

SAFETY AND PEACE PROMOTION RESEARCH UNIT (SAPPRU)

CLOTHING IGNITION BURNS TO CHILDREN: AN EXPLORATION OF AETIOLOGY AND INTERNATIONAL AND SOUTH AFRICAN PREVENTION LEGISLATION

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BUILDING A HEALTHY NATION THROUGH RESEARCH



BACKGROUND

- The World Health Organization (WHO) estimates that over 300 000 people die from flame or fire-related burn injuries annually (Peck, Molnar & Swart, 2009; Mock, Peck, Peden & Krug, 2008)
 - Burn deaths include fatalities as a result of residential fires, scalds, clothing burns, and other sources of thermal energy (Rivara, 2000).
 - Scalding is the most common type of children's burns globally (see e.g. WHO Mortality Database: Tables, 2009; Albertyn et al, 2006)
- South Africa has a high rate of burns, but is one of a number of low to middle income settings for which there is an emerging platform for burn prevention
- In South Africa flame or fire-related burns are typically more severe than scalds and cause the majority of fatalities (see e.g. Davies, 1976; Forjuoh & Gielen, 2008, Van Niekerk, 2004)

BACKGROUND cont...

- Flame injuries are most commonly the result of clothing ignition (Kalayi, 1994; McLouglin et al., 1998)
- 70% of pediatric burns involving clothing or garment ignition result in severe injuries (Oglesbay, 1998).
- Clothing burn injuries or garment burns are therefore often severe and extensive in body surface and skin or tissue depth and carries a high mortality (Tempest & Atkins, 1985)
- However, despite the severity and extent of domestic burns due to the ignition of clothing, little is known about the causes, contribution or prevention of garment burns amongst children

STUDY OBJECTIVES

This study aims to:

- 1) identify and review studies that investigate the role of clothing in children's burns; and
- 2) review the South African and international legislation proposed to prevent or control such burns.

REVIEW METHODS

- Different databases used to access International and South African databases aimed at recent (1990 to 2009) studies.
 - abstracts, articles and web-references to identify etiological and legislative findings and recommendations.
 - A total of 47 articles, 5 abstracts and 17 web-references were retrieved; all of these were in English, 7 referred to SA literature

REVIEW METHODS cont..

- **First search:** The key words used were flame/ thermal/ burn injury(ies), combined with garment/ clothing/ fabric and children
- **Second study:** anti-fire laws; protective clothing; flame-resistant fabrics; safety clothing/advocacy efforts; and flame resistant clothing policy/legislation
- **Both searches:** International databases i.e. Medline, the Cumulative Index to Nursing and Allied Health (CINAHL) (R) Database, 1998-2000, and PsycINFO (1993-2000)
- **South African databases:** ISAP Index to South African Periodicals and the National Research Foundation (NRF) NEXUS Database System, Copernic 2000

PROVISIONAL FINDINGS: AETIOLOGY

- Clothing burns involve 3 factors: fabric flammability (clothing), the behaviour of the wearer, and the presence of a source of heat
- Clothing combustion: fuel + oxygen +an ignitions source
- Clothing combustion factors:
 - Pile/naps, weave/weight, clothing design, flammability and composition of clothing fabrics
 - Ability of garment to ignite is dependent on various factors [see table]
- Teenage boys are the group with the highest risk for clothing burns: interest in fire and risk taking behaviour
- Girls are particularly at risk in the older children
- Ignition in younger children due to curiosity and explorative nature

Fabric Flammability

Extinguishing Effects
LOI: Limiting oxygen index.

Material

Burning Rate

Burning Behaviour

Blends

Group I LOI < 21 Burn readily in air Mostly ordinary,	Group II LOI > 21 Often extinguish themselves when ignited	Group III LOI >> 21 Almost always extinguish themselves
Everyday clothing : Cotton and Linen	Polyamides, polyesters	Natural silk, wool/Modacrylics, Flame resistance treated (FR), cotton, viscose and wool
Fastest burning characteristics Can burn quickly when ignited Cellulose fibers have the most rapid ignition rate	Flame resistant than cotton and rayon	Least flammable with exception to chemically treated cellulosic fabrics
May shrink from the flame initially, but will ultimately sputter; flame and melt to the skin, or drop to the floor	When melts it tends to pull away from the ignition source	Do not melt as readily as other synthetics

Behave somewhat differently as they burn e.g. Cellulosic fibers burn with a yellow flame,	Can be considered less safe than their individual components	Blends are sometimes more dangerous than either fiber
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PROVISIONAL FINDINGS

Current international legislation/policy

- In United States of America in 1972, established Consumer Product Safety Commission codified the standard for the Act at 16 Code of Federal Regulations (C.F.R.) 1610
- Classes of flammability were used to dictate sleepwear standards for sizes 0-6 years and 7-14 years (CPSC, 2002).
- **Canada** adopted the US Children's Sleepwear Flammability Act, **but**
- ✓ Amendment in 1987 with more stringent regulations, known as the 'Hazardous Products (Children's Sleepwear) Regulations' (Consumer Products Safety Commission, 1999; NCC, 1999).
- ✓ General textiles are restricted by American Society for Testing and Materials (ASTM) Method D1230-61 → prohibits fabrics with a flame spread <3.5 seconds or raised surface fabrics with a flame spread of < 4 seconds from clothing manufacturing.

PROVISIONAL FINDINGS

Current international legislation/policy

- The [United Kingdom](#) is the only European country that has legislation or standards specifically to control the fire safety of children's sleepwear (Consumer Products Safety Commission, 1999; NCC, 1999)
 - Statutory Instrument 1985 no 2043, the 1985 Nightwear Regulations, [makes it illegal to “supply, offer to supply, or hold stock for sale merchandise](#) which is commonly worn as children's nightwear which does not pass the test ([Consumer Products Safety Commission, 1999](#)).
 - [Places a flame spread restriction \(British Standard 5722\)](#) on children's' night-dresses, dressing gowns, bath robes and similar garments, such as babies' garments ([Consumer Products Safety Commission, 1999](#)).
- Because all clothing in these categories must pass flammability tests, labeling is not necessary.
- However, [the label “Keep away from fire” must be used](#) on clothing that does not pass the flame spread restriction and may be used on nightwear that does pass

PROVISIONAL FINDINGS

Current international legislation/policy

- The Standards Association of **Australia** issued the **Safe Design Rules for Children's Night-Clothes (AS1249)** in 1972 (Consumer Products Safety Commission, 1999).
- ✓ Covers age groups 12 months to 14 years
- Garments are grouped into **three categories** and must be labeled accordingly
 - **Category 1**: domestic apparel fabrics of low fire hazard [**“low fire danger”**]
 - **Category 2**: includes garments which may not be of flame resistant fabric, but are designed to reduce fire hazard [**“designed to reduce fire danger, flammable fabric”**]
 - **Category 3** garments do not comply with either category [**“Warning: High fire danger, keep away from fire”**]

PROVISIONAL FINDINGS

Current international legislation/policy

- In SA, no policies/legislative efforts found as yet: main focus is on supplying safety clothing for construction workers and firemen (Occupational Health and Safety Legislation, 2008).
- Codes and regulations related to children's or even adult's wearing apparel remains limited
- Lack of literature regarding legislation pertaining to children's clothing burns preventions

→ Legislation is required to address these safety features

PROVISIONAL FINDINGS

Outcomes

- A study at the Shriver's Burn Institute in the US showed that the percentage of **sleepwear related burns dropped from 12% to 3%** of all burn admissions after the standards were enforced by the government (in 1975)
- **In Australia**, initial emphasis was placed on children's nightwear
 - Since that time, **nightwear has been found to be involved in a small proportion of clothing burns** (Belshaw & Jerram, 1986; Gordon & Pressley, 1978)
 - **From the year 1970 to 1994**, the period during which legislation was introduced, **burn admissions decreased by 66%**, **flame burn admissions decreased by 57%** (Streeton & Nolan, 1997)
 - **Flame burns associated with clothing ignition by indoor heating systems decreased by 88%** (Streeton & Nolan, 1997)
- Legislation has thus resulted in a decrease in sleepwear ignition burns (Trauma Foundation, 2003)

CONCLUSION

- South African legislation has yet to consider the establishment of legislation and codes that govern the manufacture, labeling, advertising, display, distribution or sale of fire retardant clothing, despite the indications of the impact of such legislation in other settings.
- Recent intervention focus has been on encouraging safety efforts from communities or (non-) governmental organizations, with legislation placed on the safety mechanisms of high risk settings (such as oil refineries) and appliances such as paraffin appliance (Panday & Mafu, 2007).

RECOMMENDATIONS

1. Creating awareness among caretakers of children about the burn risks & hazards certain clothes carry
2. Create awareness and promote a climate of responsibility and accountability among child garments manufacturers/importers
3. Have SABS regulation for child clothing
4. Have labels on all child clothing with the specific characteristics as well as risks

Child safety comes first!

THANK YOU.

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