



Reaching Impact, Saturation, and Epidemic Control (RISE)

Trainer's Handbook

Rational and Hygienic Use of Medical Oxygen

Medical and Nursing Personnel

Acknowledgments

This trainers' handbook on the "Rational and Hygienic Use of Oxygen for the Medical and Nursing Personnel" by PATH, which is the implementation partner for USAID RISE Project, which is primed by Jhpiego. PATH supports the USAID RISE project in building and upgrading capacities of critical workforce and medical and nursing personnel for medical oxygen management, COVID-19 case management, and judicious use of oxygen for successful administration of medical oxygen therapy.

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Acronyms

ABG Arterial Blood Gases

ARDS Acute Respiratory Distress Syndrome

ASU Air Separation Unit

BIS Bureau of Indian Standards

BPAP Bilevel Positive Airway Pressure

CARP Covid Awake Repositioning Protocol

CCOE Chief Controller of Explosive

COVID- 19 Corona Virus Disease-19

CO2 Carbon Dioxide

COPD Chronic Obstructive Pulmonary Disorder

CPAP Continuous Positive Airway Pressure

Cu M Cubic Metre

FiO₂ Fraction of Inspired Oxygen

HAFOE High Air Flow with Oxygen Enrichment

HDU High Dependency Units

HFNC High Flow Nasal Cannula

ICU Intensive Care Unit

ISO International Organization for Standardization

LMO Liquid Medical Oxygen

LPM Litre Per Minute

MGPS Medical Gas Pipeline System

MI Myocardial Infarction

MT Metric Ton

NIV Non-invasive Ventilation

NRBM Non-Rebreather Mask

O₂ Oxygen

OC Oxygen Concentrator

PaO2 Pressure of Oxygen

PESO Petroleum and Explosives Safety Organization

PISS Pin Index Safety System

PPE Personal Protective Equipment

PRV Pressure Relief Valve

PSA Pressure Swing Adsorption

SPANC Self Proning In Awake Non-Intubated Covid- 19

SpO2 Saturation of Peripheral Oxygen

UN United Nations

VPSA Vacuum Pressure Swing Adsorption

Introduction to the Trainers' Handbook

Context

India experienced the worst of the COVID-19 pandemic. Reported daily new infections in India had crossed the 400,000 mark with daily reported deaths are more than 2,700. The demand for hospital beds, personnel, drugs, testing kits, and life-saving oxygen spiked to unprecedented levels. The demand for medical oxygen peaked to around 11,000 MT per day by the beginning of May from around 3,800 MT per day in the mid-May 2021, over four times the pre-second wave levels. Pushed to the limits of what it could achieve, given its current state, the healthcare supply chain snapped at many places.

Although medical oxygen is an essential medicine that is used in care for patients across the healthcare systems, the pandemic has accelerated its demand and made the delivery of oxygen supplies more urgent than ever. As part of its preparations for the third wave for COVID-19, the Government of India and its state counterparts are rapidly scaling up its oxygen systems – liquid medical oxygen (LMO), pressure swing adsorption (PSA) plants and oxygen concentrators – across government health facilities, in addition to improving availability of oxygen supply systems through medical gas pipeline systems (MGPS), manifold systems and oxygen cylinders.

One of the many critical actions the government has prioritized to improve health outcomes and save lives is augmentation of the public health system's capacity to reliably deliver oxygen. The public health systems in the country, with exception to the large teaching hospitals and tertiary healthcare facilities, had historically relied on oxygen cylinders to meet its medical oxygen demands. As a result, there were very few trained personnel who understood the complexity of integration and maintenance of these newly deployed oxygen systems and know how to manage them. This course provides training to the medical and nursing personnel to understand the components of medical oxygen management, COIVD-19 case management with oxygen, devices used to deliver oxygen therapy to the patients and judicious use of oxygen to meet the future demand for medical oxygen.

Purpose of the training

At the end of this course, participants are expected to effectively oversee the management of medical oxygen and judiciously use medical oxygen in respiratory care and COVID-19 case management.

Training objectives

By end of this training, the participants will be able to:

- Understand medical oxygen and its importance in respiratory care and COVID-19 case management
- Understand the importance and indications of oxygen therapy
- Understand the rationale and the procedure for using different oxygen therapy devices- high flow and low flow- for optimally administering medical oxygen
- Recognize the adjuncts to oxygen therapy and appropriate oxygen dosage/ judicious use of oxygen

- Have a detailed understanding of 'proning' technique for COVID-19 case management
- Demonstrate the procedure for decontamination and disinfection of oxygen therapy devices

The training module includes a package of standardized printed material, standardized power point slides, simulation using mannequins, hands-on and video demonstrations, group activity and pre-test and post-test questions.

Training methodologies

Training techniques that use participatory learning approaches have been used in this module. The training would be imparted through interactive presentations, hands-on and video demonstrations, simulations using mannequins, group activities by the trainers and the participants. This course is structured in such a way that each participant is encouraged to discuss with the facilitator, their problems, or questions, if any.

Notes for the trainer

- Please read up about medical oxygen therapy (Indications of oxygen therapy, oxygen therapy devices, judicious use of oxygen), the Guidebook on Medical Oxygen Management Systems, SOP for Medical Oxygen Use and Fire Safety for Public and Private Hospitals of Madhya Pradesh, SOP for Rational Use of Oxygen by MoHFW and Handouts on Proning for self-care.
- 2. The training should be done as a full day, classroom training.
- 3. Ensure that you have prepared the PowerPoint slides, the notes on the flipcharts and Index Cards prepared well in advance.
- 4. As far as possible consider doing training with a co-facilitator. The trainers must discuss their individual roles for each session when preparing for the training and share the responsibility of facilitating and co-facilitating sessions.
- 5. Both the trainers need to participate in all sessions with equal enthusiasm, irrespective of who is leading the session. This will help the participants stay focused during the training.
- 6. Explain the difficult or less familiar words. Keep asking questions to participants to the session topic to know whether they understand the contents of the session.
- When you initiate group discussion with participants, keep moving among the participants and try identifying the shy participants, encourage them to participate in the discussions and provide input.
- 8. Keep an eye on the time all the time to ensure that you are aware of the time being consumed for each session and in each activity. Ensure that all activities are done in time.

- 9. Neither be very loud, nor be very low in your voice. Do not give participants more information than they need.
- 10. Do not interject when any of the participants is speaking but do encourage participants to speak to-the-point.
- 11. Ensure that all the background materials are available prior to trainings.
- 12. Standardize training slides.
- 13. Ensure that a communication of the trainings has gone well in advance to all trainees.
- 14. Always repeat the key points of the session at the end of each session, as a reminder and to conclude the session.

Training Schedule

No.	Sessions	Methods	Duration
	Tea and registration of participants		
1	Session I: Introduction and pre-test	Group activity	30 mins
2	Session II: Introduction to medical oxygen and oxygen therapy	Presentation, discussion, and demonstration	45 mins
3	Session III: Oxygen therapy devices	Presentation discussion, demonstration, and simulation	90 mins
4	Session IV: COVID-19 case management with oxygen	Presentation, demonstration, and group work	90 mins
5	Session V: Infection prevention and decontamination practices for oxygen devices	Presentation and demonstration	45 mins
6	Session VI: Post-training assessment and transfer out	Group activity	30 mins
	End of training		

Session I Introduction

Context

This is the first session of the training. Although most of the participants might be familiar with each other, the trademark "good start" to any training is when the trainer and the participants not only are familiar with each other, but also are able to connect their expectations with the objectives of the training. This will help the participants stay focused during the sessions.

Activity 1.1 15 mins

Introduction/ice-breaking

Learning Objectives	Materials	Methodology
Get familiar with each other	-	Group work

 Welcome all participants to the training, introduce yourself and briefly introduce the project and PATH's technical assistance for strengthening oxygen ecosystem.

NOTE: Please collect information about the project and PATH's technical assistance role from the project manager or the state lead.

• Ask all participants to stand in a circle.

NOTE: If the training is being done with fixed seating and limited space, the participants can stand on their spot.

- Inform the group that we will begin the training by getting introduced to one another.
- Ask the participants to pair up with one of the two people standing to either of their sides.
- Ask the participants to introduce themselves to their paired-up partner. During the introduction, ask the participants to share the following (1) their name, (2) their designation and department, (3) the numbers of years in service and (3) one thing about medical oxygen systems that they (the partner) are concerned about.
- Start with the person standing first to your left-hand side so that you are the last person to complete the introduction.
- Ask the person to introduce his or her partner.
- Thank all participants for introducing themselves.

Activity 1.2 10 mins

Know the training flow and align expectations

Learning Objectives	Materials	Methodology
Get ready to work each other	Presentation slides	Presentation
to enhance learning		

	Be aware of objectives and	Flipcharts (at least 2)	Discussion
\(\rightarrow\)	flow of the training Express expectations from the training and	Marker pens of different colors Flipchart stands (2) Scotch tapes/ magic tapes	
	apprehensions with the training	Scotch tapes, magic tapes	

- Using a PowerPoint presentation, introduce the participants to the purpose, objectives and schedule of the training.
- Inform the participants that the training is designed to help them familiarize them with the rational and hygienic use of oxygen, in general, and that the training will provide information on various aspects of rational and hygienic use of oxygen.
- Use two flipcharts. Put title as "Expectations" on one flipchart and title the other flipchart as "Apprehensions" and put them on separate flipchart stands.
- Inform the participants that all of us have expectations as well as apprehensions when we come for training. By sharing their expectations and apprehensions before start of the training, they will be able to help the trainers customise the training to meet their expectations.
- Ask them to express their expectations and apprehensions related to this training.
- Record their expectations and apprehensions on respective flipcharts.
- Put the flipcharts of "Expectations" and "Apprehensions" on the walls in the training with the help of scotch tape.
- Assure the participants that you will try to meet their expectations and address their apprehensions during the training.

Activity 1.3 05 mins

Pre-training knowledge assessment

Learning Objectives	Materials	Methodology
Understand the existing level of knowledge on medical oxygen systems	Pre-test questionnaires	Self-assessment

- Distribute pre-test questionnaire (Participant's Handout 1.3.1) for Rational and Hygienic Use of Oxygen
- Give 05 minutes for them to write the answers
- Collect the response sheet.

NOTE: Do not discuss the correct response. The co-facilitator reviews the responses while the lead facilitator initiates the next session.

Session II Introduction to Medical Oxygen and Oxygen Therapy

Context

This is the first technical session of the training. The trainer, through this session, will provide foundational information to the participants. As participants to this training are medical and nursing personnel, who have been involved in various stages of medical oxygen management, administering oxygen therapy, and COVID-19 case management, the session will focus on providing them fundamental, relevant, and actionable information on rational and hygienic use of oxygen.

Activity 2.1 45 mins Introduction to medical oxygen and oxygen therapy

Learning Objectives	Materials	Methodology
 Get to know about medical oxygen and its importance in respiratory care and COVID-19 case management Become familiar with oxygen therapy, its objectives and where it is needed Learn about the short term and long-term indications of oxygen therapy Learn how to perform assessment and monitoring of oxygen 	Presentation slide deck Pulse Oximeter Participant's handbook- Guidebook on Medical Oxygen Management Systems, SOP for Medical Oxygen Use and Fire Safety for Public and Private Hospitals of Madhya Pradesh and SOP for Rational Use of Oxygen by MoHFW	Presentation, discussion, and demonstration

Part 1: Presentation and discussion (40 minutes)

- Distribute the guidebook on Medical Oxygen Management Systems, SOP for Medical Oxygen Use and Fire Safety for Public and Private Hospitals of Madhya Pradesh SOP for Rational Use of Oxygen by MoHFW before starting the presentation in as many copies as the participants.
- Use PowerPoint slides from Trainer's Handout to introduce them to medical oxygen and oxygen therapy. Make them understand the indications for oxygen therapy and how to perform assessment and monitoring of oxygen.
- Use pulse oximeter to demonstrate the monitoring of blood oxygen level.
- Ask the participants to refer to the chapter 5 and chapter 6 of the SOP for Medical Oxygen Use and Fire Safety for Public and Private Hospitals of Madhya Pradesh for detailed information. Familiarise yourself with the section in the SOP.

Notes for the facilitator

- Make sure you have as many copies of the handouts available as the participants.
- You may allow participants to ask questions in-between the presentation or you may also ask them to park their questions till you complete one section of the presentation before they ask you their questions related to that particular section.
- Repeat, in your own words, the question the participant has asked to ensure that you have correctly understood the query. This will also give you time to think through the response to the question.

Part 2: Demonstration (5 minutes)

- You should have pulse oximeter present with you, so it could be physically shown in the classroom while you explain the topic.
- Take assistance from the co-trainer while performing the monitoring of blood oxygen level to the participants.

- Check whether pulse oximeter required during the session are available and functional with you beforehand
- You may ask participants to park their questions till you complete the demonstration.
- Repeat, in your own words, the question the participant has asked to ensure that you have correctly understood the query. This will also give you time to think through the response to the question

Session III Oxygen Therapy Devices

Context

The third session of this module is on oxygen therapy devices. The trainer, through this session, will introduce various devices used for oxygen therapy, their structure and mechanism, indications, contraindications (if any), advantages and disadvantages of each device.

Activity 3.1 90 mins
Oxygen therapy devices

Learning Objectives	Materials	Methodology
 State the various devices used for oxygen therapy Learn about various low flow/ variable performance devices Learn about various high flow/ fixed performance devices 	Presentation slide deck Simulation using mannequins Oxygen devices (based on availability) Nasal cannula Nasal catheter Rebreathing mask Non-rebreathing mask Venturi mask and valves Jet Venturi mask High Flow Nasal Cannula Non-Invasive Ventilation (NIV) mask	Presentation, demonstration, and simulation

Part 1: Presentation and discussion (45 minutes)

- Before starting the presentation, ensure that every participant has the SOP for Medical Oxygen Use and Fire Safety for Public and Private Hospitals of Madhya Pradesh.
- Ask the participants to refer to Section 5.8, 5.9 and 5.10 of Chapter 5 of the SOP for detailed information. Familiarise yourself with the content in the SOP.
- Use PowerPoint slides from Trainer's Handout to discuss about the various devices used for oxygen therapy. Explain the structure and mechanism, indications, contra-indications (if any), advantages and disadvantages of each device.

Notes for the facilitator

You may allow participants to ask questions in-between the presentation or you may also ask
them to park their questions till you complete one section of the presentation before they ask
you their questions related to that section.

 Repeat, in your own words, the question the participant has asked to ensure that you have correctly understood the query. This will also give you time to think through the response to the question.

Part 2: Demonstration and Simulation of oxygen therapy using mannequins (45 minutes)

Demonstration

- You should have all the devices present with you so it could be physically shown in the classroom while you explain the structure and mechanism.
- Take assistance from the co-trainer while showing the oxygen therapy devices to the participants.
- As you explain each of the oxygen device and show them in the classroom, also pay attention to the devices that have supplementary video demonstrations. Once you finish explaining, tell the participants that you would be playing a video demonstrating the use of this device.
- Most of them are short videos, and it is recommended to go through them once before the session. This would make it easier to explain them to the participants.
- The following devices have video demonstrations:
 - Non-rebreathing mask
 - Venturi mask
 - High flow nasal cannula
- After playing the videos, you must also explain to the participants what they just saw in the video.

Simulation using mannequins

- The section will also involve group work.
- Divide the participants into 4-5 groups with approximately equal number of participants in each group.
- You will now explain the procedure of oxygen therapy via live demonstration on a mannequin using two devices: nasal cannula and venturi mask.
- Correlate this demonstration with the video demonstrations shown during the previous activity
 while explaining it to the participants. The live demonstration will require help from the cotrainer.
- Ask the co-trainer to distribute two oxygen delivery devices (one low flow and one high flow), to each of the groups.
- Now, you should ask each of the groups to perform oxygen therapy simulation on mannequins with low flow and high flow oxygen therapy devices. If mannequins are not available, one of the group members can become the patient such as in a role play.
- Give the participants approximately 15 minutes for this activity.
- After 15 minutes, you will observe the oxygen therapy simulation by each group. Make sure that
 all the other participants also observe the simulations performed by other groups. It is essential
 for participants to observe others' work since all the groups will be performing oxygen therapy
 simulation using different devices.
- Lastly, you must address the improvisations and give your insights on each of the group's work

- Check whether all the materials required during the session are available with you beforehand.
- For video demonstration, make sure you have MP4 versions of all these videos prior to the session.
- Keep an eye on the time all the time to ensure that you are aware of the time being consumed group work. Ensure that the activities are completed on time.
- You may ask participants to park their questions till you complete the demonstration.
- Repeat, in your own words, the question the participant has asked to ensure that you have correctly understood the query. This will also give you time to think through the response to the question.

Session IV COVID-19 Case Management with Oxygen

Context

This is a session on COVID-19 case management. The trainer, through this session, will provide foundational information to the participants on judicious use of oxygen and adjuncts to oxygen therapy. As participants to this training are medical and nursing personnel, the session will provide the information on proning technique for COVID-19 case management.

Activity 4.1 30 mins Adjuncts to oxygen therapy and judicious use of oxygen

	Learning Objectives	Materials	Methodology
	Recognize the adjuncts to oxygen therapy	Presentation slide deck	Presentation, and discussion
	Become familiarize with the concept of oxygen dosage		
	Understand the importance of judicious use of oxygen		
>	Learn about the harmful effects of oxygen		

• Use PowerPoint slides from Trainer's Handout to introduce the concept of oxygen dosage, understand the importance of judicious use of oxygen and harmful effects of oxygen.

Notes for the facilitator

- You may allow participants to ask questions in-between the presentation or you may also ask
 them to park their questions till you complete one section of the presentation before they ask
 you their questions related to that section.
- Repeat, in your own words, the question the participant has asked to ensure that you have correctly understood the query. This will also give you time to think through the response to the question.

Activity 4.4 60 mins

Proning technique for COVID-19 case management

Learning Objectives	Materials	Methodology
Understand the importance	Presentation slide deck	Presentation, discussion, and
of proning technique Learn how to perform proning exercise	Participant's handout- Proning for Self-care (in as many copies as participants)	demonstration

Proning Exe	rcise- Mat and 5-6	
cting pillows		
NC		
'ID awake		
ol (CARP)		
		cting pillows NC ID awake

Part 1: Presentation and discussion (30 minutes)

- Distribute the Proning for self-care handouts to the participants in as many copies as the participants.
- Ask the participants to refer to the handout for detailed information. Familiarise yourself with the content in the handout.
- Use PowerPoint slides from Trainer's Handout to introduce proning technique and familiarize them with the guidelines for conducting proning.

Notes for the facilitator

- You may allow participants to ask questions in-between the presentation or you may also ask
 them to park their questions till you complete one section of the presentation before they ask
 you their questions related to that section.
- Repeat, in your own words, the question the participant has asked to ensure that you have correctly understood the query. This will also give you time to think through the response to the question.

Part 2: Demonstration and group work (30 minutes)

- This section will involve demonstration and group work.
- Divide the participants into 4-5 groups with approximately equal number of participants in each group.
- You will now demonstrate proning technique with the help of the co-trainer. This would require a mat for lying down and 5-6 pillows.
- Correlate this demonstration with the video demonstration shown during the previous activity while explaining it to the participants.
- Now, ask each of the groups to come forward and perform proning technique. The work of each group will be observed by you and all the other participants.
- Lastly, you will be addressing the improvisations and give your insights on each of the group's work.

- Check whether all the materials required during the session are available with you beforehand.
- Keep an eye on the time all the time to ensure that you are aware of the time being consumed during group work. Ensure that activities are completed in time.
- You may ask participants to park their questions till you complete the demonstration.
- Repeat, in your own words, the question the participant has asked to ensure that you have correctly understood the query. This will also give you time to think through the response to the question.

Session V Infection Prevention and Decontamination Practices for Oxygen Devices

Context

The fifth session of this 6-part module is on infection prevention and decontamination practices for oxygen devices. The session will provide the insight on the importance of disinfection practices for respiratory equipments.

Activity 5.1 45 mins Infection prevention and decontamination practices for oxygen devices

Learning Objectives	Materials	Methodology
Understand the importance of decontamination and disinfection of respiratory equipments	Presentation slide deck Demonstration using oxygen devices- Nasal catheter and humidifier bottles etc. Clean water, non-foaming soap, Syringe, Cleaning brush, Tubs (or buckets), Bleach (or boiling water), PPE (glasses, mask, gown, gloves)	Presentation, discussion, and demonstration

Part 1: Presentation and discussion (30 minutes)

• Use PowerPoint slides from Trainer's Handout to discuss the decontamination and disinfection procedures for respiratory equipments.

Notes for the facilitator

- You may allow participants to ask questions in-between the presentation or you may also ask
 them to park their questions till you complete one section of the presentation before they ask
 you their questions related to that section.
- Repeat, in your own words, the question the participant has asked to ensure that you have correctly understood the query. This will also give you time to think through the response to the question.

Part 2: Hands-on demonstration (15 minutes)

- This section will involve demonstration of the decontamination procedure.
- You will now demonstrate disinfection of a nasal catheter with the help of the co-trainer.
- The demonstration should involve all the steps from wearing PPE to drying the disinfected device. Preparation of 0.5% sodium hypochlorite should also be demonstrated.

- Check whether all the materials required for demonstrating decontamination procedure are available with you beforehand.
- You may ask participants to park their questions till you complete the demonstration.
- Repeat, in your own words, the question the participant has asked to ensure that you have correctly understood the query. This will also give you time to think through the response to the question.

Session VI Post-Training Assessment and Transfer Out

Context

This is the final session of the training. During this session, the trainer shall facilitate a recall of key takeaways of various sessions and conduct a post-training assessment.

Activity 6.1 30 mins

Key takeaways

Learning Objectives	Materials	Methodology
Recall and refresh the key lessons from the previous sessions	Flipcharts (at least 2)	Group work
	Marker pens of different colors	
	Flipchart stands (2)	
	Scotch tapes/ magic tapes	

- Divide the participants into five groups.
 - You can either make the participants count from 1 to 4, and group all participants counting '1' into one group, those counting '2' into another group and so on, or
 - Allow participants to self-select into one of the four groups
- Announce the four technical sessions of the training and allocate one session name to each group,
 ensuring that each group gets only one session
 - o Introduction to medical oxygen and oxygen therapy
 - Oxygen therapy devices
 - o COVID-19 case management with oxygen
 - Infection prevention and decontamination practices for devices
- Ask the groups to record "What did we learn in this session?" on the flipchart.
- Instruct the groups to
 - o Put each lesson or take-away in bullets, with one bullet for each lesson
 - o Identify a presenter from the group to present it back to the larger group
 - Complete the task in 05 (five) minutes
- Invite each group to present the key take-aways of their session. Give each group 2-3 minutes to present their take-aways.

- Time permitting, you may allow other groups to add more take-aways for the sessions.
- Encourage participants to contribute and be positive to input from other groups and avoid confrontations.

Activity 6.2 15 mins

Post-training assessment

Learning Objectives	Materials	Methodology
 Assess the change in knowledge from the pre- training levels 	Post-training questionnaire	Self-assessment

- Distribute the post-training questionnaire (Participant's Handout 7.2.1) to all participants
- Ask participants to respond to the questions, and hand-over their responses to the co-facilitator.
- Discuss each question and its correct answer.

Participant's Handouts		
Please refer to the Participants handouts folder		
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