**Institution:** Anglia Ruskin University

**Unit of Assessment:** 3

**Title of case study:** Reducing the Fire Risk from Emollient-Impregnated Fabrics

**Period when the underpinning research was undertaken:** 2010-2020

**Details of staff conducting the underpinning research from the submitting unit:**

| Name(s): | Role(s) (e.g. job title): | Period(s) employed by submitting HEI: |
|---|---|---|
| Sarah Hall | Senior Lecturer | 2000- Jan 2020 |
| Jo Morrissey | Senior Lecturer | 2017 – to date |

**Period when the claimed impact occurred:** 2013-2020

**Is this case study continued from a case study submitted in 2014?** N

**1. Summary of the impact** (indicative maximum 100 words)

Research into the flammability of fabrics impregnated with emollient skin care products has led to changes in regulatory safety warnings, new advice for medical professionals and patients, and raising awareness of the hazards among Fire and Rescue Services (FRSs). The research prompted the MHRA to issue regulatory and license updates for product labels as well as new safety advice. It led to changes in NHS prescription software and improved awareness amongst health care professionals and better advice to patients. The professional body of UK FRSs used the research to raise awareness and change their training programmes among its members.

**2. Underpinning research** (indicative maximum 500 words)

Over the last 20 years, more than 50 deaths in the UK have been linked with the victims' use of an emollient; this is a considerable proportion of fatalities due to clothing/bedding fires. When emollients dry and build up on clothing, dressings, or bedding, they can accelerate the flammability properties of the material. However, prior to the research, the influence of emollients on material flammability had not been tested, with little awareness of the risk among healthcare and fire service practitioners. This meant that unsuitable safety advice was given on such products, and links with their use in fatal fires were underreported. This is notable when considering GPs in England prescribed emollients over 10.5 million times in 2018.

Sarah Hall (at ARU until January 2020, most recently as Senior Lecturer) began leading fire-related research in 2010. Her research on the recovery of accelerants at fire scenes demonstrated a novel adsorbent offers substantial advantages over other methods [1]. This led to collaboration with Essex FRSs on the flammability of emollients, after a fatality in 2013. The initial research, using basic tests, showed increases in flame height with fabrics impregnated with emollients [2]. This in turn led to further tests using a more established standard method, revealing large reductions in ignition time with fabrics impregnated with dried-on paraffin-based products [3]. Also, indicating the likelihood of severe skin burns, it was shown impregnated fabrics burn longer next to the skin. It demonstrated that someone's chance to react quickly enough if clothing or bedding accidentally catches fire is reduced when emollients are present, especially for the elderly or immobile [3]. Elderly people are particularly prone to skin problems, with 76% of the over 70s having at least one skin condition; there is a high use of emollients among this age group.

Collaboration with the Medicine and Healthcare products Regulation Agency (MHRA) led to regulatory and license updates which were underpinned by the research findings. In 2018, Joanne Morrissey (at ARU since 2017) joined the team, and Hall and Morrissey started running consultations on emollient safety with stakeholders including the MHRA, West Yorkshire FRS and London Fire Brigade. Further research investigating paraffin-free skincare products [4] showed similar burn behaviour as with the paraffin-based variety. These findings are important, as previous MHRA advice related to products that contain more than 50% paraffin. The research also showed that fabrics with flame-retardant properties also ignited quicker when impregnated. Demonstrating the serious fire risk caused by emollient-impregnated bed sheets, gowns or nightwear, often used in care homes and hospitals.

Research carried out with West Yorkshire FRS, investigated how successfully the MHRA's new safety advice on emollients, had been communicated internally and publicly [5]. The study (including a Freedom of Information request) showed that 63% of FRSs and 72% of local health boards had no safety advice within their website or formularies. The same was true of 32% of Clinical Commissioning Groups (CCGs). Of those that did have such advice, very few were up to date. Further exploration of fatalities in dwellings revealed that clothing and bedding are a contributory factor in the UK [6] and further suggests underreporting and revealed international awareness is limited.

**3. References to the research** (indicative maximum of six references)

The body of research represented below meet the two-star threshold for underpinning research since they have been published in peer reviewed journals, received 5 citations, and won the Collaboration of the Year award at the Excellence in Fire and Emergency Awards in December 2019:

[1] **Hall, S**., Gautam, L. and White, G. (2016) The development of a novel adsorbent for collecting ignitable liquid residues from a fire scene. *Journal of Analytical and Applied Pyrolysis,* 122, 304–314. https://doi.org/10.1016/j.jaap.2016.09.012

[2] Leal, C., **Hall, S**. and Hadjicostas, D. (2013) Investigation of burns from cigarettes and naked flames on different substrates impregnated with white soft paraffin. Oral presentation at *9th National FORREST (FORensic RESearch & Teaching) Conference*, UK, June 2013.

[3] **Hall, S**., Franklin, L., Bull, J., Beard, A., Phillips, G. and **Morrissey, J.** (2019) The flammability of textiles when contaminated with paraffin base products. *Fire Safety Journal*, 104, 109-116. https://doi.org/10.1016/j.firesaf.2019.01.003

[4] **Hall, S**. and **Morrissey, J.** (2019) The fire hazard associated with fabrics contaminated with skin care products. Oral presentation at *16th Annual Training Conference of UK Association of Fire Investigators*, Leeds, UK, January 2019. Available on demand from ARU.

[5] **Hall, S., Morrissey, J** and Blackburn, K. (2020) The awareness of emollient flammability and current research *Fire Protection (The Journal of the Institution of Fire Engineers), 32, 21-24.* Available on demand from ARU.

[6] **Hall, S., Morrisey, J**. and Blackburn, K. (2020) Exploring the flammability of emollients and skincare products. *Fire Magazine* (November) 57-59. Available on demand from ARU.

**4. Details of the impact** (indicative maximum 750 words)

**Summary**: The research primarily benefited the following groups/organisations: Medicines and Healthcare products Regulatory Agency (MHRA); the NHS and healthcare professionals; patients using emollient products; Fire and Rescue Service professionals; and fire fatality investigators. Specifically, impact was on licensing and regulatory decisions by the MHRA; awareness of healthcare professionals, leading to improved safety advice to the public; awareness within Fire and Rescue Services; improvements fire investigation processes and advice in fatalities linked with emollients.

**Impact on licensing and regulatory decisions by the MHRA**

Hall and Morrissey and FRSs partners advised the MHRA on the risks demonstrated by the research and the need for regulatory action. In response, the MHRA issued a drug safety update in December 2018 (**evidence 5.1 and 5.3**), highlighting the risks presented by low-paraffin and paraffin-free products and dried-on residues on clothing. In this document, the MHRA advised healthcare professionals to warn patients using emollients not to smoke, not to go near naked flames and to be aware of the risk of easy ignition.

As a result of this update, ScriptSwitch (the prescribing software used widely by the NHS) was updated by 17 NHS CCGs (as of May 2019) to include a flammability warning on all skincare products (**evidence 5.2**).

The MHRA also used the research for regulatory and licence updates for manufacturers. These include flammability warnings on products (**evidence 5.3**). By the end of December 2020, 159 licenses had been updated, with 19 pending. The MHRA used the research for updates in the British National Formulary (BNF), in December 2018 (**evidence 5.4**), warning against the risk of severe burns with paraffin-based and paraffin-free emollients. In July 2020, the MHRA used research findings in its new communication strategy for professional bodies.

**Impact on healthcare professionals**

Hall and Morrissey are members of a regional stakeholder group with Cambridgeshire and Peterborough CCG and Cambridgeshire FRSs. A partnership campaign on safer use of emollients, was launched in October 2019. The campaign material was sent to local pharmacies (160), dispensing practices (50), GP practices (100), acute trusts (10), hospices (4) and care homes (180). This included 20,000 public information leaflets for NHS 'stay well' packs; 18,000 patient/public information leaflets (**evidence 5.5**); 840 posters; 5,000 carers leaflets; and 15,000 pharmacy bags. Feedback demonstrates the effectiveness of the campaign (**evidence 5.5**); one pharmacist commented: "*The bags were an excellent prompt. Nearly all patients asked why they had a special bag, which facilitated the conversation*". Another practitioner commented: "*It allowed us to effectively target those patients for whom this campaign was intended*".

Hall and Morrissey gave three presentations to West Essex CCG in 2018/19. Members of the audience (approx. 120 from within the NHS) have changed their advice to emollient users on the basis of these presentations (**evidence 5.5**).

Hall and Morrissey gave two talks (2018) to NHS Home Oxygen Services (HOS) and patient safety groups on the fire risk posed by emollients, receiving strong pledges to communicate updated emollient advice (**evidence 5.6**). As a result, the HOS changed its advice to practitioners and patients, warning against touching oxygen systems with hands contaminated with creams, and the risks of wearing of clothes impregnated with dried residues of emollients (**evidence 5.6**).

**Impact on Fire and Rescue Services**

In 2019, the National Fire Chiefs' Council (NFCC), the professional voice and a major resource of all 53 of the UK's FRSs, was represented at a presentation of the research at the UK Association of Fire Investigators conference in Leeds. The NFCC released a statement on the importance of being aware of the hazards posed by paraffin-free emollients. The NFCC Emollients Lead, said: "*We are asking people who prescribe, dispense or apply these products to be aware that switching to a lower or paraffin-free emollient will not reduce the fire risk. Washing fabrics will reduce the risk but may not totally remove it*" (**evidence 5.7**).

**Impact on forensic investigations**

As well as the research results being incorporated into training packages in the FRSs (**evidence 5.7**), the research has benefitted forensic investigators. In Spring 2020, Prometheus Forensic Services, an independent fire investigation company and training provider, asked police forces that have fire-related work to note the use of emollients in any of the cases (**evidence 5.8**). A fire investigator working with North Wales Fire and Rescue Service approached Hall for advice in February 2020, which led to the researchers analysing fabrics from a victim to identify any traces of emollients. The information provided by Hall was used in the investigator's report to the coroner (**evidence 5.9**).

**Awards**

The collaboration with West Yorkshire and Essex FRSs and the London Fire Brigade won the Collaboration of the Year award at the Excellence in Fire and Emergency Awards in December 2019 (**evidence 5.10**).

**5. Sources to corroborate the impact** (indicative maximum of 10 references)

5.1) Screenshots of old MHRA and new MHRA warning including low paraffin content and paraffin-free products and advice on washing underpinned by ARU research (18/04/2016; 18/12/2018).

5.2) Screen shot of Script Switch prescribing software used by the NHS (UK) with the additional flammability warning.

5.3) A letter from the Director of Vigilance and Risk Management of Medicines, MHRA to highlight the contribution and impact of the research on the regulatory and license change. Plus, stakeholders consortium and Commission on Human Medicines (CHM) recommendations for risk minimisation and picture of the change in labelling of skin care products after MHRA regulatory and licensing changes.

5.4) Update to British National Formulary, December 2018 https://bnf.nice.org.uk/treatment-summary/emollient-and-barrier-preparations.html

5.5) Electronic copies of patient's leaflets (proof versions) and scanned pharmacy bag with advice on the safer use of emollients and warning of the risk of fire. Part of a joint campaign with Cambridgeshire and Peterborough Clinical Commissioning Group (NHS), Cambridgeshire Fire and Rescue Service and ARU (ARU logo on leaflets). Slides of impact and quotes in relation to local campaign.

5.6) Letter of support from Home Oxygen Regional Lead and recognition of research and importance to home oxygen prescribing and Power point slides sent from HOS on the feedback and outcomes/actions from the talk.

5.7) NFCC stating the importance of the research on their website (https://www.nationalfirechiefs.org.uk/News/latest-research-shows-hidden-fire-risk-of-emollients); and Letter from the lead of the NFCC emollient safety group including a statement of developing training packages to include awareness of emollient flammability.

5.8) Letter of support from the Director (a Forensic Fire Investigator), Prometheus Forensic Services.

5.9) Email trail of conversation with a Fire Investigator, North Wales Fire and Rescue Service.

5.10) Scanned copy of photographs of Collaboration of the Year Award 2019 and partners, plus award ceremony's website with winners of award.