Piped Oxygen Supply Business Continuity Plan v2

# 1.0 Introduction

This plan is designed to provide guiding steps to be followed in the event of increased demand on the vacuum insulated evaporator supply (VIES). This is the mechanism by which piped oxygen is supplied to patients and therefore, following the actions described at each of the specified trigger points, aims to mitigate any impact on service provision and patient treatment.

The aim of this plan is to ensure actions are taken at these trigger points in order to prevent exceeding the system capacity, or failing completely.

The exponential increase in demand for oxygen supply as a result of the COVID-19 pandemic, has put increasing strain on the infrastructure supporting it. Particularly approaching the festive season of 2020 monitoring has indicated it be prudent to develop a more robust plan for responding to a full failure in the unlikely event such a scenario occurs, which is the key update of this version of the plan.

At the end of 2020, NHS England and Improvement national coordination structures required the demand for oxygen supply across England, be managed as a major incident, which is particularly prudent for the Queen’s Hospital (QH) site as the highest percentage user of its capacity, in England (based on seven day rolling telemetry).

# 2.0 Approval & Review

This plan has been approved by Trust Gold Command on 08 January 2021, following consultation and approval from a dedicated, multi-disciplinary, Oxygen Incident Management Team (OIMT).

This is a working document that will be reviewed at least annually, or in line with changes to release of new guidance and updates to local services, or following learnings identified after a test or activation.

# 3.0 Triggers

Assurance has been provided that the VIE system is capable of operating at 100% of its capacity however, this should be maintained below 80% to protect the integrity of the system and as per the Piped Oxygen BCP.

Using these as a guide, triggers have been established as follows:

|  |  |  |
| --- | --- | --- |
| **Level** | **VIES Demand Trigger****(at EITHER site)** | **Monitor Frequency** |
| 1. Green
 | Less than 80% | 2 per day |
| 1. Amber
 | 80% | 2 per day |
| 1. Red
 | 90% | Hourly (2 or more consecutive readings) |
| 1. Black
 | 100% | Hourly |

In the event that the system is working beyond its capacity to the extent that it is unable to maintain the necessary pressure, audible low pressure alarms will activate.

If the alarms are isolated to a particular area, this is suggestive of a localised issue that should be reported and rectified urgently, through existing engineering processes.

This plan should be activated in the event of low pressure alarms activating across multiple clinical areas to suggest to the engineering team that a more systemic issue is occurring and there is potential for a system failure.

The timeframe for a full loss of supply from this point is variable depending on a number of factors but 60 minutes should be taken as a very approximate guide. It is highly unlikely that an immediate failure of the entire system would take place. The actions in either scenario are the same, only the speed at which they are required to take place being increased or decreased accordingly.

# 4.0 Notification

All pager call signs in this section can be contacted by:

* Calling 08448 222 888
* Ask for a message to be communicated to the relevant call sign
* The format of your message should be:
	+ RAG rated i.e. RED for “action required” AMBER for “no immediate action, update to follow” GREEN for “information only.”
	+ Organisation
	+ Role of message sender
	+ Return contact number
	+ Brief summary of the issue
* Sample message:
	+ “RED: Please contact BHRUT Gold on Call (NAME) on (MOBILE NUMBER). Major Incident declared due to (potential) oxygen infrastructure failure at Queen’s Hospital Romford.”

## 4.1 Internal

As the system reaches Level 4 or starts failing, the sounding of ward level low pressure alarms should follow normal reporting and response actions within the ward area and with the support of the FM provider to resolve if necessary, in and out of hours.

Should the FM provider begin to receive notifications from more than one area, they will escalate to the Clinical Operational Site Team (COST):

* Queen’s Hospital, dect 6601
* King George Hospital, extension 8478

If the matter is deemed necessary for escalation, the follow sequence should be followed:

* Silver on Call (BHRAC2, by COST)
* Gold on Call (BHRAC1, by Silver on Call)
* Platinum on Call (by Gold on Call)
* Executives (by Platinum on Call)
* Oxygen Incident Management Team (OIMT WhatsApp group, by Platinum on Call)
* Security Team (by Silver Estates on OIMT WhatsApp Group)
* Fire Team (by Silver Estates on OIMT WhatsApp Group)
* Communications (07795 642319, by Silver Operations on OIMT WhatsApp Group)
* Transport (via Switchboard, by Silver Operations on OIMT WhatsApp Group)

## 4.2 External

Following discussion with Platinum on Call, Gold on Call should notify the relevant external partners.

If there is a decision made to declare a major incident, this must be notified to NHS England (London) Gold on Call, pager call sign “NHS01”

A further specific call group has been established in the event that Gold and Platinum on Call think it appropriate to notify a group of external partners with one message. Call sign “BHRSUP1” will notify all of the below organisations (with their individual call signs also noted):

* BHRUT Gold on Call (BHRAC1)
* BHRUT Silver on Call (BHRAC2)
* BHRUT Emergency Planning
* East of England Ambulance Control
* LAS Duty IDM
* NEL STP Gold on Call (NELCA1)
* NEL CSU Director on Call (NELCSU2)
* NHSE (London) Gold on Call (NHS01)
* NHSE (London) Senior Manager on Call (SM01)

# 5.0 Command & Control

## 5.1 Oxygen Incident Management Team (OIMT)

The internal incident management team is currently being supported by Mark Fisher and Charles Hanford, national oxygen leads for NHS England and NHS Improvement, and Archna Mathur, Oxygen SRO, North East London.

|  |  |
| --- | --- |
| **Incident Role** | **Post Holder** (as at 31 December 2020) |
| Gold Command | Nick Swift, Chief Finance Officer |
| Silver Medic | Tomas Jovaisa, Divisional Director Acute Medicine & Critical Care |
| Silver Nurse | James Avery, Director of Nursing, Safety and Learning and Workforce Safeguards |
| Silver Estates | Steve Last, Director of Estates & Facilities |
| Silver Operations | Keith Donnelly, Head of Emergency Preparedness |
| Silver Pharmacist | Sarla Drayan, Chief Pharmacist & Associate Director Medicines Optimisation |
| Silver Data | Ben Conway, Director of Performance Analytics |

This group sits alongside the existing, primary Trust command structure below. OIMT Silver Operations will provide necessary updates and cascade to the Trust Silver Support, Silver Command Team (SCT) and Gold Command Team (GCT). OIMT Gold Command will likewise communicate with the Trust Executive Team.

## 5.2 Trust Command & Control Structure

* Gold Operations
* Gold Medic
* Gold Nurse
* Strategic Advisor
* Gold Loggist

Trust GCT

* Communications

KGH SCT

Trust SCT

* Silver Operations
* Silver Medic
* Silver Nurse
* Silver Support Team
* Divisional Triumvirates (as required)
* Silver Operations
* Silver Medic
* Silver Nurse

Bronze Command Team

* Clinical Site Operations Lead
* Matrons / Service Managers

# 6.0 Response Activity

## 6.1 Level 1 Green – less than 80% demand on VIES (business as usual)

|  |  |  |
| --- | --- | --- |
| **Action** | **Lead** | **Completed?** |
| The oxygen flow rate and resulting percentage demand on the VIE at each site, should be checked twice per day, seven days per week (normally 1am and 1pm) via the online portal. | Silver Estates |  |
| Circulate findings above via email. | Silver Estates |  |
| All units to be de-iced twice per day, seven days per week (normally 9am and 5pm). | FM Provider at both sites |  |

## 6.2 Level 2 Amber – 80% demand on VIES

|  |  |  |
| --- | --- | --- |
| **Action** | **Lead** | **Completed?** |
| Actions detailed above for Level 1 to be reviewed. |  |  |
| OIMT should be notified that the Level 2 trigger point has been reached and the Trust Silver and Gold Command teams should be advised for information only via OIMT Gold. | Silver Estates |  |
| Twice daily OIMT huddles to be convened (0930 & 1500) along with daily NEL briefings; should include action log covering measurements, daily management and improvements. | OIMT Gold |  |
| The oxygen (O2) demand at the affected site is to be measured at a ward level (via Daily Patient Oxygen Monitoring Report) to identify any unexpectedly high demand areas. | Silver Estates |  |
| A review of all patients on piped oxygen supply across the affected site, to be initiated to ensure they are only receiving the prescribed amount, and where prescriptions can be appropriately reduced. | Silver Medic &Silver Nurse |  |
| If authorised by Trust Gold Command and where clinically appropriate and safe, patients on the affected site should be transferred to portable O2 cylinder supply.Patients not on high pressure machines (e.g. NIV, ventilators):* Saturation >94%: no additional oxygen supply;
* 0 – 5 litres per minute: oxygen concentrator;
* 5 – 15 litres per minute: w-size cylinder;
* There are likely to be further cylinders available that can be considered depending on number of various sizes available at the time.
 | Silver Medic &Silver Nurse |  |

## 6.3 Level 3 Red – 90% demand on VIES

|  |  |  |
| --- | --- | --- |
| **Action** | **Lead** | **Completed?** |
| Actions detailed above for Level 2 to be reviewed. |  |  |
| Notify Trust Silver and Gold Command teams that Level 3 trigger point has been reached. | OIMT Gold |  |
| Membership of twice daily huddles to be extended to national oxygen team, BOC, and NEL team, as necessary. | OIMT Gold |  |
| Initiate Plant Resilience Plan (*to follow*) adding cylinder manifold contingency and agreeing engineering options e.g. running vaporisers in series rather than parallel, where this enhances performance. | Silver Estates |  |
| Where wards or other clinical areas are due to change functionality that would impact on O2 demand, this should be reviewed and delayed where appropriate. | Trust Silver Command |  |

## 6.4 Level 4 Black – 100% demand on VIES

The below actions should be applied as required, as the demand increases beyond 100% or in the event the system starts to fail. Actual or potential system failure will be indicated by low pressure alarms activating across multiple clinical areas.

|  |  |  |
| --- | --- | --- |
| **Action** | **Lead** | **Completed?** |
| **Technical System Assessment** |
| Ascertain extent and duration of system compromise and if / when it will be back online. | Silver Estates |  |
| **Notification** |
| Initiate internal on call notification process in sequence, as per Section 4.1 above. | Initiated by COST |  |
| Silver, Gold and Platinum on Calls to discuss declaration of a major incident. | Silver on Call |  |
| In consultation with Platinum on Call, notify NHS England (London) Gold on Call, by contacting 08448 222 888 and call sign “NHS01” to declare a major incident due to infrastructure failure.Suggested message: “RED: Please contact BHRUT Gold on Call (NAME) on (MOBILE NUMBER). Major Incident declared due to (potential) oxygen infrastructure failure at Queen’s Hospital Romford.”Depending on the scale / duration of the failure, it may be required to request:* Full LAS divert away from both hospital sites;
* LAS oxygen support vehicles that may be on standby at Romford and Silvertown (Ilford). The capacity and capability of these vehicles is included in Appendix 1;
* Support for mass transport of patients to alternative locations.
 | Gold on Call |  |
| If appropriate, Gold and Platinum on Call to consider wider external notification if not being managed by NHS01.Details included in Section 4.2 above. | Gold on Call |  |
| Escalate to NEL Oxygen Lead and London Oxygen Lead | OIMT Gold |  |
| Notify transport providers of expectation to require significant number of patient transfers off site.Further support may be required from Local Authority or health partners. | TransportSilver Operations / Platinum on Call |  |
| Notify BOC of anticipated increased demand for oxygen cylinder supply.Further support may be required from Local Authority or health partners. | Silver EstatesSilver Operations / Platinum on Call |  |
| Establish immediate and on-going administration and loggist support. | Silver on Call / Silver Operations |  |
| Identify cohort of staff that can support with cylinder deployment and manual ventilation of patients in the event that either becomes required. No clinical skills required for either role. | All |  |
| **Action** | **Lead** | **Completed?** |
| **Patient Oxygen Assessment** |
| Coordinate an immediate further assessment of patient-level oxygen need to ensure all patients are taken off the piped supply and it is protected for high use areas, using the actions below. | Silver Medic &Silver Nurse |  |
| Theatres:* Anaesthetic machines already have back bars with cylinder back up cylinder supply to allow moving off piped supply;
* Use in combination with moving to low-flow anaesthesia technique.
 |  |
| Patients dependent on high pressure supply e.g. Critical Care, NIV, ED:* NIV – patients on O2 pressure-driven machines e.g. Respironics V60, to be transferred to turbine-driven machines e.g. Breas, Vivo, Prismavent and then O2 to be delivered by cylinder supply. Insufficient cylinder supply will mean prioritise patients on less than 60% for turbine-driven machines or reliance on room air;
* Ventilators are driven by medical gases and therefore likely to continue. If no large volume cylinders available change to manual ventilation with self-inflating bag and cylinder oxygen supply (AMBUbag or similar, Waters/Mapelson C circuits MUST NOT be used in this situation). If no oxygen cylinders available continue manual ventilation with room air;
* HFOT e.g. Optiflow, to be transferred to <15 litres per minute via non-rebreather mask and cylinder supply;
 |  |
| Patients receiving palliative care to have their oxygen provision reduced or removed. |  |
| All available staff to support with manual ventilation of patients on a priority basis as determined by Silver Medic & Silver Nurse. Patients on less than 60% O2 to be prioritised. |  |
| Where patients do not meet the thresholds above, assessment to be made as to whether patients are suitable to move to alternative site once capacity is identified. | Silver Medic &Silver Nurse |  |
| Automatic DNACPR order for all patients dependent on high pressure gas supply systems. | Silver Medic &Silver Nurse |  |

|  |
| --- |
| **Security & Communication** |
| Declaration of a major incident will attract public and media attention. Coordinate reminding all Trust staff not to speak to media or comment inappropriately on social media. | Communications Team |  |
| Ensure internal and external communication platforms are updated and monitored. | Communications Team |  |
| Review security provision on site to accommodate potential for additional public and media presence on site, as well as additional cylinder storage being required. | Security Team |  |
| Coordinate provision of a dedicated Fire Team, if necessary, to provide a continuous preventative monitoring of areas where cylinders are in use, which bring increased risk of fire / explosion due to missing inbuilt safety mechanisms compared to piped system. This monitoring will include:* Removing sources of ignition;
* Maximising air flow through the areas (e.g. open windows);
 | Fire Team |  |

|  |  |  |
| --- | --- | --- |
| **Action** | **Lead** | **Completed?** |
| **Secondary Site** |
| It may be appropriate to identify a Second Silver Commander for the less-impacted / secondary site. If not already in place, COST at that site may deputise until appropriate colleagues are identified. | Gold on Call |  |
| The secondary site will be expected to accommodate a number of the primary site’s patients. A rapid assessment of capacity should be undertaken:* Nurse staffing capacity: can this be increased or risk thresholds adjusted?
* Medical staffing capacity: can this be increased or risk thresholds adjusted?
* Bed capacity: immediate review of barriers to inpatient discharges; consider increasing risk threshold of patient discharges; where can additional beds be placed outside of the normal locations and is there sufficient staff, equipment, medicines, etc. to accommodate?

The movement of oxygen-requiring patients to KGH will increase the risk at that site and should be considered accordingly. It may be balanced with moving patients on and off oxygen supply. | Second Silver |  |
| Coordinate appropriate levels of Security, Fire and Communications teams’ presence at the site, in discussion with the relevant leads from the primary site. | Second Silver |  |

# 7.0 Stand Down

It can generally be considered appropriate to stand down the response, when activity has declined to a sufficient level that it can be managed through business as usual, or when the level of coordination required can be deescalated.

When the decision has been made to stand down, the following actions should be taken:

1. Stand down message to be cascaded appropriately, internally and externally (partner agencies, general public and media).
2. Ensure handover to Recovery Working Group.
3. Ensure a welfare check of all responding staff.
4. Carry out hot debrief centrally and at team level as appropriate.
5. Ensure all Logs are signed off and collected for use during the Structured Debrief, to feed into the post-incident report and for any other internal or external learning or investigation.
6. Further recovery activity as detailed in the Trust Major Incident Plan.

# Appendix 1 – LAS Oxygen Support Vehicles

LAS have two vehicles currently on standby for QH, with an accompanying crew for each. These are London and national assets and therefore their support cannot be guaranteed in the event of an incident.

LAS have provided details in the attachment below, with a summary as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sequence** | **Vehicle** | **Flow rate** | **Duration** | **Volume** | **Notes** | **Location** |
| 1st response | ESV(18x ZD cylinders) | 8lpm | 70mins | 18 casualties |  | Romford |
| Follow up | MCV / MPU | 8lpm | 30mins | 48 casualties (groups of 4, daisy chained together) | Unlikely to find second replacement cylinder supply once used | Silvertown |
|  |  |  |  |  |  |  |
| (FYI) | AmbulanceHX cylinder | 8lpm | 287mins | 1 casualty | (could be connected to 4-way valve from MCV to give 4 patients, 70mins) |  |

Intended to be used within temporary holding areas whilst awaiting transfer from one area to another, or during repairs.

Oxygen is supplied via facemask, provided by LAS.

