Proceedings of The National Conference
On Undergraduate Research (NCUR) 2015
Eastern Washington University, Cheney, WA
April 16-18, 2015

Qualitative Evaluation of Pediatric Burn Injury in Malawi: Assessing Opportunities for Injury Prevention

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Abstract

Introduction: The burden of burn injury in low and middle-income countries (LMIC) is high, particularly in sub-Saharan Africa. Prior studies have shown that children bare a disproportional share of the burn injury burden. In order to develop burn injury prevention strategies, characterizing the circumstances surrounding the burn event is imperative. Methods: This is a prospective qualitative study of pediatric burn survivors (age ≤ 8 years) admitted to Kamuzu Central Hospital (KCH) in Lilongwe, Malawi. Each patient's primary guardian was interviewed between the weeks of June 16, 2014 and September 1, 2014 using a developed questionnaire. Results: There were a total of 72 guardians interviewed for the purpose of the study. The mean age of the cohort was 3 years and 56.94% (41 patients) were male. The most frequent mechanism of burn injury was flame (44.40%, or 32 patients) and scalds (38.89%, or 28 patients). There were seasonal and temporal patterns to burn injury, occurring most frequently in the cold season (80.56%, or 58 patients) in the late afternoon (38.89%, or 28 patients). Mothers were most likely to be with the patient at the time of the burn injury (23.61%, or 17 patients), while 22.2% (16 patients) were unmonitored at the time of injury. More than half of the burns (55.56%, or 40 patients) were cooking-related. Information from this report should be used to help create effective burn prevention strategies for those in sub-Saharan Africa. Conclusion: Burn prevention strategies are necessary for addressing the high rates of burns for children in sub-Saharan Africa. The most important aspects of a burn prevention program should be caregiver education, continuation of burn research to influence public policy, and community monitoring. According to this study, the most cost-effective way to implement burn prevention strategies would be within the home environment.

Keywords: Burns, Sub-Saharan Africa, Prevention

1. Introduction

Burns are a significant burden of pediatric injuries. In 2008, more than 47,000 children less than 15 years of age died from burn-related injuries worldwide. Mortality from pediatric burns is most pronounced in low- and middle-income countries (LMICs) where over 90.00% of burn-related pediatric deaths occur. This is equivalent to 3.4 burn-related deaths per 100,000 children in LMICs compared to 0.5 deaths per 100,000 in high-income countries. By region, the World Health Organization's (WHO) African region has the highest rate of pediatric burn-related deaths at 7.03 per 100,000 children.[1]

In sub-Saharan Africa, poverty, mass illiteracy, and migration to urban areas are some of the factors that have led to an increase in burns during the past decade. From a purely human perspective, there is nothing more tragic than a preventable burn that often leads to devastating outcomes. The full physical, psychosocial and economic long-term costs of sustaining a pediatric burn are potentially significant, and difficult to quantify.[2]

In sub-Saharan Africa, pediatric burns occur mostly in and around the home. It has long been recognized in the public health literature that pediatric burns are preventable, irrespective of the country/culture in which they occur. Some of the factors that increase the risk pediatric burn include the built environment. The design of traditional

dwellings and mud huts contribute to burn incidents. In many instances, the space inside the dwelling is used for both cooking and sleeping. In rural African homes, the charcoal stove is often the only method of cooking or heating, other than an open unguarded fire on the floor.[3]

There are very few acute burn units in sub-Saharan Africa and currently most are focused on the treatment of burn injury, specifically wound care and less so on exploring the environmental issues surrounding the injury event. The North Carolina Jaycee Burn Center and the Kamuzu Central Hospital have partnered since 2008 to improve burn care for patients at KCH. While efforts on burn prevention are critical to an overall public health and governmental public policy and strategy, this will take time to implement. Due to the high morbidity and mortality associated with burn injury, we sought to gain insights into the circumstances surrounding the burn injury so as to better inform burn injury prevention strategies.

2. Methods

This study is a prospective qualitative survey and analysis based at the Burn unit at Kamuzu Central Hospital (KCH), Malawi. KCH is a 600-bed tertiary care hospital in the capital city of Lilongwe, which serves as a referral center for approximately five million people in the central region of Malawi. The burn unit at KCH was established in 2011 and averages 25-40 admissions per month.[4] Pediatric and adult patients are admitted to the same unit, which consists of 31 beds, 10 full-time nurses, and two trained clinical officers with surgical oversight.

A 35-question quantitative survey was translated to the local language, Chichewa, and approved by the UNC Office of Human Ethics Research. When designing the survey, the primary objective was to address how serious burns occurred for children ages eight and under, and the environment surrounding the accident. Therefore, in addition to determining burn etiology, we assessed other socio demographic factors potentially affecting the burn accident. Additionally, several survey questions were used to eliminate any unrelated causes of the burn, such as associated comorbidities and temporal and seasonal effects. The survey consisted of five main sections, including basic patient demographics, socio-demographic characteristics of the patient's primary guardian, cooking style in the home of the patient, child care in the home of the patient, and information about the circumstances surrounding burn injury event. A data clerk administered the survey at KCH. Data was collected directly from each patient's primary guardian.

3. Results

Data was collected for a total of 72 patients. The average patient age was 3 years, and 56.94%, or 41 patients, were males. The majority of patients (57) received treatment within 24 hours of the burn. 81.90% of the patients (59) had been admitted to the unit 2-7 days prior to the interview, and 65.28% (47) had been burned 2-7 days prior to the interview. 55.56% of patients (40) came high-density areas, and 22.22% of patients (16) were transferred from another hospital. Patients came from a total of 38 different regions throughout Malawi. 70 patients had no underlying associated comorbidities, while 1.39%, or one patient, had a constant cough, and 1.39%, or one patient, had epilepsy. None of the patients had a recurrent burn injury.

3.1 Guardian socio-demographics

72 primary guardians for interviewed for the purpose of the study. Of the primary guardians interviewed, 59.72% (43) were between the ages of 21-30, and 20.83% (15) were between the ages of 31-40. All of the primary guardians were female, and 88.89% (64) were the patient's mother. 34.72% (25 guardians) were unemployed, 30.56% (22 guardians) worked in agriculture, and 22.22% (16 guardians) worked in business. Due to their employment status, 61.10% (44 guardians) reported being at home with their children every day.

61.10%, or 44 guardians, were homeowners. Number of people in each household ranged from 2-4 per household in 48.61% (35) of cases, while 41.67% (30) reported 5-7 people in their household. When asked how many adults lived in each household, the survey revealed that two adults lived in 59.72% (43) of the households, and 3 adults lived in 15.28% (11) of the households. 61.10% (44) said 1-2 children lived in the home, while 27.78% (20) had 3-4 children in the home. 69.40% (50) said their house had tin roofing, and 30.56% (22 guardians) said it had straw roofing. Overcrowding in the house did not seem to be an area of concern for most of the guardians.

3.2 Cooking practices

As shown in Figure 1, 58.30% (42) used charcoal and 37.50% (27) used wood, while only 4.17% (3) used electricity for cooking. 76.39% (55) cooked on the floor, 19.40% (14 guardians) cooked on a low stove, and 4.17% (3) cooked on a high stove. 55.60% (40) and 37.50% (27) of guardians cooked outdoors and indoors, respectively, and 6.94% (5) varied cooking location depending on weather conditions.

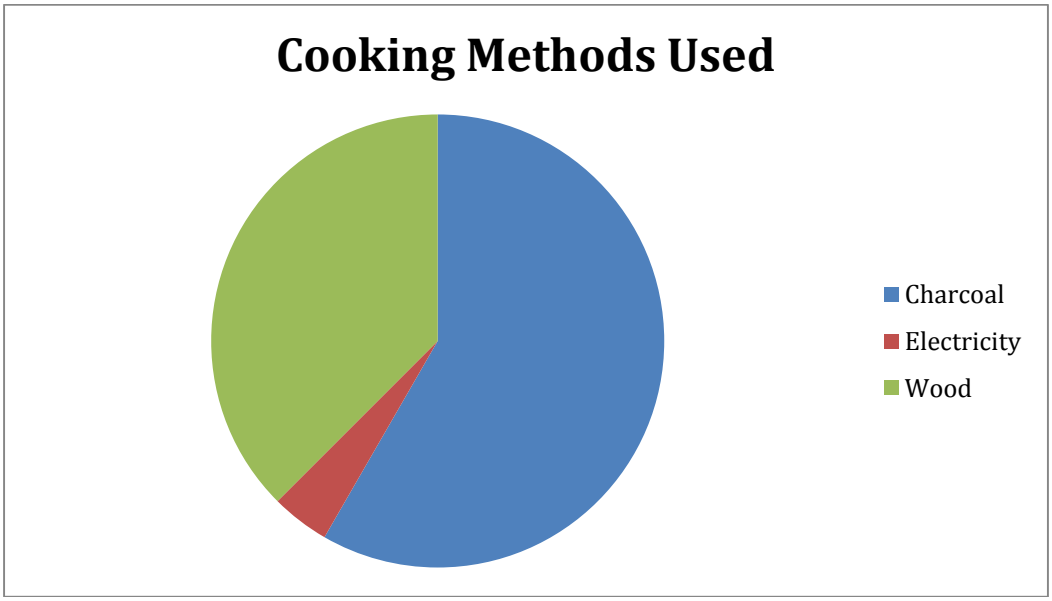

Figure 1: Cooking methods used in home of patient

3.3 Child care characteristics of patient

During daytime hours, 41.70% (30) mothers were responsible for looking after their patient. 13.90%, or 10, grandmothers watched over the patient, and 8.33%, or 6, sisters watched over the patient. During this time, 51.39% (37) of those responsible for the patient were taking care of 1-2 children, and 34.72% (25) were responsible for 3-4 children.

In the evening, 90.28% of mothers (65) were responsible for looking after the patient, and 9.72% of grandmothers (7) were responsible for looking after the patient. During this time, 62.50% of those responsible for the patient, or 45 guardians, were taking care 1-2 children, and 27.78%, or 20 people, were taking care of 3-4 children. 93.06% of mothers (67) and 6.94% (5) of grandmothers were primarily responsible for deciding who would look after the patient at any given time. During both the day and night time, it did not seem as if the patient's caregiver was responsible for too many children.

3.4 Burn incident characteristics

44.40% (32) were burned by open flame fire, 38.89% (28) by hot water, and 11.11% (8) by hot porridge resulting in scalds. 38.89% (28) were burned in the late afternoon, and 22.22% (16) were burned in the early morning. 55.56% (40) sustained their injury outdoors were burned outside, while 44.44% (32) were burned inside. 80.56% (58) were burned in relatively colder weather, and none of the patients in the study were burned while it was raining outside. These results can be seen in Figure 2.

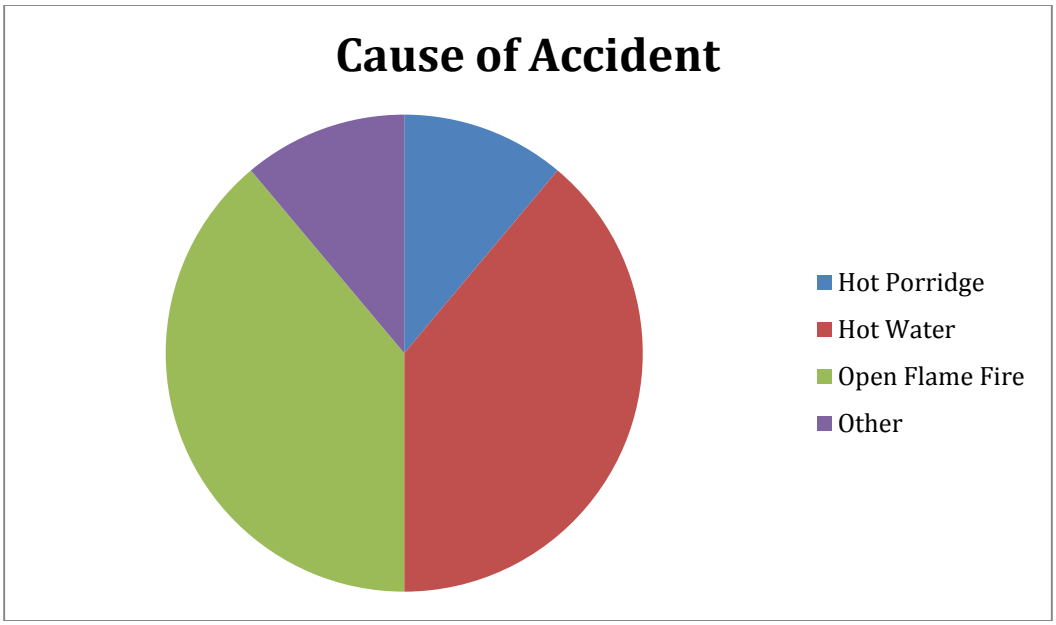

Figure 2: Cause of accident for patients

55.56% (40) had cooking-related burns. 97.50% of cooking-related burns took place in the normal cooking area (39). 37.50%, or 12, burns not due to cooking were related to heat; furthermore, 18.75%, or 6, were related to bathing water and 18.75%, or 6, were related to use of candles or open flames as a light source. At the time of the burn, 23.61% (17) of the mothers were with their patient, while 22.22%, or 16 patients, had no one looking after them. 12.50% (9) were being taken care of by a sister, 11.11% (8) were being taken care of by a family friend, and 6.94% (5) were being taken care of by a grandmother.

4. Discussion

This study describes the socio-demographics of our burn patients and their guardians and the circumstances surrounding the burn injury event in patients presenting to a hospital in sub-Saharan Africa, a region with the highest pediatric burn mortality in the world.

Given the significant burden of pediatric burn injuries, prevention is essential to reduce burn-related mortality and morbidity with its associated childhood suffering. However, prevention initiatives are most likely to be effective only when interventions are evidence-based, designed to address specific etiologic patterns and target high-risk populations.[5] Like any injury mechanism, the first steps in prevention require obtaining adequate and accurate data of vulnerable populations and associated risk factors and then use this knowledge to inform targeted prevention strategies.[6]

Risk factors identified in our study include burns caused by scalds and burns that occur in the home. The most common type of burn injury resulted from scalds, which was also the most frequent cause of pediatric burns described in the literature. The majority of burn patient had cooking related burns. Food preparation using open cast iron pots for cooking food and boiling water constitute a major hazard for small children and toddlers as they often play around the cooking area, moreover, most cooking is ground level cooking, which is accessible to toddlers and children and this lends it self well to injury prevention initiatives.

According to the study, burn prevention strategies should target young mothers. Hence, the strategies should be relevant to mothers who stay at home during the day. For instance, the majority of mothers try to work while also loosely supervising their children. Because many patients were burned when no one was watching them, prevention strategies should talk extensively about what it means to carefully protect children. One way to prevent accidents would be for a responsible adult to be near the children any time fire or hot water is close by.

Urban migration, poverty, and the development of slum areas relate significantly to overcrowding and the risk of burn. Families are often forced to share small, overcrowded living spaces. However, in our study, this was not a pattern

that was detected. Only about 10% (8) lived in a home with more than four children, and 83.83% (60) had at least two adults in the home. Burn incidents are prone to happen when parents, in an attempt to find work, leave small children unsupervised or in the care of other children or relatives. As is evident from our study, only 23.61%, or 17 mothers, were present or in the vicinity of the child during the burn incident.

Burn prevention strategies should primarily discuss potential accidents regarding fire and hot water. A specific strategy could be allowing bathing water to cool for at least three minutes before pouring it on the child. Furthermore, people use fire more often for warmth and light in the cold season, which is why the majority of burns took place in the early morning or late afternoon. Therefore, burn prevention strategies should focus on these times of the day. Additionally, because a majority of burns took place in high-density areas, strategies should specifically focus on reaching those in such places.

This study had several limitations. The duration of the study was over 12-week period in the winter months and so the full temporal spectrum of burn injury and over all season may not be fully appreciated. Secondly we only interviewed patients admitted to KCH who typically sustained more serious burns injury, exposing our findings to selection bias. We missed all non-serious burn and we could have gleaned significant insight into the circumstances surrounding minor burn events. Lastly, our findings may not be representative of all of Africa, but we believe it is representative of the region. A large multi-national, multi-institutional study might be needed for further analysis.

5. Conclusion

Burn injury prevention would be effective if a multi-targeted strategy of developing programs of caregiver education, continuing burn research to inform public policy, and community monitoring was supported by repetition of the burn injury prevention message in different forms. Based on our study, the most cost-effective area to start a burn injury campaign would be within the home environment.

6. Acknowledgments

All funding for the study was given through the Honors Carolina Burch Fellowship. The University of North Carolina Project in Lilongwe, Malawi, and the UNC Department of Surgery and NC Jaycee Burn Center that provided administrative assistance throughout the research process.

7. Footnotes

7.1 Conflicts of interest

The authors had no conflicts of interest to declare in relation to this article.

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