

CASE STUDY: INSTALLATION OF AN OXYGEN CONCENTRATOR

Charing Cross Hospital, London

Charing Cross is an acute general teaching hospital in Hammersmith, west London and is part of Imperial College Healthcare NHS Trust. Originally established in central London in 1818, it is a tertiary referral centre for neurosurgery and pioneered the clinical use of CT scanning.



The Project

In March 2020, when the effects of the Covid-19 pandemic were beginning to hit the UK, Charing Cross, like many other hospitals, was facing unprecedented oxygen demands which the existing medical gas plant could not meet. It was facing the prospect of having to turn patients away.

SHJ suggested using an oxygen concentrator. A concentrator separates oxygen from the ambient air whereas a typical hospital supply uses liquid oxygen stored in a VIE (Vacuum Insulated Evaporator). Although common overseas, concentrators had never been used in a UK mainland hospital before.

The Challenges

As at most hospitals, space is at a premium and there are not many plant rooms lying empty waiting to accommodate an oxygen concentrator. Charing Cross is no different and so to overcome the problem, SHJ suggested a technique it has used at other hospitals to offer a speedy and flexible way of getting new systems up and running as quickly as

possible: two 40' metal shipping containers installed in the hospital car park.

Oxygen from a VIE will produce a nominal 99.6% purity, while an oxygen concentrator produces at 93% +/- 3%. This is acceptable for patient use as long as the impurities are non-toxic, but did mean that the hospital would have two different oxygen products available – a constraint it was happy to work with, understanding that it could switch between the two, but not mix them.

The Solution

The hospital decided to allocate the concentrator to one of its blocks which houses elderly care wards and in which new Covid beds had hurriedly been placed. Pipework was laid which would enable the concentrator to supply the block independently, while retaining the connection to the main VIE to allow maximum flexibility. It also allowed generated oxygen to be supplied to the entire hospital site via a ring main in the event of total failure of the VIE.

Services provided include:

- 24-hour A&E
- Hyper Acute Stroke Unit
- West London Neuroscience Centre
- Cancer services
- Cardiology
- Rheumatology
- Plastic surgery
- General surgery



The team began sourcing all the plant, pipelines and electrical supplies required at the beginning of April. Working round the clock 7 days a week, engineers were able to begin quality testing less than 4 weeks later. On the last day of the month, final testing verified that oxygen production met the requirements of European Pharmacopeia Monograph 2455 and ISO 10083 for Oxygen 93 (oxygen purity of 93% +/- 3%). The new system went into service at 4pm that day.

Key Facts:

- Installation of a oxygen concentrator plant
- Extremely short timescale
- Upgrade of existing pipework
- Creation of site-wide ring main to increase oxygen supply capacity
- Installation carried out adjacent to occupied patient areas
- New plant fitted with locally and remotely-monitored alarm system
- Worked with the constraints imposed by Covid-19

The Benefits

This project offered an immediate solution to a patient-threatening situation when all other options had been ruled out. Charing Cross now has a backup oxygen supply system which enabled it to meet the extraordinary demands of the Covid-19 pandemic – and which will stand it in good stead should the “second wave” happen later in 2020 and into 2021.

There has been considerable interest in the Charing Cross experiment from other NHS trusts as hospitals look to upgrade their oxygen delivery mechanisms at this unprecedented time.

Customer Testimonial

“SHJ has the technical knowledge and access to suppliers that was invaluable. They are not afraid of innovation and pushing the boundaries. To have made the decision to buy it and to have it installed, operational and connected to patients in less than a month was phenomenal”.

Shane King, Head of Estates Operations, Imperial College Healthcare NHS Trust

This project demonstrates SHJ’s “can-do” attitude and positive approach to solving customer problems. We pride ourselves on finding innovative solutions to the trickiest of MGPS challenges.



Imperial College Healthcare

NHS Trust

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Dear Stafford

I wanted to take this opportunity to write personally to thank you and your team for your support during the COVID-19 crisis and now, as we recover and reset. The country has thanked the NHS for the amazing work of our frontline colleagues but we know that without the help, advice, long hours and support from our external partners, our response would not have been as effective as it was.

When I thanked the Imperial Estates team for their work, they told me how grateful they were for the support from SHJ Hospital Pipelines Ltd, hence wanting to write to you. They were especially appreciative for supporting the Estates teams across all sites in the detailed assessment of existing piped medical gas system capacity to meet increased ICU ventilator requirements. I want to share what they said: "Including the redesign of systems and installation of new pipework infrastructure to provide adequate oxygen and medical air flow capacity to designated points of use. Also for the turn-key solution in supplying and installing the innovative oxygen concentrator plant increasing site oxygen capacity by 850 litres/min (33%) when conventional liquid oxygen supplies were unable to meet estimated demand, often working in close adjacency to COVID-19 positive patients".

As we reflect on the exceptional circumstances and the way in which organisations have pulled together to support the Trust, our staff and patients, we must also look at the potential for future waves. Please feel free to share any learnings for the future.

But for now we are grateful for the support the Trust has received during the COVID-19 pandemic - from colleagues in so many partner organisations. Thank you. Your company made a big difference to the way the Trust was able to respond.

Please do share this letter with all involved.

With very best wishes.

Yours sincerely

Paula Vennells CBE
Chair

P.S

Please accept my apologies for the use of my electronic signature but this was the most efficient way to expedite my letter to you.