

Delivering oxygen at doorstep: A case study on Rajasthan's Oxygen Concentrator (OC) Banks

Background

Globally, patients with mild to moderate long-term respiratory distress are primarily treated at home. These home-based patients require continuous oxygen supply for extended periods of time. In order to assist these home-based patients, two manufacturers, Union Carbide Corporation and Bendix Corporation, developed an innovative device called oxygen concentrator (OC). An OC, as the name implies, concentrates oxygen from ambient air by selectively removing nitrogen, thereby supplying oxygen to patients. Patients access the oxygen provided through the concentrator by a cannula, oxygen mask, or nasal tube.

During the COVID-19 pandemic, the SARS-CoV-2 virus infected patient's respiratory systems, causing drop in blood oxygen levels and shortness of breath. As the infection level in the community soared and demand for medical oxygen increased, patients sought oxygen therapy from nearby hospitals, resulting in dwindling oxygen supplies. Hospitals revised their in-patient strategies by admitting patients with severe symptoms only, and in line with the World Health Organization's guidelines, the governments advised patients with mild to moderate symptoms to isolate at home. This led to a considerable increase in demand for OCs by COVID-19 patients who sought care at home.

The Government of Rajasthan swiftly stepped up and implemented a series of measures to support patients requiring oxygen. One of the many measures include establishing OC Banks. This case study documents various aspects of establishing OC Banks, their impact, and lessons learned from this intervention.

Structure of OC Banks

The Rajasthan state administration established OC Banks, or simply, "Oxygen Banks," that enabled access to oxygen to home-based patients with mild to moderate symptoms.

"This unique rental scheme of providing OCs to patients at their doorsteps has proved beneficial and cost-effective. This scheme not only benefited COVID-19 patients but also patients suffering from other respiratory disorders such as silicosis, chronic obstructive pulmonary disease (COPD), etc. Patients can be taken care of at home and family members attending to such patients need not worry about arranging medical oxygen when required."

- Dr Prem Singh, State Nodal Officer, Rajasthan

This initiative was aimed at providing medical oxygen equipment to patients suffering from respiratory diseases, such as COVID-19, silicosis, COPD, etc. directly at their doorstep. This concept was envisioned to reduce the spread of COVID-19, minimize the load on medical facilities, and most importantly, reduce the loss of life due to respiratory diseases.

Procurement and Quality Checks

The Government of Rajasthan procured around 33,000 OCs through its procurement agency, Rajasthan Medical Services Corporation Limited (RMSCL), at a cost of approximately INR 50,000 – INR 60,000 per OC. The OCs were procured through the state funds. The state also received around 10,000 OCs through donations from various foundations.

Quality check of the procured OCs were conducted by issuing tenders and deploying

biomedical engineers to review their quality. Facility in-charges were also directed to unbox each OC and check the devices for proper functioning.

Deployment of OC Banks

The Chief Executive Officers of Zila Parishad, in coordination with District Collectors and Chief Medical and Health Officers (CMHOs), were entrusted with the task of identifying the requirement of OCs and generator sets for their respective districts. The state government equipped every health centre with two OCs and one diesel generator set. The generator sets were provided to ensure uninterrupted operation of the OCs.

Out of 33 districts in Rajasthan, seven districts namely Jaipur, Jodhpur, Udaipur, Ajmer, Bharatpur, Bikaner, and Kota were provided with more than 500 units of OCs. At least 400 OCs were stored in the Jaipur warehouse. Additionally, 200 OCs each were provided to Alwar, Bhilwara, Pali, and Ganganagar. Rest of the 22 districts were provided with 100 OCs each.

“We have an oxygen bank with 200 units of concentrators in our warehouse and provide these devices to home-based patients with respiratory distress. A prescription is required from the doctors and a security amount of Rs 5000/- is deposited to the bank. At the time of the delivery of the OC, the patient and family members are trained on the operation and maintenance of the device. We have provided seven OCs to benefactors since 2022. The scheme is beneficial to the patients as they could get oxygen therapy at home and the family members can take care of them. In future, we would like to extend this service to all the patients suffering from respiratory diseases in the community.”

-Dr Ghanshyam Chawla, Deputy CMHO,
Bhilwara, Rajasthan

Capacity-Building on OCs

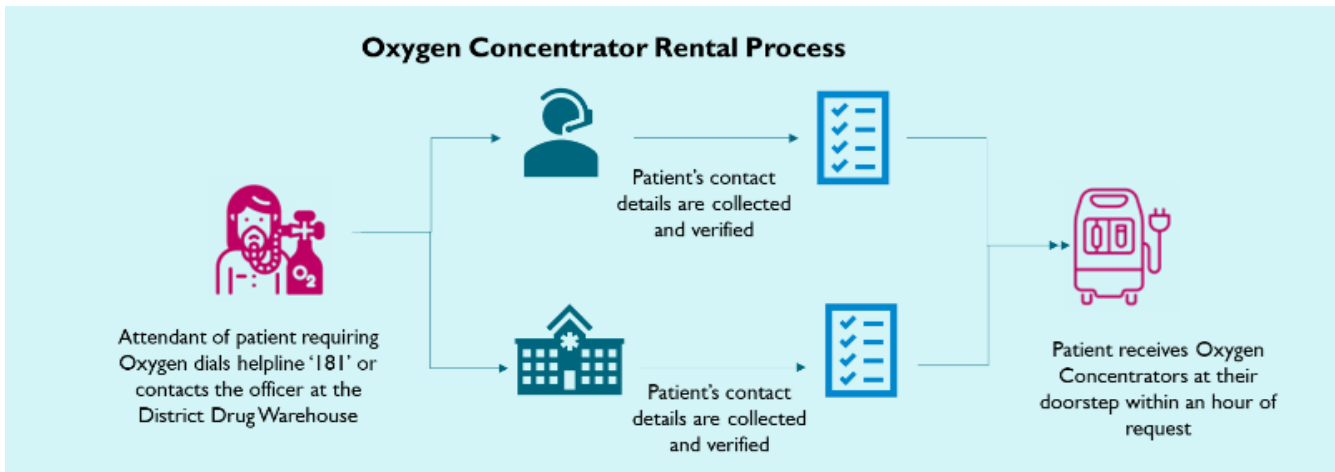
In order to ensure that the OCs are operated and handled properly, the state government undertook series of capacity-building programs on aspects such as operations, handling filter, decontamination, among others. The trainees were primarily medical staff working from primary-level to tertiary-level health facilities. Additionally, the state has plans to conduct training on repair and maintenance of OCs through Skill Mission India so that certified repair and maintenance trainers are onboarded throughout the state.

Function

On the lines of blood banks, the Government of Rajasthan facilitated seamless and decentralized supply of the OCs to the people. OCs could immediately respond to oxygen needs as they are easy to deploy and operate anywhere, thereby meeting community demands. This was also an attempt to reduce the burden on secondary- and tertiary-level hospitals.

Patients with moderate to mild symptoms of breathlessness were advised to stay at home and use OCs in case of need. Patients requiring OCs could call a helpline number or contact the officers at the District Drug Warehouse (DDW). Thereafter, the OC would be made available to them on rental basis. The helpline operator or the officer from the DDW collected the contact details of the patient and after verification. The OCs were delivered within an hour.

The staff operating the helpline number were given additional responsibility of managing the calls for OC requests. The District In-Charge of DDW and his two-member team were responsible for verifying the identity of the potential beneficiary.



“During my hospitalization in ESI hospital, Babu Nagar, Bhilwara, the doctors and hospital staff told us about the rental scheme of the OCs that can be used at home. This scheme was beneficial for us as I could stay at home my family could take care my care. We have talked about this scheme to everyone in the village. The scheme will benefit many people who requires oxygen at home.”

- Bhagwati Devi, Gowliya Village, Sada Tehsil, Bhilwara

A refundable amount of INR 5000/- was collected from the beneficiary as security deposit before delivering the OCs, which was paid in full once the OC was returned to the bank.

Repair and Maintenance through E-Upkaran

The state has developed a web-based platform to upload details of all the OCs provided through state funds. The platform includes information of OCs received through donations from various entities or as part of corporate social responsibility or procured at the state level or local level. The repair and maintenance of all the OCs in the state is managed through this platform. Apart from directly logging into the E-Upkaran website, complaints for repair of OCs can be made through other channels such as by calling a toll-free number or using the mobile app version or the e-Upkaran software.

Impact

- > The state has ensured oxygen support to the most marginalized sections across all districts of Rajasthan by making OCs easily accessible and free of cost.
- > The treatment of a majority of mild and lower moderate cases with OCs at the periphery level significantly reduced the load on secondary- and tertiary-level hospitals. This helped the medical facilities in focusing on more severe patients.

E-Upkaran – Support for repair & maintenance

	A web-based application	manages and maintains equipments and instruments from one platform	ensures seamless and error free functionality	contains detail of all the OCs available in the state	manages repair and maintenance of statewide oxygen concentrators
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NATIONAL HEALTH MISSION
Medical, Health & Family Welfare Department
Government of Rajasthan



NATIONAL HEALTH MISSION

E-Upkaran

e-Upkaran: Equipment Management and Maintenance System.
e-Upkaran (EMMS) is a comprehensive software solution to improve the Inventory Management & Maintenance Services of Equipments in Hospital's across the Rajasthan.

- ▶ Availability of and easy access to OCs greatly reduced the panic surrounding shortages in medical oxygen supply.
- ▶ The services of OC Banks at zero cost were an important step towards extending medical facilities to the people who otherwise could not afford them.
- ▶ OCs helped in dealing with immediate priority of treating COVID-19 patients and in improving respiratory care management of silicosis and other similar diseases in the long run.

Lessons Learnt

- ▶ **Simplified procurement:** The procurement was done through RMSCL, a state agency for procurement of drug and equipment. RMSCL is a reliable intermediary, with demonstrated history of quality and timely delivery. Procurement through this agency saved the state government the delays which normally come with the process of tendering.
- ▶ **Explore multiple channels:** Since oxygen is a lifesaving medicine, it is crucial that state governments explore multiple channels to make oxygen available to the marginalized population at all levels of health care. The state government linked the OC Banks to helpline number, thus, making it easily accessible to the most vulnerable population.
- ▶ **Strengthening the capacity of healthcare to respond to pandemic:** A pandemic as devastating as COVID-19 cannot be managed solely at tertiary care facilities. Training on all aspects of the oxygen ecosystem should be plugged into various upskilling plans of health care service providers and should be conducted and upgraded periodically. It is critical to prepare ourselves and the health systems not only for pandemics like these but also for the overall strengthening of the primary and critical health care needs of the country. The preparedness to such a pandemic

also requires interventions at rural level and services at facility nearest to the community.

- ▶ **Use of automated system for operations and maintenance:** The use of digital platform such as E-Upkaran, ensured state-wide seamless support for repair and maintenance of OCs. It provided error-free details of all the OCs that are available and functional, thus, ensuring smooth operations and maintenance.

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