

Hazard of Oxygen-Enriched Atmospheres in Healthcare Facilities

Recent incidents in healthcare facilities have highlighted the need to raise awareness of the hazards of oxygen-enriched atmospheres, particularly during the COVID-19 pandemic.

The potential hazards associated with oxygen-enriched atmospheres are well known and several EIGA publications provide personnel working with oxygen with details of the fire and explosion hazards associated with these conditions.

Moreover, during the COVID-19 pandemic patients receive High-Flow Nasal Oxygen (HFNO) as an effective means of treatment, capable of delivering an oxygen flow rate of up to 60 litres per minute. As more wards are equipped for oxygen treatment and HFNO treatment, it is possible the ventilation systems will not be able to maintain atmospheres that are not oxygen enriched.

All these factors contribute to the higher risk of oxygen-enriched atmospheres (i.e. more than 23.5% O₂ in air) in healthcare facilities.

Besides the increase in oxygen concentration in the ward, there is the potential for clothing and bedding material to become enriched with oxygen, making them extremely flammable and should these ignite, they will burn fiercely. Additionally, care should be taken with the use of hydrocarbon-based creams and gels, which can support a fire and makes the situation worse. When an environment or material becomes oxygen enriched and therefore very flammable, a low energy source can easily ignite these materials. Therefore, care shall be taken to assure that any electrical equipment in the vicinity of the patient has been suitably tested to ensure that it will not cause any sparks that could ignite clothing and bedding.

In operating theatres care is also required where oxygen is administered whilst using hot/heated surgical equipment.

Open flames and smoking (including electric cigarettes) shall not be allowed in the vicinity where oxygen is applied.

Conclusions

During the COVID-19 pandemic the risk of oxygen-enriched atmospheres in healthcare facilities is higher than usual. Although well known, EIGA wants to make all healthcare facilities aware of oxygen hazards and propose precaution measures:

Factors contributing to the increase in risk of oxygen enrichment:

- High-Flow Nasal Oxygen therapy with flow rates of up to 60 litres per minute;
- More patients treated than usual;
- New additional 'side wards' not appropriately equipped with a suitable ventilation system; and
- electrical equipment in the vicinity of the patient not tested to prevent creation of sparks.

Some precautionary measures include:

- Train all users on safe handling of oxygen;
- Make staff familiar with the position and procedure of emergency oxygen shut-off valves at every ward (in case of fire alarm);

- Never allow open flames and hot equipment in the vicinity;
- Do not use hydrocarbon-based creams and gels;
- Assuming air changes are as required, the increase in oxygen concentrations within the Intensive Care Unit should be risk assessed and dealt with accordingly;
- Where the ventilation system is not designed to provide sufficient air changes, to additional ventilation is recommended to assist the process of dispersing the oxygen within the ward area or in a 'side ward' (for instance, open windows). It may be appropriate for clinical staff to wear personal oxygen monitors under these circumstances; and
- Where a patient is being treated even with low oxygen volumes, if they are moved to an area where there is a potential for open flames to be present, their clothing and bedding should be allowed to 'ventilate' for at least 15 minutes to assure that any excess oxygen is dispersed.

References

EIGA Doc 04 *Fire Hazards of Oxygen and Oxygen Enriched Atmospheres* www.eiga.eu

EIGA Safety Leaflet *O₂ Hazard! Oxygen Enrichment* www.eiga.eu

Safety information on oxygen enrichment is given in the EIGA eLearning on oxygen safety <https://eiga.eu/publications/elearning/>

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