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Home fire safety education for parents of newborns

Carlee Lehna [a,b,*], Erin Fahey [a], Erika G. Janes [c], Sharon Rengers [c], Joseph Williams [d], Drane Scrivener [d], John Myers [b]

[a] University of Louisville School of Nursing, 555 S. Floyd St., Louisville, KY 40202, United States
[b] University of Louisville School of Medicine, Abell Administration Building, 323 E. Chestnut St., Louisville, KY 40202, United States
[c] Safe Kids Louisville, led by Kosair Children's Hospital and Children's Hospital Foundation Office of Child Advocacy at Kosair Children's Hospital, 315 E. Broadway, 5th Floor, Louisville, KY, 40202, United States
[d] Louisville Fire Department, 1135 W. Jefferson St., Louisville, KY 40203, United States

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ABSTRACT

In children under 1 year of age, the proportion of unintentional burns increases with infant age and mobility. Infants are not able to avoid burns and are dependent on parental or adult help. Treatment of burns in young children is expensive in terms of the life-long costs. The purpose of this study was to examine changes in home fire safety (HFS) knowledge and practices over time for parents of newborn children and expecting parents. HFS knowledge of 103 parents was assessed at baseline, immediately after watching a DVD on HFS (recall), and at 2-week follow-up (retention). In addition, the United States Fire Administration (USFA)/Federal Emergency Management Agency (FEMA) Home Safety Checklist which examines HFS practices in the homes was administered. Seventy percent of the participants were Caucasian, 65% were married, and 81% were first-time parents. HFS knowledge increased significantly from baseline to recall ($45 \pm 12\%$ vs. $87 \pm 17\%$ correct responses, $p < 0.0001$), but declined to $75 \pm 18\%$ correct at retention. That is, an individual's baseline scores nearly doubled at recall ($42 \pm 11\%$ change in baseline score), but only increased by 67% at retention ($30 \pm 15\%$ change in baseline score). For a subsample of parents who completed the USFA Checklist ($n = 22$), the mean percentage of advocated practices followed was $71 \pm 11\%$ (range: 40–89%). Using DVDs was an effective educational modality for increasing HFS knowledge. This addressed an important problem of decreasing burns in infants through increasing parent knowledge and HFS practices using a short, inexpensive DVD.

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For infants under 1 year of age, unintentional burns increase with age and mobility [1]. Prevalence of burns in this group peaks around 9 months of age due to increased mobility, the infant's interest in exploring the environment without awareness of danger, and the parents' underestimation of the child's ability to reach certain areas [2]. Burns and scalds, the most common burns in infants, are caused by contact with hot beverages, hot water, and cooking appliances [1,2]. Scalds

* *Corresponding author at*: School of Nursing & Associate in Pediatrics, School of Medicine, University of Louisville, 555 S. Floyd St., Louisville, KY 40202, United States. Tel.: +1 502 852 3913; fax: +1 502 852 0704.
E-mail addresses: c0lehn01@louisville.edu (C. Lehna), Erin.Fahey@louisville.edu (E. Fahey), Erika.Janes@nortonhealthcare.org (E.G. Janes), Sharon.Rengers@nortonhealthcare.org (S. Rengers), Joseph.Williams@louisvilleky.gov (J. Williams), Drane.Scrivener@louisvilleky.gov (D. Scrivener), John.Myers@louisville.edu (J. Myers).
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from hot water are from tap, bath, or shower water [3]; oven doors are the main source of contact injuries [1].

Although great advances have occurred in the treatment of childhood burns, the infant with a burn may still experience multiple medical and surgical procedures over the course of 3–4 years during treatment after acute injury [4]. For example, in one study 230 children with burns experienced an average of two surgeries (range: 1–12) after their burn. Total cost (hospital and physician charges) per child's injury treatment averaged $83,535 ± 155,716 [4].

1. HFS in parents

In the first of three studies on HFS from the injury prevention group at Johns Hopkins Bloomberg School of Public Health, Gielen and colleagues in 246 caregivers (76% single, $n = 186$ and 93% mothers, $n = 229$), who were unemployed (50%, $n = 123$), had high school educations (56%, $n = 138$), with incomes ≤$5000 (69%, $n = 161$) and were recruited from emergency departments and well child clinics [5]. Mothers described their children as being male (54%, $n = 133$), and averaging 2.5 years of age. HFS checks revealed 82% had at least one working smoke alarm and 42% had a smoke alarms on each level of their home. Parker and colleagues for 240 caregivers of children under 18 years of age reported 40% ($n = 95$) had working smoke alarms and 50% ($n = 118$) had safe hot water temperatures below 120 °F [6]. Shields and colleagues in a randomized control trial of an educational intervention delivered to 720 parents of children 4 months to 5 years, in an urban emergency department, who were telephoned 4–6 months to assess self-reported knowledge and behavior found no difference in knowledge and self-reported behaviors between groups (those receiving the intervention and those who did not) [7]. For the sub-set receiving home visits, data was collected on location and functionality of smoke alarms, no difference between control and intervention groups between safe and unsafe smoke alarms.

HFS was examined prospectively in the other studies. Duchossois and colleagues examined west Philadelphia fire-fighters whom performed classroom HFS education with third and fourth graders [8]. A randomized sample of student homes were selected to participate in home visits to install free smoke alarms with 10-year lithium batteries. Families were also instructed on smoke alarm testing, and fire escape plan development and practice. A 4-month post-home visit was conducted again by fire-fighters to confirm smoke alarm installation and conduct a HFS knowledge survey. Sixty-six of 86 households participated in the follow-up home visit. There was a significant change in HFS knowledge and practice from an average of 3.3 ± 1.9 to 5.6 ± 1.3. Most notable changes were having operational smoke alarms on every level of the home and selection of a meeting place outside the home.

Lehna and colleagues in a prospective HFS study examined parents' of children with and without special needs learning via small groups or classroom participation [9]. No difference was found in learning between groups, parents of a child with or without special needs, or between classroom and small group parent education strategies. A few questions were asked at all three time points (pre-, post-test, and 2-week follow-up). The need to have a smoke alarm outside the bedrooms increased significantly over time and was retained. Having a fire escape plan increased from pre to post-intervention but at follow-up returned to pre-levels. Perceived knowledge and ability increased over time for all groups. Home visits were not conducted.

Carlson and colleagues in a HFS study conducted in Sweden with control and intervention groups examined changes in mothers of 4–7 months old having low income, knowledge and practice after attending a 30–60 min workshop on HFS [10]. Mothers in the intervention group had significantly improved HFS practices (e.g., cooker securely anchored, warm liquid not in reach of child, electrical cords to iron and coffee and water heating appliances not within reach of a child).

Gaps in the HFS research involve examining more than smoke alarm placement and functionality, and hot water heater temperatures. Educational interventions need to be combined with HFS home checks to improve home practices for vulnerable populations such as first time parents, or parents of children with special needs. HFS checks as suggested by the USFA/FEMA in addition to smoke alarms and hot water temperature, include cooking safety, electrical and appliance safety, candle safety, carbon monoxide (CO) alarms, smoking safety, heating safety, home escape planning.

Suffering a childhood burn is a significant physical, emotional, and financial burden for the infant victims and their families over time. It is imperative to focus on prevention of burns in this population. Because of their age and dependence, prevention efforts should be focused on parents and caregivers of infants; however, there is limited information on home fire safety (HFS) knowledge and practices in parents of newborns and expecting parents. Therefore, the purpose of this study was to measure HFS knowledge over time using a simple educational intervention and to describe HFS practices in this population.

2. Methods

2.1. *Design and sample*

Data were collected in a longitudinal intervention study on HFS knowledge and practices of 103 parents of newborns. After institutional review board and hospital research committee approval, parents were recruited from prenatal classes, neonatal intensive care unit (NICU) support groups, and NICU follow-up appointments within one hospital system, at two hospitals, one urban and the other suburban. To participate in the study, parents only had to be expecting a child or have a newborn less than 1 year old. Parents were categorized based on whether their child was a healthy newborn, a newborn with special needs, or a newborn whose birth status was unable to be determined.

We assessed burn prevention knowledge at baseline (T1), recall of information (T2), and retention (T3; 2-week follow-up, Mean = 32.85 ± 16.42 days, range = 11–83 days). We hypothesized that HFS scores would significantly increase over time, with recall scores being the highest. We examined change in overall scores as well as scores for individual questions.

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