' or a 'freak accident'. They perceived it as a one-time event and something that was unlikely to happen to them again in the future.

You don't want to, like, give up just 'cause you hurt yourself once. Especially 'cause it wasn't, like, it was kind of just a fluke ... that one time. I broke my arm that one time so – it's not like it's going to happen a whole bunch more times.

Whilst some participants suggested there was no way to prevent their fracture, most participants identified ways that they might have prevented sustaining a fracture and/or strategies to prevent future fractures. One participant described a fracture incident that occurred during physical education class, where she tripped whilst running backwards.

I was running backwards and I was trying to catch a ball and both my arms were up in the air and I was running backwards and then I tripped on one foot. And so I fell on my left hand and I was still trying to catch the ball with my right hand ... maybe kids shouldn't be allowed to run backwards.

All participants returned to the activity they were engaged in when they sustained their fracture, with the exception of one participant who was unable to ride her bicycle for one year. However, the participant stated that she looked forward to riding her bike again. Interestingly, although no participants described being fearful of the activity they were engaged in at the moment of fracture, several mentioned that they modified their activity after sustaining their injury.

I: You still go on the trampoline?

R: Yeah, but I don't do the same thing that I did when I broke my arm.

When asked how they would prevent future fractures or how they would help prevent other children from sustaining fractures, 14 participants stressed the importance of wearing protective equipment (three boys did not wear protective equipment), being more careful, paying attention to their surroundings and communicating intentions with others.

Wear protective stuff at all times and then always be aware of your surroundings 'cause you don't know if you're going to, like, catch a pothole or get hit by a car.

Discussion

Photovoice in combination with semi-structured interviews was an effective way to enable children to tell their story and share their views on how and why their fracture occurred. Information gleaned from this bottom-up approach may guide health practitioners, educators and parents regarding how best to intervene with children to raise awareness of safety issues and practices to prevent future injuries and assist with translating safety messages that resonate with the children's own perspectives. For example, the current literature that examines the relationship between the built environment and childhood injury focuses on play surfaces (Laforest et al., 2001; Norton et al., 2004; Thomas et al., 1994). However, children do not necessarily favour playgrounds as spaces for informal play, opting instead for less managed open spaces (Brockman et al., 2011; Burke, 2005; Veitch et al., 2006; Veitch et al., 2008). This is consistent with our findings; many of our participants did not sustain their injury in a managed play setting but rather on a sidewalk, road, field or yard – the use of photovoice enabled the children to 'tell' this story. Our findings suggest that these built environment features play a key role in children's injury. Participants underscored that safety messages need to include a focus on these unmanaged and sometimes unruly play spaces (i.e. gnarly tree routes).

Children in our study described their fracture as part of a series of events, not as a single incident. This challenges existing research and injury prevention strategies that describe injury as a singular event. In falls research with older adults, this is conceptualized in the Swiss Cheese Model, which suggests that multiple 'holes' (events) need to line up for a fall to occur. The alignment of holes creates the perfect context for fall and injury (Zecevic, 2010). In the case of the children in our study, if one of the events or steps (i.e. going too fast, the bike being too big, feeling tired, the ground being uneven, etc.) leading to the final incident (impact on the ground, fracture) had been modified, the injury may not have occurred. This was clearly expressed through discussion of their photographs. This notion challenges injury prevention messages to focus not just on the sentinel incident (in our study a distal fracture) but also on the journey and multiple events leading up to an injury. It seems important to consider injury as having a longer trajectory with more opportunities for prevention.

Eighty-two percent of the children in our study described their injury as preventable. Given that approximately 20% of children experience multiple fractures during the growing period (with a greater number of boys experiencing multiple fractures than girls), it is important to acknowledge that children see the opportunity for prevention and take action (Jones et al.,

2002). This finding is a reminder for health professionals to take the opportunity to speak about prevention with their young patients. It also underscores photovoice as a powerful tool for children to engage in conversations about their own health matters.

One limitation of our study is that it focused specifically on forearm fractures (not fractures more generally). Whilst we suspect that our findings may be similar for other types of fractures in children, we cannot be certain.

Conclusion

Children are eager to offer solutions for prevention and can identify their own preventive strategies. Photovoice offers a vehicle for children to engage in research about intentional and unintentional injury prevention and offer their unique, and insightful, perspectives. Just as photovoice engages its participants in ‘telling’ their story, a simple clinical step to potentially reduce subsequent fractures will be for the medical team to have a brief conversation with their young patients and to listen to the child’s personal preventive strategies. Future research on fracture prevention in children might focus more fully on gender and age differences in prevention strategies. We would advocate for the use of a visual methodology such as photovoice.

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Figure 1.
Root cause.

Figure 2.
Journey not an event.

Table 1

Descriptive characteristics of participants' fractures.

Gender	Age (years)	Fracture site	Activity	Place of occurrence	Mechanism of injury	Object producing injury
Boy	12.8	Left radius and ulna	Basketball	Sporting hall	Struck by moving object before which person moved/was moved	Ground surface
Boy	11.2	Right radius	Other specified individual water sport (skimboarding)	Beach	Fall from a height less than 1 metre	Ground surface
Girl	13.2	Left radius	Cycling – road	Roadway	Transport injury event – pedal cyclist; fall from a height less than 1 metre	Ground surface
Girl	9.3	Left radius	Cycling – road	Roadway	Transport injury event – pedal cyclist; fall from a height less than 1 metre	Ground surface
Boy	10.4	Left radius	Cycling – road	Sidewalk	Transport injury event – pedal cyclist; fall from a height less than 1 metre	Ground surface
Boy	14.5	Left radius	Soccer – outdoor	Sporting grounds	Falling/stumbling by slipping on the same level	Ground surface
Boy	10.0	Left and right radius	Skate boarding	Public park	Fall from a height less than 1 metre	Ground surface
Girl	10.6	Right radius	Gymnastics – trampoline	Sporting hall	Falling from a height of 1 metre or more	Ground surface
Boy	11.5	Left radius	Kickboxing	Sporting hall	Falling/stumbling by tripping on the same level	Ground surface
Girl	10.7	Right radius	School free play	Playground at school	Pushed on the same level	Ground surface
Girl	12.7	Left and right radius	Handball	Sports and athletics area at school	Falling on the same level	Ground surface
Boy	15.2	Left radius	Snowboarding	Skiing or snowboarding area	Falling/stumbling by slipping on the same level	Ground surface
Boy	12.6	Right radius	Skateboarding	Stake park	Pushed on the same level	Person or ground surface
Boy	12.3	Right radius	Snowboarding	Skiing or snowboarding area	Falling/stumbling by slipping on the same level	Ground surface
Girl	9.7	Right radius	Rollerblading	Roadway	Falling/stumbling by slipping on the same level	Ground surface
Boy	12.2	Left radius	Rollerblading	Roadway	Falling/stumbling by slipping on the same level	Ground surface
Girl	13.0	Left radius	School physical education class	Sports and athletics area at school	Falling/stumbling by slipping on the same level	Ground surface