Vacuum Cleaner Related Friction Burns in the Paediatric Population: A 10-Year Institutional Review of Clinical Outcomes and Management Strategies

PINDERFIELDS PLASTIC SURGERY RESEARCH UNIT

The Mid Yorkshire Teaching NHS Trust
Pinderfields Burns Service

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INTRODUCTION

Friction burns from household appliances remain a significant hazard despite continual improvements in safety standards. Vacuum cleaner related friction burns in the paediatric population are under-recognised and remain poorly characterised clinically. Recent epidemiological data suggest an increasing frequency of these injuries; however, detailed clinical outcome data from large institutional cohorts are missing.

AIM

To characterise epidemiology, injury patterns, management strategies and clinical outcomes of vacuum cleaner related friction burn injuries.

METHODS

STUDY DESIGN
Retrospective institutional review

STUDY PERIOD
January 2015 – December 2025 (10 years)

DATA SOURCE
International Burn Injury Database (iBID)

POPULATION
Paediatric patients (<18 years)

STUDY IDENTIFICATION PROCESS

1. Search in iBID database
2. 300 friction burn injuries retrieved (225 paediatric, 75 adult)
3. Reviewed "Source of Injury" and "Cause of Injury" fields
4. Keywords used: "hoover", "vacuum", "vacuum cleaner", "vac", etc.
5. 45 peadiatric vacuum cleaner friction burn injuries included in study

INCLUSION CRITERIA

- Age <18 years at time of injury
- Friction burn injury caused by vacuum cleaner
- Injury date between January 2015 and December 2025
- Complete medical record documentation including date of injury, injury description, and outcome data
- Managed at Yorkshire Regional Burns Centre, Mid Yorkshire Teaching Hospitals NHS Trust, Wakefield, UK

EXCLUSION CRITERIA

- Age ≥18 years
- Friction burns from other mechanisms (treadmills, e-scooters, motorcycles, playground equipment, etc.)
- Incomplete follow-up data or missing outcome information
- Referred from external facilities with incomplete documentation

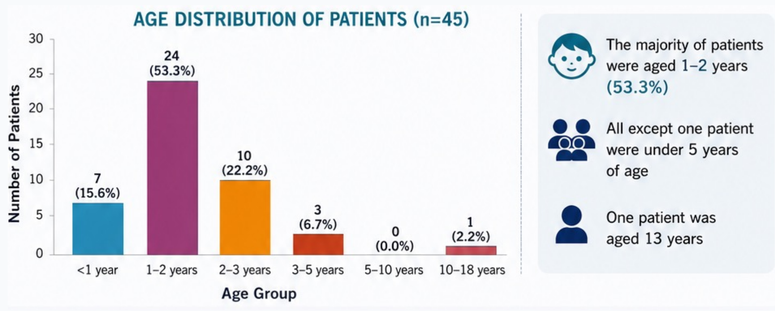
VARIABLES COLLECTED

- Demographics (age, gender)
- Injury characteristics (anatomical site, TBSA, mechanism)
- Treatment approach (conservative care, surgery, skin grafting)
- Outcomes (healing time, complications)
- Clinical outcomes and follow-up

PATIENT DEMOGRAPHICS

- **45** children
- Mean age **2.02** years
- Median age **1.47** years
- Mean healing time **16.6** days
- Median healing time **15.0** days
- Skin grafting required in **3** patients (6.7%)

AGE DISTRIBUTION



- The majority of patients were aged 1–2 years (53.3%)
- All except one patient were under 5 years of age
- One patient was aged 13 years

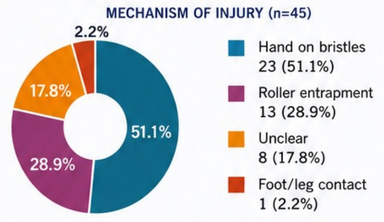
INJURY DETAILS

INJURY PATTERN

ANATOMICAL SITE

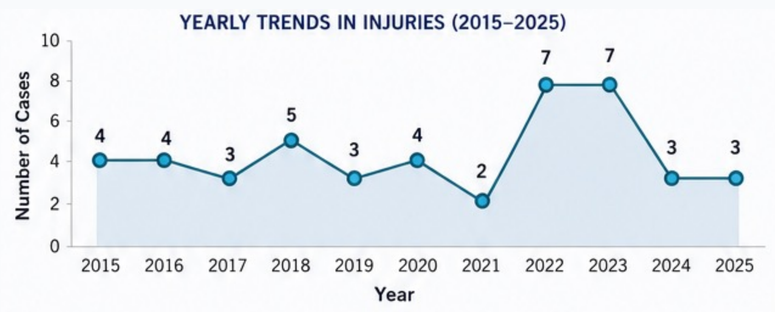
51.1% of injuries involved the hands / fingers

MECHANISM OF INJURY (n=45)



- Mean healing time: 16.6 days
  Median healing time: 15.0 days
- Conservative management: 42 patients (93.3%)
- Skin grafting required: 3 patients (6.7%)

TRENDS



CLINICAL PHOTOS

Friction Burn to Index Finger from Vacuum Cleaner
2-year-old child – Managed conservatively

Fig. 01 – Day 0
Initial friction burn with skin loss

Fig. 02 – 3.5 Weeks Post Injury
Early epithelialization with pink, healing skin

Fig. 03 – 10 Weeks Post Injury
Stable scar and no visible contracture

DISCUSSION

This case series represents the **largest reported cohort** of paediatric vacuum cleaner friction burns, emphasizing the unique mechanism, strong age predilection, successful conservative management, and the need for prevention.

- **Largest reported cohort** – Largest reported cohort of paediatric vacuum cleaner friction burns (n=45) over a 10-year period.
- **Injuries were exclusively paediatric** – Injuries were exclusively paediatric despite 300 total friction burn cases identified.
- **Strong age specificity** – Strong age specificity: 68.9% occurred in children under 2 years.
- **Predominantly involved hands/fingers** – Predominantly involved hands/fingers due to brush roller entrapment.
- **Most injuries were small and healed well** – Most injuries were small burns (<1% TBSA) and healed successfully with conservative management.
- **Low need for surgical intervention** – Only 3 patients (6.7%) required skin grafting.
- **Important and preventable hazard** – Findings highlight vacuum cleaners as an important and preventable paediatric household hazard.

KEY OBSERVATIONS

- Vacuum cleaner friction burns are an under-recognized but significant source of paediatric injury.
- Young children, especially those under 2 years, are most vulnerable due to curiosity, mobility, and close interaction with household devices.
- The mechanism of injury is distinctive, typically involving entrapment in the rotating brush roller.
- Prompt recognition, appropriate wound care, and conservative management lead to excellent outcomes with minimal morbidity.

CLINICAL IMPLICATIONS

- High index of suspicion in compatible injury patterns.
- Conservative management is effective in the majority.
- Surgical intervention is rarely required.
- Caregivers should be educated on safe storage and supervision around vacuum cleaners.

CONCLUSIONS

Vacuum cleaner injuries predominantly affect **toddlers aged 1–2 years** and typically involve the **hand**. **Conservative management** yields **excellent outcomes** with minimal surgical intervention. These injuries are **preventable** through improved vacuum cleaner **design** and **parental awareness**. Greater attention to this **emerging injury pattern** is warranted.

- **Prevention is key**
- **Usually <1% TBSA**
- **Low operative requirement**

FOR PREVENTION: PARENTS & COMMUNITIES

- Educate parents about prevention strategies.
- Consider age-specific prevention messaging for families with toddlers.

FOR PREVENTION: STAKEHOLDERS

- Vacuum cleaner manufacturers should improve safety features (guards, automatic shutoff).
- Public health campaigns should target families with young children.
- Healthcare providers should counsel parents about household hazards.

FOR FUTURE RESEARCH

- Prospective studies of vacuum cleaner injury prevention interventions.
- Long-term follow-up studies of functional and cosmetic outcomes.
- Analysis of specific vacuum cleaner types and their injury risk.
- Comparison of management strategies across institutions.

Preventable, minor injuries with excellent outcomes—through awareness, safety design, and targeted prevention.

KEY MESSAGES

1. **Vacuum cleaner injuries are a significant pediatric problem**
   – 45 cases over 10 years at single institution
2. **Peak risk is toddlers aged 1–2 years**
   – 53% of cohort in this age group
3. **Conservative management is effective**
   – 93.3% managed conservatively, not requiring surgery
4. **These injuries are preventable**
   – Call for improved design and parental awareness
5. **OUR COHORT is the largest detailed clinical series**
   – Fills a gap in literature

A PREVENTABLE PAEDIATRIC HOUSEHOLD HAZARD

Early awareness and safer vacuum cleaner design may reduce injury risk.

BRITISH BURN ASSOCIATION ANNUAL CONFERENCE

NOTTINGHAM: 17th – 19th JUNE 2026

Are We There Yet? National Burn Care Review: 25 Years On

BRITISH BURN ASSOCIATION

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