

What Oxygen Safety Means to a Healthcare Facility

Mike Ralph

Director of Estates & Facilities

Croydon Health Services

Contents

- **Introduction**
- **Security of Supply**
- **Quality of Supply**
- **Safety of the User**
- **Safety of the Patient**
- **Conclusion**

Introduction

Medical oxygen is one of the commonest drugs administered to patients in hospital.

Although common – it is essential for life.

Often ‘taken for granted’ – it is supplied either from cylinders or ‘out of the wall’ from a pipeline system.

But oxygen brings with it some risks – so it must be supplied and used with care.

Although the responsibility of the Pharmacist – it is often provided in cylinders to the Doctor or Nurse by the Porter or via the pipeline by the Engineer.

Everyone in the hospital has a responsibility to supply the correct product safely.

Three Kinds of Safety

Medical Oxygen impacts on the day to day safety in the hospital of both the patient and the healthcare professional - in three completely different ways:

- As a safe and secure supply ensuring that there is always product available.**
- As a quality product ensuring right product at the correct quality and the right pressure and flow is supplied to patients.**
- As a safe product minimising the risks of fire or personal injury to both patients and healthcare employees.**

Security of Supply

Hospital oxygen supply system design is based on the principle of Single Fault Failure.

- ensures the supply system will continue to function (even when under maintenance conditions) when any component of the system fails.**
- recommended in ISO 7396-1 (Medical Gas Supply Systems).**
- requires three sources of supply of medical oxygen.**
- robust pipeline system that will not cause a failure of supply with a single fault.**

Security of Supply

The standard requires three sources of supply – to the patient:

- main supply source
sized to meet the predicted demand and agreed
supply frequency.**
- back up supply
large enough to manage a loss of prime supply
source.**

Installation showing main supply vessel and back up liquid tank.



Security of Supply

The standard requires three sources of supply – to the patient:

- **main supply source**
sized to meet the predicted demand and agreed supply frequency.
- **back up supply**
large enough to manage a loss of prime supply source.
- **emergency supply**
normally in the form of cylinders – either on a manifold or individual cylinders available for a strategic supply to ensure the high risk patient always has gas available – under any condition.

**Installation
showing
typical
cylinder
backup
manifold**



Design of Pipeline System

Medical gas pipeline systems:

- utilises the principle of Single Fault Failure in the design.
- risk of failure minimised by using Risk Management
- security of supply potentially improved by using ring main system
- located to minimise the risk of mechanical damage.
- failure of supply potentially controlled by use of strategically located isolation valves

**Installation
showing
typical
medical gas
pipeline
system**



Design of Pipeline System

Medical gas pipeline systems:

- utilises the principle of Single Fault Failure in the design.
- risk of failure minimised by using Risk Management
- security of supply potentially improved by using ring main system
- located to minimise the risk of mechanical damage.
- failure of supply potentially controlled by use of strategically located isolation valves
- **constructed to ensure a safe system - even under extreme conditions (such as fire).**
- **Alarm systems used to provide early warnings of system faults.**

Installation showing typical alarm panel for medical gas supply system



Design of Pipeline System

Medical gas pipeline systems:

- utilises the principle of Single Fault Failure in the design.
- risk of failure minimised by using Risk Management
- security of supply potentially improved by using ring main system
- located to minimise the risk of mechanical damage.
- failure of supply potentially controlled by use of strategically located isolation valves
- constructed to ensure a safe system - even under extreme conditions (such as fire).
- Alarm systems used to provide early warnings of system faults.
- **Design files and 'As Installed' drawings maintained**

Quality of Supply

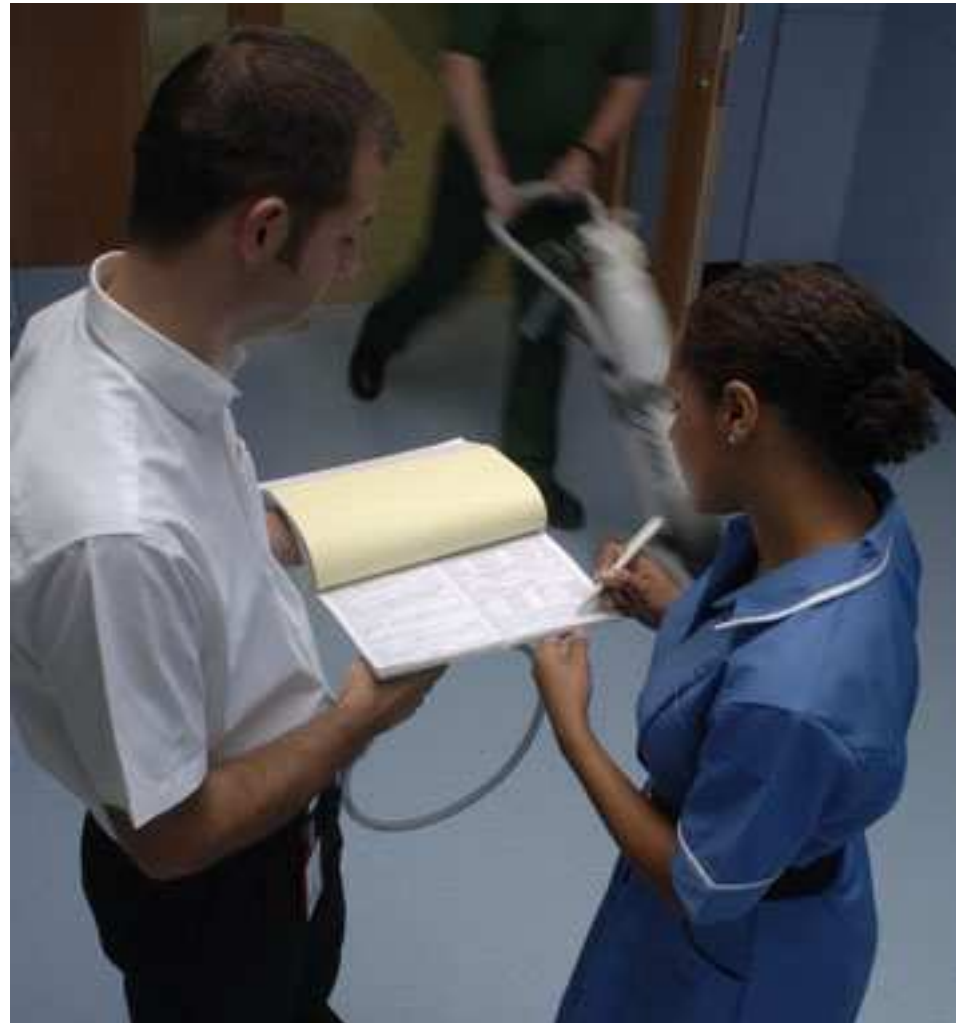
Medical oxygen quality prime requirement for patient safety.

- **medicinal grade certified product supplied into supply system storage vessels.**
- **Hospital Pharmacist responsible for quality of medical oxygen administered to patients.**
- **management of pipeline system critical to ensure the correct gas of the right quality of gas is delivered to the patient.**
- **number of incidents have occurred where poor maintenance procedures have led to the wrong gas being administered.**
- **the consequences of getting it wrong can be fatal.**

Management of Pipeline System

- Pipeline management essential to ensure patient safety.
- Pipeline systems under control of an Approved Person
- Any modifications controlled using a 'Management of Change' system supported by a Risk Assessment
- Permit to Work system used to ensure maintenance work is correctly planned.
- Warnings given to users prior to taking out of service.

Management of Pipeline System



Management of Pipeline System

- Pipeline management essential to ensure patient safety.
- Pipeline systems under control of an Approved Person
- Any modifications controlled using a 'Management of Change' system supported by a Risk Assessment
- Permit to Work system used to ensure maintenance work is correctly planned.
- Warnings given to users prior to taking out of service.
- **Testing required after any work to ensure end to end integrity.**
- **Control of the reinstatement of systems following any work to ensure systems are operating correctly.**
- **Design files updated to reflect all changes to the system**

Management of Medical Devices

- **Correct oxygen flowrates prescribed by doctor.**

Management of Medical Devices

Typical flowmeter
used to monitor
flow to patient



Management of Medical Devices

- Correct oxygen flowrates prescribed by doctor.
- **CE approved Medical Gas devices used to administer the correct flows of oxygen to the patient.**
- **Device management essential to ensure patient safety – both use and maintenance.**
- **Only Approved suppliers used to maintain equipment.**
- **Equipment maintained to ensure safety with oxygen as well as correct flows and pressures.**

Safety of Personnel and Patients

- Risk management used to identify the potential safety issues with the supply of medical oxygen.
- Training is essential in the mitigation of some of the risks with using medical oxygen.
- Everyone involved in the process of supplying the patient needs suitable training.
- New design of medical cylinders with integral valves has helped to reduce the risks around the use of high pressure.
- Risk of fire with oxygen is a major issue that needs careful control – from the design of systems onwards.

Safety of Personnel and Patients



Training

Awareness of the risks is an essential element of the training package which include:

- **Manual handling techniques to handle cylinders safely – use of cylinder trolleys.**
- **Cleanliness requirements when handling oxygen equipment – no oils and grease.**
- **Device management – to ensure that the gas is only ‘turned on’ when required.**
- **Adequate ventilation – to ensure that oxygen enrichment is managed to reduce the risk of fire.**
- **Limiting amount of oxygen on the ward – to minimise risks in event to fire.**
- **Device maintenance and calibration – to ensure the patient gets the correct flow of gas.**

Conclusions

Medical oxygen is an essential requirement for any healthcare facility – but it needs to be managed carefully:

- Robust supply systems to maintain supply of gas to the patient.**
- Safe administration of the gas to the patient using correctly designed pipeline system and correctly maintained equipment.**
- Risk assessment to identify the potential risks.**
- Making everyone aware of the risks.**
- Providing training to everyone to manage the mitigation to ensure safe systems for its administration and use.**

EIGA

NHS

EUROPEAN INDUSTRIAL GASES ASSOCIATION

www.eiga.eu

Thank You