

Prevention of Burns

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Abstract

Burn injuries result in lifelong physical and psychological scarring, causing pain and influencing mental health, quality of life, ability to return to work and subsequent mortality. Although information on burn epidemiology is essential for resource allocation and prevention, the available data are variable and inconsistent. The majority of data are from high income countries and are directly related to access to health care resources, differences in environments and the resources of the various health-care systems. In lower income countries, fewer resources, geographical constraints and cost limit data collection and access to health care. Additionally, cultural factors such as open air cooking areas and loose clothing (for example, saris), domestic violence and dowry deaths contribute to regional variation. The various preventive strategies are adopted based on the epidemiology of burns.

Keywords: Prevention; Burn.

INTRODUCTION

Burns are a type of injury that can occur when the skin comes into contact with heat, radiation, chemicals, or electricity. They can vary in severity from minor burns that only affect the top

layer of skin to more severe burns that penetrate deeper layers of tissue and can be life-threatening. Prevention is key when it comes to avoiding burn injuries. This can include measures such as ensuring hot liquids and foods are kept out of reach of children, using caution around heat sources, wearing protective clothing when handling hot objects, and being aware of potential burn hazards in the workplace or home. It is also important to teach children about fire safety and to have working smoke alarms and fire extinguishers in the home. In addition to prevention, prompt and proper first aid is essential for treating burns and minimizing the risk of infection or further damage. WHO has proposed a plan for burn prevention and care at a global level.^{9,10}

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income countries, fewer resources, geographical constraints and cost limit data collection and access to health care. Additionally, cultural factors such as open air cooking areas and loose clothing (for example, saris), domestic violence and dowry deaths contribute to regional variation.¹¹

At Home

In India, most burn injuries occur at home, especially in the kitchen. Various risk factors are floor level cooking, sub standard kerosene pressure stove, loosely worn garments (saris and dupatta), low level electric plug points, long over hanging flex of kettle, over hanging table cloth over which hot food or beverages are kept, carelessly kept match boxes within reach of children, substandard pressure cookers, etc.

At Work

Inadequate safety measures, over work, and fatigue are common workplace risk factors.

At Play

During Diwali, Indians play with fire crackers and celebrate the festival with lights. Inferior quality of crackers and carelessness during their bursting are important risk factors.

Basic Principle Underlying Burn Prevention Strategies

Keep people separated from excessive heat. This may appear simplistic, but it is fundamental. A person cannot be burned unless a person and a heat source come into contact.¹

- *Separate with a barrier:* For example, insulate the outer surfaces of stoves and heaters to prevent contact burns; install fences to keep trespassers away from electrical power stations; use sun block creams, umbrellas and roofs to protect people from sunburn.
- *Separate by location:* For example, keep children out of the kitchen or away from the cooking area.
- *Separate by time:* For example, permit trucks carrying volatile fuel to be driven through tunnels only during hours of low traffic volume.

Sequence of Tasks For Burn Prevention Programs

The Haddon Matrix (assessing prevent, event related and post event factors) should be considered when constructing prevention programmes^{10,11}

as the matrix helps to organize interventions for appropriate upstream, midstream and downstream targets. This approach can be applied at a regional level or even at a case level.

There are six major tasks within a burn prevention program:¹

1. Document the problem
2. Set goals
3. Consider possible strategies
4. Design the intervention
5. Implement program
6. Evaluate program

Above tasks can be exemplified by study program conducted in India by Injury Prevention Workers to protect the people of India from burns caused by fireworks; a secondary success was increasing the use of cool water as first aid for burns.

Document the Problem

Determine the size and nature of the burn problem in your community. Make sure you get good information about what causes these burns and what products and circumstances are involved e.g., in India, researchers found out that the 'cone fountain' fireworks were involved in most of the injuries sustained during Diwali, the festival of lights.²

Set Goals

Decide what you want to accomplish in your prevention program. Have single and specific goals, not multiple and broad ones, e.g. in India, researchers decided to prevent injuries caused by 'cone fountain' fireworks.

Consider Possible Strategies

Use the 'public health model', following the example of public health specialists who consider three factors (Agent, Host and Environment) when trying to eradicate diseases. Energy (be it thermal, electrical, chemical or ultraviolet History, Epidemiology and Prevention of Burns 15 radiant energy) is the 'agent' for the burn injury. Host is person at risk. Environment includes both social and physical environment. Here is an example how planners in India have addressed host, agent and environmental factors when designing their programs.

Design the Intervention

Decide how your goal will be accomplished. Be

specific about what is to be done, who is to do it, in what time frame, with what resources, *e.g.* in India, researchers decided to mount a media campaign during Diwali, to teach people to handle 'cone fountain' fireworks safely and to pour water on burn.

Implement Program

Gather the necessary resources to implement your program and get to work. This means finding financial support if necessary, hiring people, or finding volunteers to perform appointed tasks and monitor progress. It means regular review of progress and brain storming on how to correct elements of the program that are not working. It means hard work. In India, researchers got financial support and technical expertise from a local insurance company and advertising firm which made television spots about safe handling of 'cone fountain' fireworks and about cool water as first aid for burns. Television spots, print advertisements and brochures were prepared. The television ran the spots just before and during Diwali.

Evaluate Program

Evaluation is the key to progress. This is true of surgical procedures, infection control, skin replacements and prevention practices. It indicates what is effective and what is not, what should be duplicated, what should be redesigned and what should be dropped. Evaluation is complex, but easier when the goals of the program are very clear. The bottom line is fewer burn injuries. Evaluators try to determine if there are fewer burns after the program, linked to measurable changes in behaviors, products or the environment. In India, researchers found no significant difference in the number of people injured by 'cone fountain' fireworks during Diwali after the media program. However, they found significant increases in the number of patients who used cool water for first aid for burns. Thus, this program had mixed results.²

General Guidelines For Potentially Effective Burn Prevention Activities

Burn prevention efforts must be tailored to the characteristics of specific burn risks. It is not possible to prevent all burns simultaneously. Burn prevention specialists must be patient and systematic, addressing one type of burn at a time. The best strategy to prevent scald burns will not reduce the number of flame or chemical burns.

Kerosene Lamps and Stoves

In homes through out the lower income nations, the most common flame burn risk is associated with kerosene lamps and stoves. These two appliances are in constant use for cooking and lighting. Burns occur when these appliances malfunction and kerosene sprays out while people attempt to clean and fix them. One study from India reported that a kerosene stove was involved in 80 percent of the flame burn injuries treated at a burn unit. Customary cooking at floor level was cited as an additional risk factor. Flame burns would be reduced dramatically world wide if people used efficient, safe, inexpensive kerosene lamps and stoves placed above floor level. Keep children out of kitchen. Avoid storing cooking material across the stove. Avoid bending over the flame to put out fire. Avoid keeping stove near gas cylinder.³

Flammable Fabrics

In many higher income countries, clothing ignition burns have become quite rare and those which do occur are often linked with flammable liquids. Reasons for this reduction include flammability standards for children's night wear, a trend toward closer fitting garments for women and girls and the redesign of ignition sources, such as space heaters. However, clothing ignition is a major problem in countries where women's traditional dress is loosely draped (saris) and made of cotton or rayon. The beauty of these garments and pride in the traditional dress has made it unlikely that reductions seen else where will occur. These garments combined with floor level cooking, place women at very high risk. Research is needed in the development of inexpensive flame resistant materials that can be used in the manufacture of saris and other traditional women's clothing. While cooking, the women should be encouraged to wear only those designs of traditional dress which fit closer to the body and are thus, less likely to catch fire at the stove. Avoid using 'sari' or 'dupatta' to handle hot vessels.³

Cigarette

Lighted tobacco products, primarily cigarettes, are the major cause of fire deaths in higher income countries, for example, approximately 50% in Sweden, 40 33% in Canada and 25% in USA.⁴ In Japan, smoking materials cause 14% of fire deaths, second only to incendiary suicide (23%).⁴² In the USA, the Center for Fire Research at the National Institute for Standards and Technology has

developed a test method to measure compliance with a performance standard to reduce cigarette ignition propensity. Once this standard is adopted, death and injury from cigarette ignited fires should drop dramatically around the world. It is necessary that all cigarettes manufactured, imported or exported, and/or sold within a country meet the performance standard for reduced cigarette ignition propensity. Home owners must install smoke detectors in all owner occupied and rented homes. Educate people not to smoke in bed or under influence of alcohol and drugs. Extinguish all cigarettes before throwing. Redesign cigarette to make them fire safe. Ban use of cigarette at places like petrol pump.

Hot Liquids

Do not keep hot liquids/foods near the edge of table. Keep them out of the reach of children. The temperature of the hot water heater should be set at 124° F. Check temperature of water before bathing children. Never leave a child unattended in the bathroom. Avoid leaving unattended hot liquids. Do not use loose pressure cooker rubber (casket). Do not carry hot water on a slippery floor. Avoid carrying hot liquids when children are around. Do not pour water in an empty hot car radiator, wait to cool or keep the face away from the radiator while pouring water.⁵

Liquid Petroleum Gas (LPG) Leak

Windows and door should be kept open. Do not light a match or switch on the electric light. Call Gas Company or Fire Department.⁵

Fire Works/Fire Crackers

Fire crackers should be ignited from a distance and those which fail to burst should not be inspected from close distance because it can burst at any time. Do not wear easily flammable fabrics while playing with fire crackers. Do not leave children to play with fire crackers unsupervised. Redesign fire crackers with safety measures. Ban dangerous fire crackers. Use fire works in the open ground only.⁵

Crowded Places (Theater)

Heat and smoke detectors should be installed. A well designed fire escape plan should be available. Fire brigade and police telephone numbers should be kept near phone. Fire extinguishers, water and sand should be available readily.⁵

Electric Burn

Educate children not to touch wires and electrical appliances. Do not handle electric appliances with wet hands and bare feet. Unplug electric appliances when not in use. Use standard company electric appliances. Plug point should be placed at higher level out of the reach of children and it should be covered with a cap. There should be no dangling cords. All flawed cords should be replaced with redesigned cords. Keep electric appliances away from the water. Hot iron should not be left unattended with in reach of children. Avoid open plug point. Avoid open bathrooms if immersion rod is used to heat water. The rescuer must be careful so that he does not become a part of the electrical circuit in attempting to free a person still in contact with a live wire. Use dry wood and push the patient away from current source. When flying a kite, it is important to remember the 3 C's of kite safety: Caution, Courtesy and Common Sense. By keeping these three items in mind at all times, you will make your recreational time more enjoyable, and safer.⁶ Here are some extra tips for making your kite outing a safe one:

- Choose a flying site at least 3 miles (5 km) away from airfields; also stay away from roads and railway lines.
- Never fly your kite near electrical pylons, overhead power cables or overhead lines of any kind.
- If your kite becomes entangled, do not attempt to free it yourself. Seek help from your local authorities.
- Do not fly your kite in electrical storms. The kite will act as a lightning conductor, causing injury and even death.
- Be aware of casual observers. They could be unaware of the potential dangers involved in kite flying.
- Flying kites on larger lines can cause line burns on your hands, so be sure to wear gloves.
- Always be aware of who or what is behind you as well as in front of you.
- Know your skill level, limitations and strength. Do not fly anything too large for the conditions or try any complicated moves in crowded areas.⁷
- Population level, collaborative projects are necessary to drive forward burn prevention through specific environmental interventions and supplementary educational programmes.¹³

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