

## FIRE HAZARD BY ABHR

Can alcohol-based handrub (ABHR) cause fire? May it happen? How common is it? What shall we do to avoid it?

One of the main concerns regarding the use of ABHR that fire incidence may occur; hospitals should install additional smoke detectors and sprinkle systems, and fire incidences threatens both healthcare-workers (HCW) and patients [1]. Should we really worry about fire when using ABHR?

**Amjadi and Greenwood 2010** reported a case, where a man suffered mid-dermal burn injuries, when he tried to light a cigarette, right after applying a hand rub [2]. In another case, HCW was receiving back her cigarette lighter from a patient, and cleaned both the lighter and her hands with an ABHR. Then she tested the lighter, causing it to burst out in a fireball, engulfing both hands. Fortunately, she did not get any significant injuries, as she immediately immerse her hands into water [3]. Both report concluded that it is not commonly recognized that sanitizing gels contain high concentration of alcohol, and therefore flammable---despite the fact that their bottle is labeled as “highly flammable”. The risk of potential injury should not be underestimated.

ABHRs – **rinses, gels and foams** – all **contains a high concentration of alcohols**. Products usually labeled as flammable, but not represent a real fire hazard, unless used near open flame or another ignition source [4].

In the United States, the **National Fire Protection Association** prohibited the placement of ABHR dispensers in the corridors at 2000. In 2004, they allowed it at certain healthcare facilities under certain specified condition. As the use of ABHR became more common, and the benefit of using ABHR has been well demonstrated the issue was re-examined. As dispensers during normal operation remains a closed system (means that vapors are not released into the atmosphere), and dispensers hold relatively small quantity, they concluded that dispensers pose little risk in healthcare facilities. Today, healthcare facilities are allowed to place ABHR dispensers to the corridors, but dispensers still need to meet certain criteria; like the maximum fluid capacity shall be 0.3 gallons/1.2 liters, need to be at least 4 ft/1.2 m from each other, not more than 10 gallons/37.8 liters ABHR shall be in use in a single smoke compartment, cannot be placed adjacent to an ignition source, if it is installed over carpeted surface than the place should have a sprinkler system, etc. Under these conditions, **ABHR dispensers are safe** [5]. This was certainly a victory for common sense [6].

Operating Room fires are a recognized, documented, although rare hazard. A so called “fire triangle” is an oxygen rich environment (generated by anesthetic gas), the fuel (that can be an alcohol-based fluid), and ignition source (laser, high speed drilling, cutting instruments, etc.). **Rocos and Donaldson 2012** studied surgical fires to explore the role of ABHR. The **National Reporting and Learning Service** (NRLS) database, a national database in England and Wales where **five million reported patient safety incidents** are stored. **13 fire incidents** were reported between 2004 and 2011 during surgical procedures, and in 11 cases, some flammable skin preparation fluid (chlorhexidine solution or povidone-iodine solution) were present; ignited or made the fire worse. To avoid these incidents, **alcohol-based products should not be allowed to pool. Skin should be completely dried** before e.g., electrosurgery commences [7].



**Bryant et al. 2002** reported a case, when a HCW removed a 100% polyester isolation glove, rubbed her hand with a rubbing gel, then pulled a metal sliding door while her hands were still wet from the gel. A static spark was generated, associated with a flash of light and spontaneous flames on her hand. Fortunately, the injury was not serious, she had only superficial skin burns. The investigation after this episode concluded that polyester accumulated static charges and the flash fire were associated with the large discharge of static electricity [4]. Quite similar case was reported from Spain; HCW's hands were wet from a gel when closed a metal door. Static electricity caused a spark and flames in the HCW's hand. In this case, HCW wore polypropylene waterproof gown. Polypropylene also had a great capacity of cumulative capture of electricity. HCW only had local skin redness [8].

**Boyce and Pearson 2003** tried to estimate how common ABHR-related fire accidents are. They sent a questionnaire to  **SHEA, APIC and EIN**  members and asked to report ABHR-related fire incidences. 798 facilities responded, representing **1,430 hospital-years** of ABHR use. During this period, **no ABHR-related case** had occurred. Nevertheless, 11.4% of the facilities reported that a local fire marshal had told them to remove the dispensers from the hallways [9]. The survey was repeated in Germany by **Kramer and Kampf 2007**. The reported period represented **25,038 hospital years**, with overall consumption of **35 million liters (9.2 million gallons) ABHR**. During this reported period, **7 fire incidents** were reported. None of them was caused by static electricity, and none of the fires led to major injuries. Four cases were related to smoking; HCW did not wait till ABHR evaporated, before handling fire (a match or lighter). Two cases arose from vandalism, and one from a patient's suicidal intention. There were not any fire incidents in the storage areas [1].

## CONCLUSION:

Fire incidents caused by ABHR are extremely rare, and most of them are preventable. HCWs should be educated about the risk associated with ABHR and open flames. Do not use open flames if the ABHR has not completely evaporated from your hands (especially do not smoke, as it is harmful anyway). Do not use open flame close to the ABHR dispenser or at the ABHR storage area. Keep in mind that operating rooms are oxygen rich environment, that increase the risk of fire. Strive for eliminating electrostatic discharge in your hospital. Keep in mind that potential benefits of using ABHR to reduce infections far outweigh the fire hazard concerns.

## REFERENCES

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