

**USAID GLOBAL HEALTH  
SUPPLY CHAIN PROGRAM**  
Procurement and Supply Management



# DEVELOPING ROBUST, SUSTAINABLE O2 SUPPLY FOR PATIENTS IN TAJIKISTAN



*Istiklol Medical Center. Photo by GHSC-PSM.*

STATE-OF-THE-ART EQUIPMENT, INCLUDING PSA PLANTS  
THAT SUPPLY OXYGEN TO MORE THAN 30 BEDS



## THE NEED FOR PSA SYSTEMS

With the arrival of SARS-CoV-2 (COVID-19) in Tajikistan in early 2020, supplemental oxygen became the most essential life-saving treatment for people infected with the deadly virus. But the country's aging oxygen supply infrastructure was unprepared, and clinical outcomes suffered.

Prior to the pandemic, many hospitals rarely needed medical oxygen were relying on bulky, expensive, and easily depleted oxygen cylinders or small concentrators that can be inadequate for a critical patient when the COVID-19 pandemic swept across the globe. In addition, these sometimes-decades-old Soviet-style cylinders often lacked regulators and were unable to be filled fully due to the danger of explosion. Piping systems were also old, unsafe, and often non-functional, missing system components. And instructions were mostly written in Russian, not Tajik.

In Tajikistan, these supply chain woes were aggravated by a shortage of health workers and technicians trained in the handling and maintenance of O2 supplies. Because clinical staff rarely used O2 masks or respirators before the pandemic, hospitals rarely had personnel dedicated to oxygen use or technical staff trained in oxygen equipment safety and maintenance. Untrained oxygen handling can ignite fires and explosions.

Early in 2021, responding to Tajikistan's need to upgrade oxygen delivery and develop training and standardized procedures, USAID tasked the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project with procuring and delivering health commodities, including oxygen equipment.

It was clear to GHSC-PSM and the Ministry of Health (MoH) that Tajikistan's hospitals needed more PSA systems. PSA is clean and cost-effective and eliminates the need for compressed-cylinder filling and storage.

The project also provided training for oversight and use of those commodities to support country-level management of COVID-19.



Odinaev Mahmad, Regional O2 engineering consultant, explains how to properly use and fill oxygen cylinders, how oxygen cylinders are connected, how oxygen is supplied to the patient, and reviews safety precautions when using oxygen cylinders. Photo by GHSC-PSM.

## MODERNIZING OXYGEN DELIVERY

Currently, the preferred method for delivering oxygen to hospitals and patients is pressure swing adsorption (PSA) technology—where an uninterrupted supply of oxygen is piped from an onsite plant directly to the patient's bedside. After meeting with Tajikistan's first Deputy Minister of Health, Dr. Gafur Mukhsinzoda, GHSC-PSM began to assess the strengths and weaknesses of the country's oxygen supply chain by visiting the few hospitals with PSA plants, as well as private medical equipment retail stores and other stakeholders. They also visited the country's major academic centers to understand the current status of non-clinical oxygen training.

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**There was a very high need to supply medical institutions of the republic with such equipment as oxygen generators, oxygen stations, and oxygen cylinders, as well as the construction of oxygen stations in multidisciplinary hospitals and next to infectious diseases departments,** ”

said Dr. Mukhsinzoda, explaining why the Ministry turned to development partners, including GHSC-PSM.

In May 2021, GHSC-PSM toured three health sites—Bokhtar, Panjikent, and Konibodom. They found that smaller hospitals often cannot accept COVID-19 patients, referring them to the larger regional hospitals, but even the larger hospitals used old, outdated equipment.

## A SPECTRUM OF SERVICES

In addition to procuring, installing and commissioning three PSA plants, GHSC-PSM supported Tajikistan's COVID response with a wide variety of commodities and related services, including:

- ➔ **Procuring and delivering oxygen cylinders;**
- ➔ **Providing an array of other consumable and durable commodities, from tools and tubing to oxygen masks and pulse oximeters; and**
- ➔ **Sourcing extended warranties and executing two-year Service Level Agreements for each of the PSAs to ensure the long-term equipment sustainability.**

**“Thanks to a donation from USAID, an oxygen station producing pure medical oxygen became fully operational in the Central District Hospital of Konibodom. The lines were installed in the intensive care unit for eight points and in the infectious disease department for 24 points to the beds of patients, which significantly improved the state of oxygen supply and its timeliness use. After the start-up of the oxygen station, all the existing problems that took place in the provision of oxygen have been exhausted.”**

— Dr. Samiev Khusain, Chief Doctor of Konibodom Hospital



Dr. Samiev Khusain



The additional PSA plants will be provided in various numbers by GHSC-PSM, the World Bank, Germany's KfW Development Bank, the Islamic Development Bank, Japan International Cooperation Agency, UNICEF, and the Government of Tajikistan. All PSA procurements were conducted alongside piping system reconstruction and installment. The project will build the country's resilience in oxygen supply, offering thousands of patients medical-grade oxygen on demand.

**“After the launch of the oxygen station, we will not have problems any more with a lack of medical oxygen. Patients, especially intensive care patients, patients with respiratory diseases, patients with COVID syndrome, will fully receive pure medical oxygen.”**

— Dr. Abdulloeva Rano, Chief Doctor, Panjikent Hospital



Farrukh Sharipov, Regional O<sub>2</sub> engineering consultant, explains how to work at the oxygen station, and reviews safety precautions when using the AirSep oxygen station. Photo by GHSC-PSM.

## DEMAND FOR TRAINING HEATS UP

The arrival of dozens of PSA plants across the country's hospitals created a national demand for training health workers, technicians, and engineers. Unified training curricula for all of Tajikistan's PSA plants needed to be developed and endorsed by the Ministry, and a training-of-trainers (ToT) program to rapidly deploy these new skills to health workers was necessary.

But first, technicians, engineers, and non-clinical support staff needed to be trained in the safe handling of O<sub>2</sub> cylinders still in daily use. A new training program, designed by Senior Technical Advisor Kartlos Kankadze and Jimmy Johnson, a Non-Clinical O<sub>2</sub> Senior Technical Advisor of URC, covers safe handling techniques when transporting oxygen, oxygen hazards encountered on the job and approaches to prevent workplace accidents involving oxygen. The training program is scheduled to be replicated in Kenya later this year, where five PSA plants procured by GHSC-PSM will be installed and commissioned.

In January 2022, Johnson and Kankadze traveled to Tajikistan's capital, Dushanbe, to conduct a ToT for approximately 22 participants using classroom lectures and hands-on demonstrations. Classroom and onsite activities taught



O<sub>2</sub> engineering consultants review oxygen station and oxygen cylinder components for health staff. Photo by GHSC-PSM.

participants to safely manage and transport oxygen cylinders. The MOH then selected three participants to serve as the lead trainers to cascade the training to 136 technicians and bioengineers throughout the country.

**“Development of the ToT program and its implementation produced enough trainers, followed by the cascade training of engineers/technicians, ensuring the critical number of prepared professionals to serve the complex oxygen production plants in the hospitals.”**

— Kartlos Kankadze, Chemonics Senior Technical Advisor

GHSC-PSM and the MoH are partnering with Tajik Technical University (TTU) to design a course in the safety fundamentals of the production and use of oxygen. During the course, students learn the intricacies of working with oxygen cylinders, and industry and international standards.

**“This course will be a solid basis for improving the quality of medical services. We are confident that specialists will be employed in medical institutions after graduation and will ensure the quality of oxygen-safe services”**

— Associate Professor Gadoev Safarali Ainidinovich, Dean of the TTU Innovative Technologies Faculty

TTU has also expressed interest in developing a course in O<sub>2</sub> production and management for the bachelor's and master's level biomedical engineering graduates and requested technical specifications of the PSA plants.

Creating a permanent curriculum in the University's Biomedical Engineering program will ensure a sustainable stream of trained oxygen professionals for the country's hospitals in the future.

In addition, GHSC-PSM identified and spoke with two other academic centers ripe for O<sub>2</sub>-related training. The National Center for Tuberculosis, Pulmonologists, and Thoracic Surgery has an advanced training facility developed mainly through USAID projects, equipped for in-class and distance learning and ready to host any training related to oxygen non-clinical and clinical topics.

They also visited the Center for Advanced Training of Workers of Labor System, Migration and Employment of the Population, operated by Tajikistan's Ministry of Labor, Migration, and Employment. This adult vocational learning center includes free and low-cost education for disadvantaged groups. While there are no courses in oxygen production or cylinder management, the Center currently trains management of pressured gases, such as freon, and welding/brazing training, including oxygen cylinder safety.

GHSC-PSM also created a public-private partnership opportunity with MedConcept, a private company that equips and supplies health centers and hospitals with medical equipment in Central Asia and Africa. They have agreed to offer internships to Tajik Technical University graduate students, as well as potential employment opportunities after graduation. The University can produce at least 20 biomedical engineers every year. In addition, MedConcept will provide preventative maintenance to each of the PSAs, ensuring this critical equipment will stay operational over the long haul.

**“Carrying out these types of trainings played a significant role for specialists and was an effective result for further work and the use of oxygen stations and cylinders. The further supply of oxygen stations and oxygen cylinders, as well as oxygen generators, has a significant role for the medical institutions of the republic, not only for the treatment of patients diagnosed with COVID-19, but also for other types of diseases.”**

— First Deputy Minister of Health Dr. Gafur Mukhsinzoda

## ELEVATING THE OXYGEN ECOSYSTEM

Finally, GHSC-PSM is working to develop standard operational procedures for PSA plants. The MOH already has draft Guidelines for the Management, Maintenance, and Rational Use of Medical Equipment in Medical Facilities, but there are no specific national guidelines for PSAs, oxygen cylinders, or concentrators. Johnson and Kankadze are drafting a complete set of guidelines and policies for review by the MOH.

Due to these multilevel interventions, PSM oxygen activity in Tajikistan has lifted the oxygen ecosystem to an advanced level, according to Kankadze. “On the policy level, the project advocated adopting national guidelines that will ensure a safe oxygen ecosystem in the country,” he said.

Furthermore, procurement of PSA plants for Bokhtar, Konibadam, and Panjikent hospitals are increasing the accessibility of medical oxygen for the patients. And the adoption of oxygen courses by the TTU will ensure that a new generation of biomedical engineers will have the skills and knowledge to operate high-tech oxygen systems in the hospitals of Tajikistan.

