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Safe Storage and Use of Vapes

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Introduction

A natural consequence of prohibiting smoking in public places has been the active encouragement to quit. Vaping is increasingly seen as a viable alternative to assist with smoking cessation, however many users may be unfamiliar with the safe use and storage of such devices.

Anatomy of a Vape Device

These devices typically have a battery that provides electrical power to the device; a tank, cartridge, reservoir, or pod that holds the vape liquid, often referred to as e-liquid; a coil or heating element that heats the vape liquid until it vaporises; and a mouthpiece where they inhale the vapour.

As with all devices that contain both a heating element, energy source and a consumable fuel the risk of fire is of primary concern.

Storage

Manufacturers recommend keeping vape devices in an upright position[1] when not in use to avoid the device leaking e-liquid. There can be many possible causes of a device leaking e-liquid but allowing it to remain in a horizontal position when not in use using the device is a common one.

Most vape devices have air vents which let air into the vape coil to facilitate the vaporisation of the e-liquid. The air vents are also designed to keep the wicking material inside the vaporiser soaked with e-liquid when vaping, preventing damage to the device.

The mechanism within a vape uses a coil to produce the vapour. Vapes using a coil with a resistance of less than one ohm or short-fill[2] devices where the user is then able to top up the bottle by adding 10 ml of e-liquid with nicotine, typically use an e-liquid which is more viscous. Regular or standard e-liquids have a thinner consistency which makes them susceptible to leakage.

When the device is horizontal for some time, the liquid inside the tank can seep out and leak out of the air vents, causing problems in other parts of the device. Therefore, the vaporiser must be kept upright whenever it is not in use, more so in the case of vape pens which use regular e-liquids.

Lithium-ion Batteries

Disposable vapes are powered by lithium-ion batteries, which have a high energy density, fast charging, and ability to be charged many times with minimal loss in capacity. While these batteries are generally safe when managed properly, they can pose a significant fire hazard if misused or mishandled.

The device and batteries should not be stored in direct sunlight[3], beside radiators, refrigerated or frozen. The device and battery should be stored between 18°C and 30°C. If the device is exposed to extreme temperatures above 30° C, carelessly managed or the battery is punctured this can lead to dangerous consequences.

Concerns

Storing disposable vapes in pockets or bags alongside metal objects, like keys or coins, can create a circuit with the battery, and potentially lead to overheating. Particular attention should be paid to signs of battery damage, such as swelling, leaking, or overheating, as these could be a precursor to a dangerous fire or explosion. A user should stop using the device immediately if any issues arise, and not attempt to replace the battery. Instead, the device should be disposed in accordance with any disposal or recycling instructions provided in the manufacturers' information.

Disposal

Single use disposable vapes awaiting disposal should be stored in a fire-resistant cabinet or box, in small quantities and away from other combustible materials. For example, a small metal storage container with a lid that can be closed. Volumes should be kept to the minimum and disposed of regularly. Keep the bin away from sources of ignition and other combustible materials and store it in a cool, dry place and away from children and other vulnerable persons.

Ordinarily waste recycling centres should have vape disposal bins to securely hold these types of devices.

Safe Use of Vapes

Fires caused by smoking materials result in more deaths than any other type of fire. Since May 2017 vaping devices have been tightly regulated in the UK for quality and safety under the Tobacco and Related Products Regulations[4] 2016.

These regulations expect that the risks related to the batteries and how they are charged should be understood by the user.

Battery Safety

There are a number of features that can improve vape battery safety. These include:

— Locking mechanism: There should be an easy way to lock or turn off the vape device so it can't accidentally fire in the users' pocket.

— Button resistance: The button on the device should have some resistance when pressed, which reduces the likelihood of accidentally pressing it.

— Automatic cut off: Modern devices usually come with a cut off feature, which stops the device from running after 10 seconds.

Charging

As with other rechargeable electrical equipment including mobile phones and laptops, e-cigarettes should never be charged or used if they have been damaged as this presents a chemical and fire risk. The user must understand:

— The device should not be charging unattended, or overnight as should a fault develop, it would not be detected quickly

— The device should only be charged by using the original charger that came with the device. Other incorrectly rated chargers my overcharge the device

— Leaving a device continuously on charge, after the charge cycle is complete, may result in the equipment overheating due to a fault in the charging cycle

— Ensuring batteries are not covered while they are on charge as this can also lead to overheating

— Avoid charging batteries in extremes of high or low temperature as this could affect the liquid electrolytes in the battery causing the battery structure to be affected

— Batteries also need to be protected from being damaged, crushed or punctured and not immersed in water. Water-damaged batteries have a far greater chance of going wrong and causing a problem. If the battery falls into or gets saturated with water, and it is not designed to be waterproof, it must no longer be used

— A battery must not come into contact with metal items such as coins or keys in a pocket or bag, as this can cause a short circuit and explosion

— The best place to charge the battery is on a hard surface. A kitchen worktop is ideal, but a hard wooden table is also fine. Always avoid charging on or near flammable materials. This includes carpets - while issues are rare, there are instances where a carpet has been singed where this advice is ignored.

Domestic and Care Situations

Special care must be taken when vape devices are used in a domestic or care situation where the following are present:

Emollient Creams

Emollient skin creams are not flammable on their own. They are also not flammable when on the body. However, emollients contain oils that can make it easier for clothing, dressings, and fabric to catch fire when they are dried on. An emollient, combined with factors such as smoking or mobility issues, poses potential fire risks and this applies to both paraffin and paraffin-free products. Washing fabrics does not fully remove this risk.

Medical Oxygen

Medical oxygen users who smoke whilst using oxygen or whilst in a potentially oxygen enriched environment is at increased risk. Oxygen is a supporter of combustion which will significantly increase the combustibility of materials, especially as it can saturate bedding and clothing. When in close in proximity to an ignition source such as a cigarette, or e-cigarette, these materials will burn more fiercely.

Dynamic Airflow Mattresses

Dynamic air flow pressure relieving mattresses[5] (and overlays placed on top of standard mattresses) are for the prevention and treatment of pressure ulcers for those people who spend prolonged periods of time in bed. They are commonly used in hospitals, hospices and residential care homes but are also provided for use at home. They are filled with air by a pump and use pressure cells to adjust positioning according to the patient's needs.

The risks of smoking in bed are well known but the consequences can be more severe when an air mattress is in use. A lit cigarette or overheating vape device can cause heating and fire when it comes into contact with bedding materials, quickly burning down to the mattress surface. If the mattress becomes punctured, the pump works harder to keep the mattress inflated. Where the puncture is caused by an ignition source, the escaping air acts as bellows and can cause the fire to increase in intensity and to spread quickly.

Therefore, vapes or e-cigarettes should never be used close to medical oxygen or where emollient creams, or airflow mattresses are being used. Where an organisation is providing vape devices it should:

— Check whether the individual or anyone in their household is a smoker and using an air mattress for use at home

— Assess the likelihood of the patient smoking in or near the bed

— Ensure that smokers using air mattresses are aware that smoking in bed is a high-risk activity and they should not:

— Smoke in a room whilst using an air mattress

— Burn candles in a room where oxygen or an air mattress is being used
— Place hot electrical items such as hairdryers or straighteners on an air mattress
— Use electric blankets whilst using oxygen or an air mattress
— Use matches or lighters in the vicinity of oxygen or an air mattress
— Ensure there are adequate arrangements for washing all bedding and air mattress covers as often as possible if oil based emollient creams are used

Driving and Vaping

Vaping creates a thick plume of vapour which could be considered a hazard in a car, given how much it may obstruct the driver's view. The Royal Society for the Prevention of Accidents[6] (RoSPA) has described vaping at the wheel as a 'growing and concerning trend' for road safety and they are concerned that distracted driving has become a leading cause of road accidents in the UK. Where someone is driving in connection with work their employer must be aware that such a secondary activity which takes the drivers eyes off the road is potentially dangerous.

Such a physical distraction while behind the wheel can create visibility problems if clouds of vapour are produced. Any road accident related to vaping could potentially be considered as distracted driving and have consequences for any claim.

Manufacturer's Information

Many users will not have carefully considered the information provided by the manufacturer of the vape device. However, the terminology they use is often not understood by the user. The information provided includes reference to contraindications. **Contraindication** is a medical term used for a specific situation or factor that makes a procedure or course of treatment inadvisable because it may be harmful to a person.

When providing such a device to a person the user must understand the effects of the substances used. For instance, the e-liquid used may contain the following:

Propylene Glycol

— May cause adverse effects in people being treated with **disulfiram** (which is used in support treatment for alcohol dependency) or **metronidazole** (an antibiotic used to treat skin infections, rosacea, and mouth infections, including infected gums and dental abscesses)
— May create an allergic reaction if a person has a history or **atopy** (the tendency to produce an exaggerated immune response to otherwise harmless substances in the environment), childhood **eczema** (A group of skin conditions characterised by red, itchy rashes) or **hay fever** (A disorder caused by an allergy-causing substance, called **allergens**)
— **Lactic acidosis** (a build-up of lactic acid in the body) may happen when propylene glycol if is consumed by children, pregnant women or individuals with **hepatic failure** (where the liver is unable to perform its normal metabolic functions) or **renal failure** (where the kidneys do not function properly cleaning the blood and removing waste and fluid from the body)

Glycerol

— Dehydration can be increased in elderly and already dehydrated people.
— Caution should be observed in people with **diabetes** (a metabolic disorder in which the body has high sugar levels for prolonged periods of time), as **metabolised glycerol** may cause minor **hyperglycaemia** (where the level of sugar in your blood is too high) or **glycosuria** (when a person's urine contains more sugar, or glucose, than it should)
— Not to be used by children and pregnant or lactating women

Additional Concerns

— Initially users may experience a dry through or cough. When symptoms persist more than 48 hours, or become more severe, they should go to their doctor
— Nicotine withdrawal may cause irritability, aggression, feeling low, anxiety, restlessness, poor concentration, increased appetite, urges to smoke, disturbed sleep, or the lowering of heart rate
— Individuals interacting with someone with nicotine withdrawal should be aware of these adverse effects and the impact on an individual's behaviour and demeanour

Vaper's Tongue

A user can suddenly lose their sense of taste partially or completely and find it difficult to clearly perceive vape flavours[7]. While this effect on the taste buds can last several days, the ability to taste can return. This happens because vaping for a prolonged time without drinking enough water, can affect a person's smell and taste receptors, leading to Vaper's Tongue.

E-liquids come in a wide assortment of flavours. Vaping a particular flavour too much without switching between flavours is one of the main causes of Vaper's Tongue.

Lemon juice has several health benefits for your body including its ability to cleanse the palate. Sucking on a slice of lemon or drinking some freshly squeezed lemon juice can help reawaken the taste buds because of the bitterness from the lemon.

Addictiveness

Care should be taken to understand that some e-liquids do contain Nicotine. Nicotine is a highly addictive substance and vapes are not recommended for use by non-smokers.

Toxicity

Nicotine may produce toxic effects when taken orally – especially for infants or children. There is a risk of poisoning from e-cigarette liquid and, as with medicines and cleaning products, e-cigarettes and e-liquids should always be kept out of the reach of children.

If a person has swallowed the e-liquid they should visit the GP immediately. If splashed onto skin, rinse with cold water immediately and continue for 10-15 minutes. Always make sure that e-liquids are out of reach of children and pets.

Summary

There is a desire to reduce the number of people addicted to cigarettes and vapes provide one potential solution to this issue.

Care must be taken to ensure that additional risks to the health and safety of the individual, and others in their immediate vicinity, are not introduced using these devices.

The user must fully appreciate these additional risks introduced into their personal lives and settings.

Any prudent and responsible organisation will regularly review their policies and practices to make sure that they are doing everything they can to ensure the health and safety of those affected by their undertaking.

For additional information, please refer to the RMP 'Vaping and the Workplace' guidance document.

References

1. Safe storage of vape pens. Available here: Storage of Vape pens
2. Vape user guide. Available here: What do we mean by shortfills
3. Vape battery safety. Available here: Battery Safety
4. Tobacco and Related Products Regulations 2016. Available here: https://www.legislation.gov.uk
5. Fire safety advice for users of dynamic air flow pressure equipment. Available here: Dynamic air flow mattresses
6. The Royal Society for the Prevention of Accidents. Available here: ROSPA
7. Possible causes and treatment of Vapers tongue. Available here: Vapers Tongue

Further information

For access to further RMP Resources you may find helpful in reducing your organisation's cost of risk, please access the RMP Resources or RMP Articles pages on our website. To join the debate follow us on our LinkedIn page.

Get in touch

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