Adverse Drug Reactions

Burns with emollients

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What you need to know

- Advise patients to continue using emollients but to be aware of burn risks, avoid naked flames, and stop smoking
- Emollients are not flammable themselves but, when impregnated into fabric, can act as an accelerant
- People most at risk are those with reduced ability to react quickly when emollient-impregnated fabric is exposed to naked flames

A 72 year old man with poor mobility, Parkinson's disease, and dementia attends the emergency department with upper body burns. He is a smoker and his carer applies emollients to most of his body daily as long term maintenance treatment for eczema. The attending clinician established that the patient's burns were sustained when his cigarette came into contact with the right arm of his pyjamas, which quickly caught fire.

Emollients are an important treatment and generally safe; they are not flammable in themselves, in their container, or on the skin. However, awareness of fire risk—from fabric that has become impregnated with emollient residue—is low.[1-3]

Emollient can transfer from skin onto clothing, furniture, and bedding, which accumulates over time—even with regular washing, some residue remains. A naked flame is needed for ignition. The residue acts as an accelerant, increasing the speed of ignition and intensity of a fire, reducing the time available to extinguish it.

What are emollients?

Emollients are moisturising treatments used for dry skin conditions such as atopic eczema and psoriasis. Formulations include lotions, creams, gels, ointments, and sprays; and broadly are petroleum (paraffin) or non-petroleum based.

They are applied directly to the skin, typically on the basis “at least daily and as required” (up to 250-500 g a week).[4] Transient reactions at the application site (stinging or redness) occur in around one third of users.[5]

In some conditions, like atopic eczema, they might be used alongside anti-inflammatory treatments such as topical corticosteroids. Eczema treatment for a minority of patients might also include wearing bandages or body suits impregnated with emollient.

How do patients with this adverse reaction present?

Typically, patients with **emollient induced burns** present to primary care or emergency departments with minor, major, or life threatening burns; **however, others die at home from their burns or smoke inhalation**.

How common are these reactions?

In England, between 2010 and 2018, more than 50 fatal incidents were recorded where emollients were known to have been used by the victim or were present at the scene[6]; and between 2010 and 2017, at least 37 fire deaths were linked to emollient use.[7] While the number of recorded incidents is low, emollient use is widespread and under reporting is likely.

International data linking emollient use with burns, fires, or fatal incidents are limited.

What is the evidence?

The earliest suggestion of emollient use leading to burns was in the US in 1984, when burns in a patient were linked to petrolatum based hair grease.[8]

In the UK, the National Patient Safety Agency first associated emollients with fire hazards in 2007.[9] Initial warnings erroneously said that increased risk only applied to products comprising more than 50% paraffin. Flammability testing under controlled laboratory conditions has subsequently shown that fire risk applies to all emollients, including products that are low paraffin (6%) and paraffin free (with a castor oil or oatmeal base).[3 10-12]

The authors are not aware of other relevant data but have not systematically reviewed the literature.

What are the risk factors?

- Emollient use over large areas, especially if there is repeated impregnation of clothing and reduced washing or changing of clothes.[11]

- Smoking—a match or cigarette lit by patients or carers acts as an ignition source.[11]
- Reduced ability to dampen flames or remove clothing if emollient impregnated fabric that is worn, laid on, or sat on catches fire[11] (eg, where the person has reduced mobility, dementia, or is a young child).
- Supplemental oxygen use.[11]
- Use of airflow mattresses or cushions.[11]
- Molten polymer fabric can result in painful and dangerous burns that can be difficult to treat[13]; however, initial flammability tests suggest that synthetic fibres (eg in polyester and cotton blends) might ignite slightly less easily (table 1).[14]

The authors are not aware of any evidence linking fan heaters or other heat sources to emollient related fires or burns. However, a higher temperature could be a contributory factor to quicker ignition, and heat can increase the volatility of the components in the emollients.[15]

Table 1 Results of testing initial flammability of sheets with and without emollients

	Mean ignition time in seconds		
	No emollient	Emollient*	P value†
100% cotton sheet	68.0	6.0	0.001
52% polyester/48% cotton sheet	336.0	12.2	<0.001

*Single application of 14.5% white soft paraffin/12.6% light liquid paraffin base cream, left to dry for 24 hours.
†Compared with mean ignition time of the respective blank control. Extract from Hall et al 2019[14]

How are they diagnosed?

Always ask people presenting with burns about emollient use. To improve awareness and reporting of the condition, routinely record emollient use in medical records.

How are they managed?

Management is the same as burns not related to emollient use.

How can the risk of harm be minimised?

Advise patients to continue using emollients as they are important, effective treatments with no alternative; however, make everyone aware that emollient residue gets into materials and increases their flammability.

Advise patients and carers to take precautions such as avoiding wearing long sleeved or loose clothing when cooking. Suggest using a safety lighter, avoiding naked flames, and smoking cessation. E-cigarettes and electric hobs are lower risk alternatives to cigarettes and gas hobs.

Give fire risk advice verbally when prescribing and dispensing, and encourage patients to inform their families, friends, and carers.

Consider patient information leaflets, posters in healthcare settings, and warning labels on emollient containers. In the UK, these are available from the MHRA (fig 1).[16]

Fig 1 UK MHRA and National Fire Chiefs Council emollients alert label. The Commission on Human Medicines[11] recommends that this warning is applied to all emollients in the UK (paraffin and paraffin-free)

Ask patients and carers to contact local fire services for advice when patients might be at high risk.

Encourage regular changing and washing of clothing, including dressing gowns, that are likely to become impregnated with emollients. However, note that, while washing items may reduce risk, some residue remains even after pre-wash treatments, use of biological and non-biological washing powders, and hot water temperatures, especially in fabrics impregnated with higher paraffin content.[17]

Report adverse incidents involving emollients, including fires and burns, to the relevant national authority (UK: MHRA "Yellow Card" https://yellowcard.mhra.gov.uk/; US: FDA "MedWatch" https://www.accessdata.fda.gov/scripts/medwatch/index.cfm; Europe: https://www.adrreports.eu/en/national.html; India: https://cdsco.gov.in/opencms/opencms/en/Home/).

Education into practice

- When prescribing emollients, how do you check patients' fire risk awareness?
- How would you advise patients or carers who are smokers?
- Do you routinely ask patients with burns about emollient use?

How patients were involved in the creation of this article

Co-author Amanda Roberts is a patient with lived experience of using emollients for atopic eczema (for herself and her children). From social media interaction with patients and carers, Amanda is aware of the lack of patient facing information. Amanda helped emphasise the wider context of risk: that naked flames are not the only potential hazard, that washed items still pose a threat, and the training implications for doctors, nurses, pharmacists, and fire brigade personnel. We also incorporated comments from an external patient reviewer, including amending the title for clarity and noting that when synthetic fibres melt, they can cause unpleasant burn injuries.

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Contributorship: MJR was invited to write the article, enlisted the help of the co-authors, wrote the first draft and subsequent revisions. SH, ML, AR, and HCW commented on all draft versions and approved the final manuscript.

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