Surgical fires must become ‘Never Event’

The Association for Perioperative Practice (AfPP) along with a coalition of patient safety focused organisations are calling for more to be done to prevent surgical fires. Lindsay Keeley, patient safety and quality lead for the AfPP, explains why such incidents must be classified as ‘Never Events’.

Surgical fires, which in the perioperative environment is a fire that occurs on or in a patient while in the operating theatre, are recognised as an international patient safety concern. This is due to the risks of injury to both patients and healthcare professionals. Surgical fires are categorised as either airway or non-airway and occur most commonly in the head, face, neck, upper chest or during ENT surgical procedures.

In England’s hospitals, the prevention of surgical fires is an urgent and serious patient safety issue that demands greater prioritisation by NHS Improvement given the lack of standardised prevention protocols in place. The Association for Perioperative Practice (AfPP) along with a coalition of patient safety focused organisations are now calling for more to be done to improve the prevention and management of surgical fires and to classify surgical fires as a Never Event.

Scale of the problem – incidence, human and financial costs

The scale of the problem is significant. In the United States, between 1994 and 2013, the Food and Drug Administration (FDA) identified 294 injuries and fatalities as a result of a surgical fire. A 2009 report estimated 550–650 fires occurred annually in the US. However, in the US at least, these numbers seem to be decreasing, with recent reports estimating 200-240 incidents annually which could be attributed to the effects of efforts to educate perioperative professionals about the risk factors of surgical fires.

The National Reporting and Learning System (NRLS) database in England and Wales identified 37 reports of surgical fires between January 2012 and December 2018, with 52% of incidents resulting in some degree of harm.

From 1 April 2009 to 31 March 2019, NHS Resolution were notified of 631 clinical negligence claims relating to surgical burns to patients. Out of these 631 claims, 459 were settled, 58 were unmeritorious and 114 are still open. This has led to NHS Resolution paying £13.9m in damages and legal costs on behalf of the NHS organisations. The disconnect between claims and reported incidents suggest a significant underreporting of incidents or near misses.

While the financial costs of surgical fires are high, the human cost of surgical fires is even more significant, leaving patients with long-lasting, life-changing injuries.

Common causes of surgical fires

The fire triangle sets out the three elements that must be present for a surgical fire to occur within the operating theatre: Ignition source (for example electrosurgical devices, lasers, and fibreoptic light sources), fuel source (for example surgical drapes, alcohol-based skin preparation agents, the patient’s hair and gastrointestinal gases) and an oxidizer (for example oxygen, nitrous oxide and room air.).

The pooling of flammable skin antiseptic, has been identified as a cause of surgical fire by NICE. The NICE Clinical Guideline advised against using excessive amounts of alcohol based antiseptic solutions, reducing pooling and allowing enough evaporation time before applying drapes to reduce the risk of surgical fires.

The quantity of alcohol-based skin preparation should be reduced to a minimum in order to decrease run off and pooling on or near the body surfaces such as skin creases, for example the groin and umbilicus.

NICE suggests that, when performing surgery, medical grade chlorhexidine should be used, with Chloraprep as a recommended option as the applicator tool administers solution in measured amounts, which reduces pooling and helps reduce wastage. At the same time, NICE highlights the importance of using medical grade chlorhexidine, given the evidence on reducing the risks of surgical site infections and that applicator tools avoid the need to use antiseptic soaked swabs, which can absorb excess amounts of solution, heightening the flammability risk.
International best practice / approaches
The issue of surgical fires was the basis of one of the first National Patient Safety Agency (NPSA) Safety Alerts that the Agency distributed shortly after it was established in 2001. However, little has happened two decades on.

While the issue was discussed at the NHS England Surgical Safety Patient Safety Expert Group, in 2016, surgical fires have yet to be classified as a Never Event by NHS England. Never Events are defined by NHS Improvement as “serious incidents that are entirely preventable because guidance or safety recommendations providing strong systemic protective barriers are available at a national level and should have been implemented by all healthcare providers.”

We know that surgical fires are entirely preventable, but the absence of national guidelines has resulted in an inconsistent approach to prevention in UK hospitals. Elsewhere in the world, surgical fires are being prioritised effectively. The FDA in the US, recently issued national guidance in 2018 for all healthcare professionals involved in surgical procedures, including surgeons, surgical technicians, anaesthesiologists, anaesthetists, nurses, as well as healthcare facility staff responsible for patient safety and risk management.

Given the increasing body of international evidence and prevention guidelines, such as the recently updated NICE Guidance (NG125), released in April 2019, a group of experts, including the AfPP, concluded that surgical fires do in fact pass the threshold of evidence to be classified as a Never Event.

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Patient Safety Learning, a charity and independent voice for improving patient safety, has lent its voice to calls for a Never Event classification. Chief executive, Helen Hughes, who has held leadership roles in healthcare in the UK and the World Health Organization and the NPSA, stated that the drive to create Patient Safety Learning has been born from the frustration of seeing the same themes emerge time and time again in healthcare systems around the world.

Short-Life Working Group on Surgical Fires launched
A short-life working group (SLWG) was established in May 2019, following an initial discussion in December 2018 on the issue of surgical fires in the UK. Consisting of leading patient safety focussed organisations such as the AfPP, Patient Safety Learning and the Patients’ Association, the group came together to urge the NHS and the Centre for Perioperative Care (CPOC) to work together to develop guidelines and share best practice on surgical fire prevention.

This broad coalition is committed to raising awareness of this issue and urge the CQC to undertake ongoing surveillance to monitor operating room safety, monitor care and help keep patients and healthcare professionals safe. The SLWG recommendations and guidelines have resulted in an inconsistent approach to prevention in UK hospitals.

In addition, the group is calling for professional associations to explore the value of a national awareness campaign for healthcare professionals; for NHS England to mandate the inclusion of surgical fire prevention and risk assessment into surgical and perioperative education and training syllabus; to conduct a literature review of best practice and evidence, in the UK and internationally, and to explore how the procurement process can encourage better local purchasing of proven surgical fire-safe technologies. Lastly, the group is calling for a national patient safety alert system that aligns the processes and outputs of all bodies and teams that issue alerts and makes sure they set out clear and effective actions for providers to take on safety critical issues.

AfPP recommendations and standards for safe use of devices (2016)
As part of the SLWG working towards the prevention of surgical fires, the AfPP presented several of its own recommendations for reducing the likelihood of incidents occurring, in addition to what hospital staff should do if a fire breaks out in an operating theatre.

The AfPP advocated for the following recommendations for the safe use of devices that may serve as an ignition source:

1. If an ignition source must be used, be aware that it is safer to do so after allowing time for the oxygen concentration in the room to decrease. It may take several minutes for a reduction of oxygen concentration in the area even after stopping the gas or lowering its concentration.

2. Inspect all instruments for evidence of insulation failure (devices, wires and connections) prior to use. Do not use if any defects are found.

3. In addition to serving as an ignition source, monopolar energy use can directly result in unintended patient burns from capacitive coupling and intra-operative insulation failure. If a monopolar electrosurgical unit (ESU) is used, do not activate when near or in contact with other instruments.

4. Use a return electrode monitoring system.

5. Electrosurgery can produce a high temperature electrical arc if carbonised tissue is allowed to build up on the tip, regular cleaning will prevent and reduce this risk.

6. When not in use, place ignition sources such as ESUs, fibre-optic illumination light sources, electrocautery devices in a non-conductive container, and put on standby when not in use.

7. A carbon dioxide fire extinguisher must always be available in the operating theatre when devices are being used.
and a laser trained keyholder must be available as an extra member of the surgical team to operate the device.

8 To recognise that other heat generating items, including drills, burners, argon beam coagulators and fibre optic illuminators can also serve as potential ignition sources. Sterile saline should be used to cool devices that create heat during use.

9 The quantity of flammable fluid used to prepare the skin should be kept to a minimum, in order to avoid run-off and pooling, either on or around the patient. Precautions should be taken to prevent pooling underneath drapes or in skin creases. Any run-off that occurs should be contained by absorbent material placed around the patient which should be removed before the drapes are applied.

10 Antiseptic skin preparation should be supplied in ready-to-use, single-use containers, applicators, such as Chloraprep, or sachets to reduce risk of contamination from using multiple-use containers. Solutions must be licensed as a preparation suitable for skin disinfection prior to surgical procedures (AIPP 2016). Single-use containers are preferred to reduce the danger of accidentally using too much solution from a multiple-use container.

Training for NHS staff and the independent healthcare sector

Many published papers on surgical fires advocate education as the key to reducing the risk of surgical fires. Despite some form of fire safety training being mandatory for all NHS staff and independent healthcare workers, during their induction and ongoing employment, it does not address the unique features involved in preventing and extinguishing a surgical fire. The response to different kinds of surgical fire – airway, non-airway and equipment – can differ, as can an individual’s role depending on who is present at the time.

Preventative measures and effective management strategies require additional education and scenario training. This should involve simulations or, with advances in technology, virtual reality may even be possible. The absence of specific perioperative education and training currently acts as a barrier to eliminating incidences and ensuring healthcare professionals are able to react to the outbreak of a fire in an operating theatre. A laminated visible surgical algorithm in each theatre, demonstrating the difference between a non-airway and an airway surgical fire, or a poster that raises awareness, would improve knowledge within perioperative practice and help provide a quick reference in an emergency situation. It has also been observed that while the decline in the use of highly flammable and explosive anaesthetic gases over the last 30 years has certainly made surgery safer, it has also reduced the awareness of the potential risk of surgical fires. As such, it is vital to communicate in an awareness campaign or though patient safety circulars the importance of this issue to the wider NHS and private sector.

Surgical Fires as a Never Event

Classifying surgical fires as a Never Event could help address many of the weaknesses in the system that stand in the way of improvement. Information collated by the SLWG found that locally recorded data and national data often contradicted each other, and the inconsistency across the country of prevention and management protocols highlights the need for uniformity in the same way as Health and Safety regulation.

As the issue of surgical fires becomes increasingly recognised around the world, most recently exemplified by the US FDA launch of its surgical fires coalition, it is important that the NHS and private sector keep up with international best practice.

It is vital that we put effective protocols in place and ensure that preventable surgical fires are classified as a Never Event, to send a message to the NHS that a patient’s safety while undergoing surgery is indeed a priority, and to bring the NHS in line with other international healthcare systems approaches.

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