Fire on our intensive care unit

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Bath
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Overview

- What happened
- Possible causes
- Recommendations
- Photographs
Tuesday 22\textsuperscript{nd} November 2011
Timeline

- 1920: Fire alarm manually activated
- +5 secs: Smoke detector activated
- 1923: RUH switchboard’s call reached Bath fire control centre
- ?1925: Fire put out
- 1927: Evacuation of eleven patients from ICU complete
- 1930: Fire and rescue service arrived at front of hospital
- 1935: Fire and rescue services arrived on ICU
- 1940: Evacuated ICU patients arrived in ED
• Overnight
  – Margi and I admitted with smoke inhalation
  – Temporary ICU set up in PACU
  – Less affected end of ICU cleaned and given three coats of paint
  – One patient transferred to Frenchay
  – Four patients transferred to BRI

• 11am following day
  – Less affected half of ICU re-opened

• Five days later
  – HSE and police finished initial investigation

• One week later
  – Rest of ICU re-opened
Three other recent oxygen cylinder fires in UK since 2010...

- **Suffolk**
  - Fire station

- **Oxfordshire**
  - GP surgery

- **Glasgow**
  - Oxygen cylinder distribution centre
Possible causes
Health and safety executive enquiry

- Cause of fire unclear
  - Cylinder almost completely destroyed

- Conclusion
  - Fire started WITHIN the cylinder valve
  - Valve regulator then destroyed
  - O2 released into environment
CD oxygen cylinder

- Flow control
- Oxygen outlet
- Pressure regulator
- Safety valve

Flow control ➔ Regulator ➔ Valve ➔ Body

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CD oxygen cylinder diagram with labeled parts.
A fire requires...

1. Fuel

2. Oxygen

3. Ignition source
Factors involved in RUH fire

1. Fuel valve components
   • Metallic
   • Non-metallic

2. Oxygen

3. Ignition source
   • Friction from movement of valve components
   • Auto-ignition of valve components
   • Possible (?) probable contaminant
Causes excluded

- Alcohol Hand gel
- Static electricity
- Aftershave/perfume
- Adiabatic heating
- Staff error
- Storage error
- PTFE tape
- Carbon tape
Coroner’s inquest no 1

• Lady on the burning bed
  – Very sadly died five weeks later

• Coroner’s verdict
  “Death due to natural causes, contributed to by the effects of the burns she suffered in the fire”
CD oxygen cylinders

- Manufactured since 1999 by BOC
  - Valve manufactured by GCE
- 650,000 in use in UK
- Re-filled 6 times per year
- 25 million cylinder fillings since introduction
Changes in Bath following our fire
Changes on ICU

• New ICU fire evacuation policy
  – Evacuate to ED
  – Assume staff not fit to work

• ‘Fire tour’
  – All new doctors and nurses

• In-situ fire training on ICU
- Bed brackets for all oxygen cylinders
- Cylinders not laid on bed if at all possible
Oxygen cylinder use

– New storage racks in designated areas
– Daily check that cylinders turned off
– ICU safety briefing
– Hospital wide training programme
• ICU and ED
  – Dedicated phone line now installed

• Fire alarm
  – Now rings within the ICU

• Low level lighting installed
Changes in theatre

• New theatre evacuation policy

• Use of oxygen cylinders
  – Storage racks
  – Stored turned off at side and on top
  – Oxygen cylinders turned on BEFORE attached to patient
Changes within the hospital

• Switchboard
  – New computerised fire panel

• Oxygen cylinder bed brackets for all ward beds
  – Hopefully soon

• Compulsory occupational health review for staff
  – Prior to returning to work after similar events
Bed bracket availability tricky...

• ICU beds
  – Brackets in use

• Hospital ward beds:
  – Liaison with bed manufacturers
  – Suitable bracket now found
  – Funding still awaited....
National changes following our fire
SALG safety alert

- All doctors
- All nurses
- All healthcare workers
- Planned distribution in Europe too
BOC guidance on use of oxygen cylinders

- Use oxygen cylinder brackets if possible
- Turn on oxygen BEFORE put mask on patient
- Turn off at side as well as at top
- Endorsed by AAGBI

Safe Handling of Oxygen Cylinders

The AAGBI Safety Committee has received notice of a fire in a hospital ITU, where a medical oxygen cylinder ignited when the oxygen flow was being selected. The cylinder had been placed on the bed, next to the patient and the bedding quickly ignited.

Although the incident investigation has not identified the cause of the ignition, a number of points concerning the use and handling of medical oxygen cylinders were raised. Having reviewed this information and discussed the incident with representatives from the cylinder supplier and the MHRA, the AAGBI Safety Committee has decided to publish this statement to inform members of what is now considered best practice when using and handling medical gas cylinders.

Prior to the incident, the cylinder had been laid on the bed as part of its preparation and testing before administering the gas to the patient. Although medical oxygen cylinder fires are very rare, when the cylinder valve is first opened and the flow selected is the most likely time for an ignition to occur.

The AAGBI Safety Committee would like to suggest the following revised steps when...
Health and Safety Executive discussions

- Fire retardant materials
- Fire extinguisher training
  - ICU and theatre staff
- Computerised fire panels
  - for all hospitals?
ICU design

- Single rooms or small bays
- Sprinkler systems
- Multiple corridors and exit routes
FRCA primary viva exams
Psychological impact
Photographs
Take home messages

- Consider looking around your own ICU
- Consider fire tour for all new staff
- New guidance for oxygen cylinder use
Thank you...

- Anaesthetic department
- ICU staff
- ED, theatre+ PACU staff
- Estates staff
- BRI and Frenchay ICUs
- Family of the lady who died
And thank you to the ICU staff working that night...
Any questions?

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