

Webinar



**World Health
Organization**

Demonstration of videos of medical equipment for oxygen delivery and monitoring

Demonstration videos of medical equipment for oxygen delivery and monitoring

Webinar agenda

13:30 to 15:30 CET, panels and Q&A

Introductions and background

WHO

Panel 1. Selection and set up of medical devices

International panelists

Panel 2. Clinical use and decontamination

International panelists

Panel 3. Maintenance and decommissioning

International panelists

OpenWHO training

WHO

Other WHO initiatives related to Oxygen

WHO

OpenWHO training series trailer



COVID-19 Clinical Management



World Health
Organization

Janet Diaz

Team Lead Clinical Management and Operations Unit
WHO Health Emergencies Programme, World Health Organization
Geneva, Switzerland

COVID-19 Clinical CARE pathway



CONFIRM
SARS-CoV-2 infection



ASSESS
symptoms, risk factors and severity

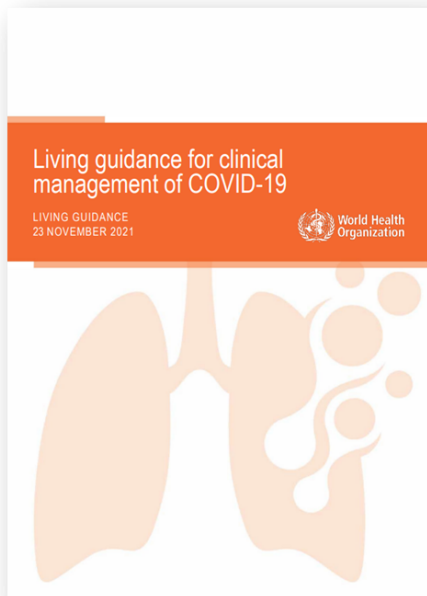


RESPOND
with appropriate care and treatment



EVALUATE
clinical response and recovery

Living guidance for clinical management of COVID-19



The WHO *COVID-19 Clinical management: living guidance* contains the Organization's most up-to-date recommendations for the clinical management of people with COVID-19. Providing guidance that is comprehensive and holistic for the optimal care of COVID-19 patients throughout their entire illness is important.

The (second) **latest version** of this living guidance is available in both pdf format (via the 'Download' button) and via an [online platform](#), and is updated regularly as new evidence emerges.

The (third) **latest version** of this living guidance is available in both [pdf](#) format (via the 'Download' button) and via an [online platform](#), and is updated regularly as new evidence emerges.

This updated (third) version contains two **new** recommendations regarding hospitalized children with Multisystem Inflammatory Syndrome (MIS-C), which includes a:

- [conditional recommendation to use corticosteroids](#) in addition to supportive care (rather than either IVIG plus supportive care, or supportive care alone), for hospitalized children aged 0-18 years who meet a standard case definition for MIS-C;
- [conditional recommendation to use corticosteroids](#) in addition to standard of care for hospitalized children aged 0-18 years who meet both a standard case definition for MIS-C and diagnostic criteria for Kawasaki disease.

Guidelines regarding the use of drugs to treat COVID-19 are included in a separate WHO document, *Therapeutics and COVID-19: living guideline*, that can via an [online platform](#) and in [pdf](#) format (or click 'PDF' in top right corner of online platform).

Guidelines regarding the use of drugs to prevent COVID-19 are included in a separate document, *WHO Living guideline: Drugs to prevent COVID-19*, that can be accessed via an [online platform](#) and in [pdf](#) format (or click 'PDF' in top right corner of online platform).

Planning the next revision of the Living Guidance for Clinical Management of COVID-19:

- **Heparin anticoagulation - three different doses**
- **Non-invasive ventilation**
- **Prognostic models**

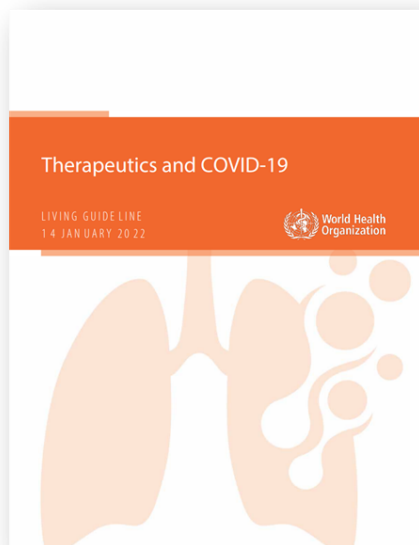
Therapeutics and COVID-19

This eighth version of the WHO living guideline now contains 14 recommendations, including three new recommendations regarding Janus kinase (JAK) inhibitors and sotrovimab. No further updates to the previous existing recommendations were made in this latest version.

The WHO *Therapeutics and COVID-19: living guideline* currently includes a:

•** **NEW** •• [Corrigendum - 2022.1 LG Therapeutics and COVID-19](#)

- [strong recommendation for the use of baricitinib](#) as an alternative to interleukin-6 (IL-6) receptor blockers, in combination with corticosteroids, in patients with severe or critical COVID-19 (published 14 January 2022);
- [conditional recommendation against the use of ruxolitinib and tofacitinib](#) for patients with severe or critical COVID-19 (published 14 January 2022);
- [conditional recommendation for the use of sotrovimab](#) in patients with non-severe COVID-19, conditional for those at highest risk of hospitalization (published 14 January 2022);
- [strong recommendation against convalescent plasma](#) in patients with non-severe COVID-19 (published 7 December 2021);
- [recommendation not to use convalescent plasma](#) in patients with severe or critical COVID-19 except in the context of a clinical trial (published 7 December 2021);
- [conditional recommendation to use a combination of neutralizing monoclonal antibodies \(casirivimab and imdevimab\)](#) in non-severe COVID-19 patients at the highest risk of severe disease (published 24 September 2021);
- [conditional recommendation to use a combination of neutralizing monoclonal antibodies \(casirivimab and imdevimab\)](#) in severe and critically ill COVID-19 patients with seronegative status (published 24 September 2021);
- [strong recommendation to use IL-6 receptor blockers \(tocilizumab or sarilumab\)](#) in patients with severe or critical COVID-19 (published 6 July 2021);
- [recommendation not to use ivermectin](#) in patients with COVID-19 except in the context of a clinical trial (published 31 March 2021);
- [strong recommendation against hydroxychloroquine](#) in patients with COVID-19 of any severity (published 17 December 2020);
- [strong recommendation against lopinavir/ritonavir](#) in patients with COVID-19 of any severity (published 17 December 2020);
- [conditional recommendation against remdesivir](#) in hospitalized patients with COVID-19 (published 20 November 2020);
- [strong recommendation to use systemic corticosteroids](#) in patients with severe and critical COVID-19 (published 2 September 2020);
- [conditional recommendation against systemic corticosteroids](#) in patients with non-severe COVID-19 (published 2 September 2020).



Oxygen and advanced respiratory support



All areas where severe patients may be cared for should be equipped with pulse oximeters, functioning oxygen systems and disposable, single-use, oxygen-delivering interfaces (nasal cannula, Venturi mask and mask with reservoir bag).

Remark:

This includes areas in any part of health facilities, including emergency units, critical care units, primary care/outpatient clinics, as well as pre-hospital settings and ad hoc community facilities that may receive patients with severe COVID-19. See WHO Oxygen sources and distribution for COVID-19 treatment centres (126).



We recommend immediate administration of supplemental oxygen therapy to any patient with emergency signs during resuscitation to target $\text{SpO}_2 \geq 94\%$ and to any patient without emergency signs and hypoxaemia (i.e. stable hypoxaemic patient) to target $\text{SpO}_2 > 90\%$ or $\geq 92\text{--}95\%$ in pregnant women.

Oxygen and advanced respiratory support



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Closely monitor patients for signs of clinical deterioration, such as rapidly progressive respiratory failure and shock and respond immediately with supportive care interventions.



We recommend prompt recognition of progressive acute hypoxaemic respiratory failure when a patient with respiratory distress is failing to respond to standard oxygen therapy and adequate preparation to provide advanced oxygen/ventilatory support.

Oxygen and advanced respiratory support



We recommend that endotracheal intubation be performed by a trained and experienced provider using airborne precautions.

Remark: Patients with ARDS, especially young children or those who are obese or pregnant, may desaturate quickly during intubation. Pre-oxygenation with 100% FiO₂ for 5 minutes, and use of a face mask with reservoir bag is preferred. When possible, avoid bag-valve mask ventilation to reduce exposure to aerosols. Rapid-sequence intubation is appropriate after an airway assessment that identifies no signs of difficult intubation (135)(136)(137).



We recommend implementation of mechanical ventilation using lower tidal volumes (4–8 mL/kg predicted body weight [PBW]) and lower inspiratory pressures (plateau pressure < 30 cmH₂O).

Remark for adults:

The implementation of mechanical ventilation using lower tidal volumes and lower inspiratory pressures is a strong recommendation from a clinical guideline for patients with ARDS (109), and is also suggested for patients with sepsis-induced respiratory failure who do not meet ARDS criteria (109). The initial target tidal volume is 6 mL/kg PBW; tidal volume up to 8 mL/kg PBW is allowed if undesirable side-effects occur (e.g. dyssynchrony, pH < 7.15). Permissive hypercapnia is permitted. Ventilator protocols are available (138). The use of deep sedation may be required to control respiratory drive and achieve tidal volume targets.

Remarks for children:

In children, a lower level of plateau pressure (< 28 cmH₂O) is targeted, and a lower target of pH is permitted (7.15–7.30). Tidal volumes should be adapted to disease severity: 3–6 mL/kg PBW in the case of poor respiratory system compliance, and 5–8 mL/kg PBW with better preserved compliance (139).

Oxygen and advanced respiratory support



In adult patients with severe ARDS ($\text{PaO}_2/\text{FiO}_2 < 150$) prone ventilation for 12–16 hours per day is recommended.

Remarks:

1. Application of prone ventilation is recommended for adult patients, preferably for 16 hours per day, and may be considered for paediatric patients with severe ARDS but requires sufficient human resources and expertise to be performed safely; protocols (including videos) are available (140)(141).
 2. There is little evidence on prone positioning in pregnant women with ARDS; this could be considered in early pregnancy. Pregnant women in the third trimester may benefit from being placed in the lateral decubitus position.
-



Use a conservative fluid management strategy for ARDS patients without tissue hypoperfusion and fluid responsiveness.

Remarks for adults and children:

This has also been recommended in another international guideline (109). The main effect is to shorten the duration of ventilation. A sample protocol for implementation of this recommendation is available (142).

Oxygen and medical equipment . Development of WHO norms and standards



World Health
Organization

Adriana Velazquez Berumen
Team Lead Medical devices and in vitro diagnostics
Access to Medicines and Health Products Division,

COVID-19 has demonstrated the need to have Biomedical engineers to ensure technology is appropriate to well-being of patients

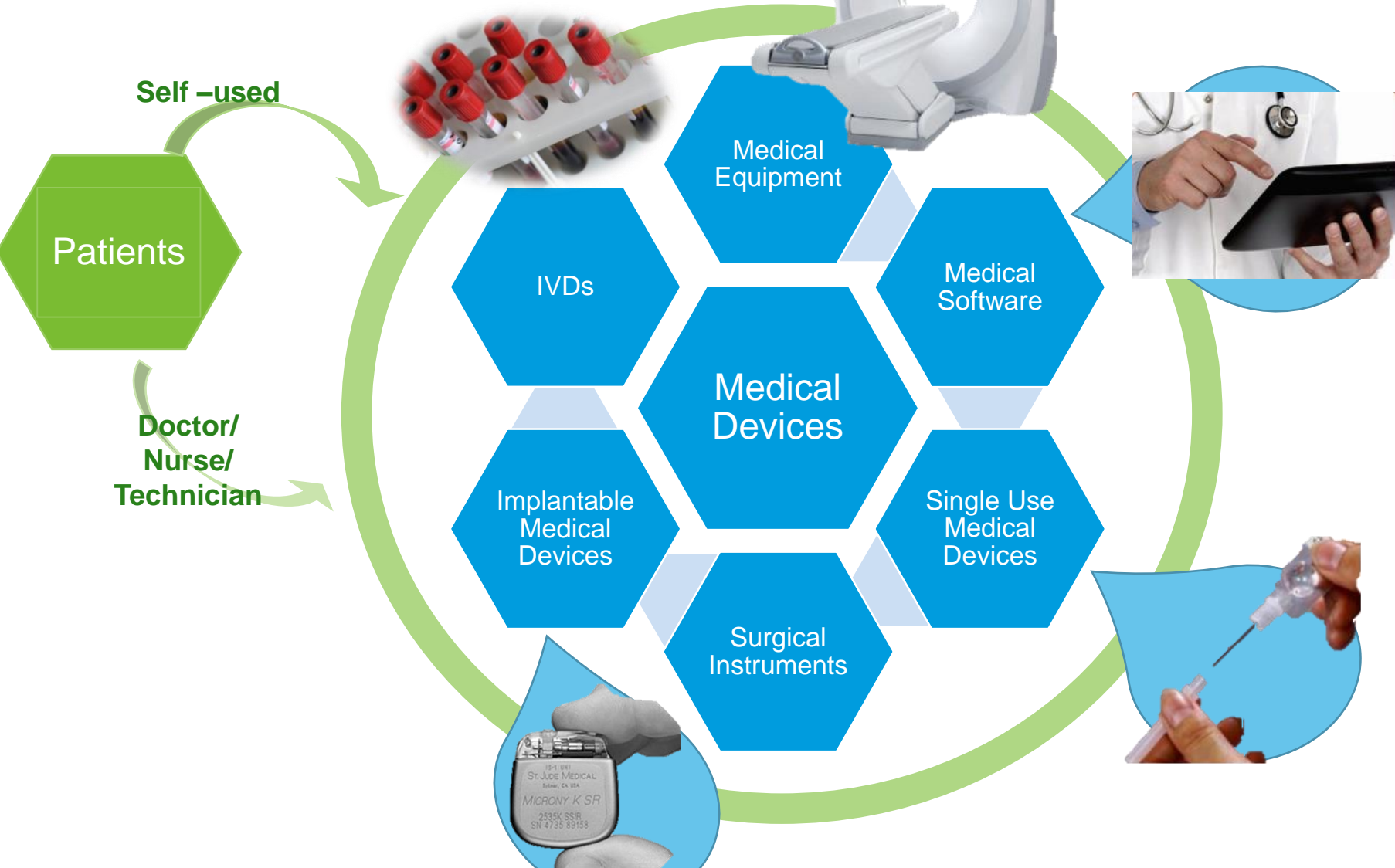
Oxygen is an essential medicine, for COVID-19, pneumonia, surgery, trauma...

Personal protective equipment, in vitro diagnostics and medical equipment



Oxygen requires medical devices to deliver and monitor.

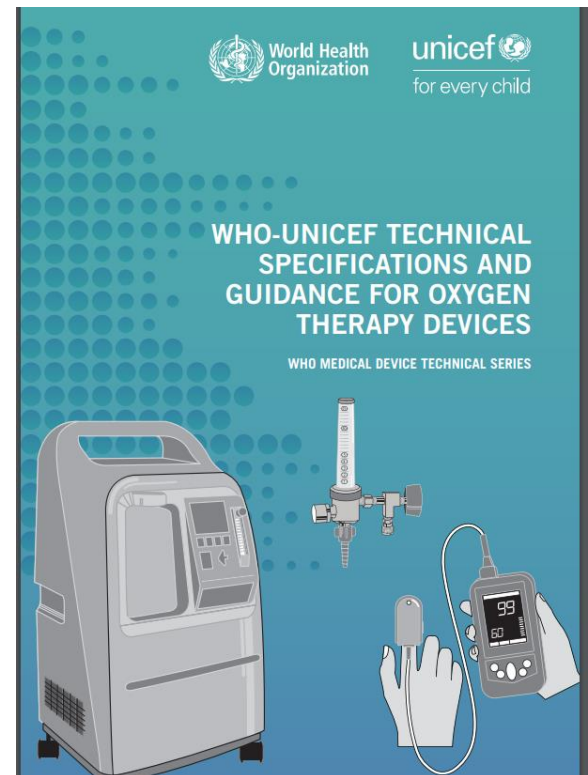
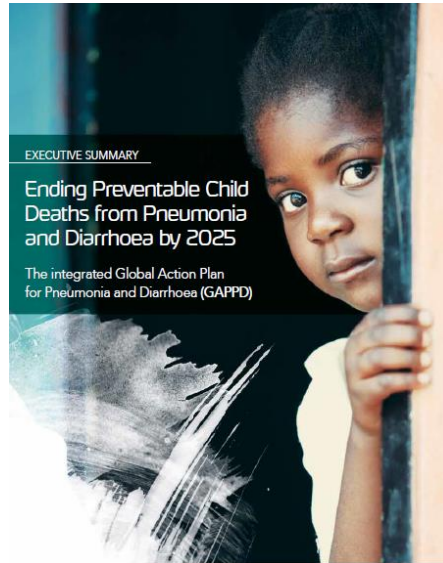
What are other types of Medical Devices?



Other priorities where oxygen plays essential role: Pneumonia

Number 1 killer for less than 5 years old.

- **WHO UNICEF Oxygen support systems (2019)**



Patient Safety should be prioritized, so training is indispensable!

Speak up for patient safety!

No one should be harmed in health care



Engineers, nurses and doctors all responsible to ensure safety.

Magnitude

4 out of 10

Up to 4 out of 10 patients are harmed in primary and ambulatory care settings

Incidence

134 million

134 million adverse events occur each year in hospitals in LMICs, contributing to 2.6 million deaths annually due to unsafe care



Oxygen, essential medicine for hypoxia (COVID-19): quality, affordability and availability in LMIC has been an urgent need for decades, but in the past only very limited investment.



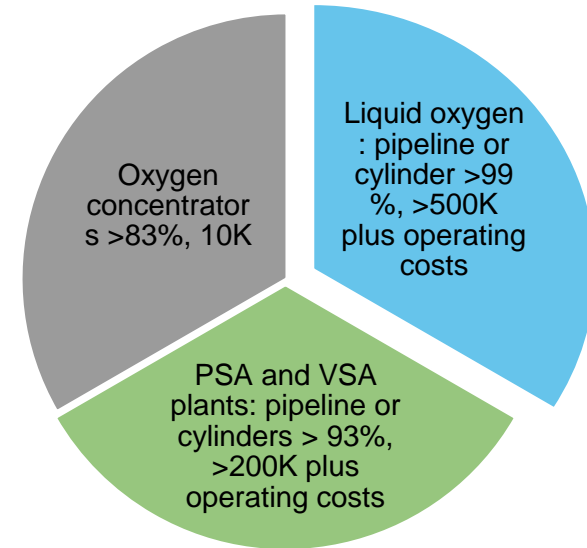
Oxygen and medical equipment **NEEDS** and **WHO** guidance

Medical oxygen source of good quality.

Distribution/monitoring/regulation, cylinders or pipeline
Pressure/volume. Maintenance, supply

Patient receiving appropriate, quality and safe care.
Medical equipment, pulse oximeters, cannulas, ventilators, masks, flowmeters...

Sources of oxygen: with different quality "Pharmacopeia" and costs.



2021 country guidance, GF funding, lack of engineering expertise pharmacopeia and GMP in MHP consultations
NGOs support, industry challenges

2015	2019	2020	2020

2016 RMNCH 2020 WHE 2021 MHP-WHE (for openWHO) safety and home use

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<https://www.who.int/teams/health-product-and-policy-standards/assistive-and-medical-technology/medical-devices/oxygen>

Priority medical devices list for the COVID-19 response and associated technical specifications (Nov 2020)

<https://www.who.int/publications/i/item/WHO-2019-nCoV-MedDev-TS-O2T.V2>



Includes 100+ types



By clinical interventions

Table 2.1 Interventions by clinical area

Clinical area	Intervention	Triage	Severe patients	Critical patients	1st level	2nd level	3rd level
Clinical assessment	Body temperature assessment	●	●	●	●	●	●
	Oxygen saturation assessment	●	●	●	●	●	●
Medical imaging	Ultrasound scan	●	●	●	●	●	●
	CT scan	●	●	●	●	●	●
Clinical laboratory	Blood gas analysis	●	●	●	●	●	●
	RT-PCR test	●	●	●	○	●	●
Clinical care	Antigen test	●	●	●	●	●	●
	Multiparametric monitoring	●	●	●	●	●	●
	Oxygen therapy	●	●	●	●	●	●
	Airway management and intubation	●	●	●	●	●	●
	Non-invasive ventilation	●	●	●	●	●	●
	Invasive ventilation	●	●	●	●	●	●
	Infusion therapy	●	●	●	●	●	●
	Intrusive care treatment	●	●	●	●	●	●
	Central venous catheter placement	●	●	●	●	●	●
	Gastrointestinal feeding	●	●	●	●	●	●
Protective equipment	Urine collection	●	●	●	●	●	●
	General	●	●	●	●	●	●
	Personal protection	●	●	●	●	●	●
	Sterilization	●	●	●	●	●	●

Devices for protection, diagnose, treatment and palliation

Technical specifications

clinical interventions in the clinical units, a navigation diagram is presented in Fig. 2.1.

Fig. 2.1 Navigation diagram



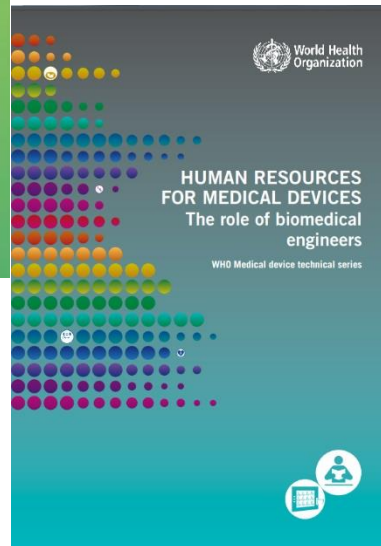
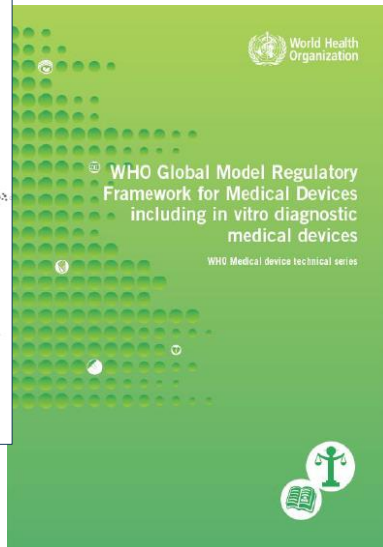
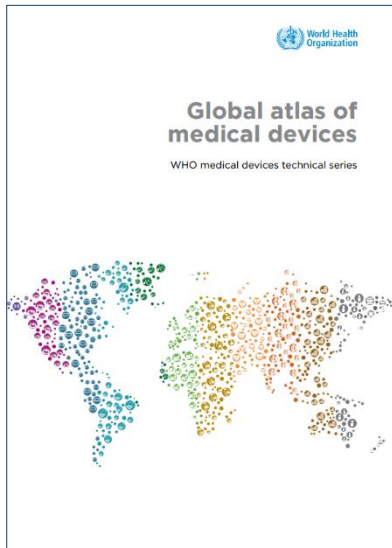
3.3 Technical specifications for procurement

3.3.1 Oxygen supply devices

3.3.1.1 Oxygen concentrator

Oxygen concentrator	
1	<p>General technical requirements</p> <p>Provides a continuous flow of concentrated oxygen (> 92%) (preferably > 95%) from room air through one oxygen outlet.</p> <p>Continuous flow up to 3 L/min or 3 L/min or 10 L/min.</p> <p>Contains oxygen monitor to verify concentration.</p> <p>Requires continuous AC power source to operate.</p> <p>Power efficiency < 70 W/3 L/min (preferable).</p> <p>User interface for ease to operate, numbers and displays clearly visible and easily readable in low ambient light and sunlight.</p> <p>Digital readout meters that display continuous flow and device operation.</p> <p>Oxygen outlet(s) with 3 mm (1/8 inch) barbed fitting or equivalent.</p> <p>Oxygen outlet to be securely mounted and labeled to indicate risk of falling broken or bent.</p> <p>Flowmeter maximum flow rate of 3 L/min or less. Flowmeter adjustable, within minimum graduation intervals of 0.1 L/min or less, 1 L/min models, and 1 L/min for larger models.</p> <p>Noise level < 60 dB(A).</p> <p>Capable to be disinfected with hospital grade detergents.</p> <p>At least F10 degree of protection to the harmful degree of water (flap/gill resistant), preferable up to IP21.</p> <p>Mechanical shock resistance, mechanical vibration, electromagnetic compatibility and electrical safety testing.</p> <p>Capable of applying the specified oxygen concentration continuously in ambient temperature from 10-40 °C, relative humidity from 15-85% (preferably up to 95%), and elevation from 0 to at least 2000 m. For operation at elevation higher than 2000 m, environmental requirements are less stringent, performance characteristics at such altitudes must be stated.</p>
2	<p>Displayed parameters</p> <p>Oxygen flow rate (on flowmeter).</p> <p>Continuous flow of operation.</p>
3	<p>User adjustable settings</p> <p>Oxygen flow rate.</p>
4	<p>Alarms</p> <p>Audible and/or visual alarm for:</p> <ul style="list-style-type: none"> Low oxygen concentration (< 92%). Power supply failure. High temperature. Low battery (preferable). Low/high flow (preferable). Low/high output pressure.
5	<p>Accessories included and mentioned in a disassembled list</p> <ul style="list-style-type: none"> DCI and 3 mm barbed adapter for each outlet (interchangeable between devices of different brands and models if applicable) 1 package of 30 per equipment. Non-flammable, leakable, non-leaking, single use (or preferred 3 months) supply required. Recalibrate may be compatible with appropriate disinfection protocols.
6	<p>Spare parts included and mentioned in a disassembled list</p> <ul style="list-style-type: none"> 1 year spare parts kit as per preventive maintenance programme, including: Internal and external mounted filters for cleaning the air intake. Spare battery set for alarm system if applicable. Spare main power cable length > 2.5 m if applicable. Replacement set of spare flow (if non-removable flow are used). Spare leads. <p>Builder must give a complete list of the specific spare parts included in their bid.</p> <p>Other spares that may be needed: small breaks, printed circuit board, spare belt, compressor service kit, valves, wheels, roller supports, flowmeters and etc.</p>
7	<p>Modularity, availability</p> <p>Includes details to be provided with reference to the spare parts.</p>

Other WHO publications, related to oxygen, innovations, clinical interventions and role of biomedical engineers



"Oxygen" new health topics webpage to include all WHO work related to Oxygen.



https://www.who.int/health-topics/oxygen#tab=tab_1

Use of oxygen across the health system

Many levels of the health systems need medical oxygen. The units in the health system that use oxygen include:

- Primary health care
 - General wards
 - Emergency transport
 - Delivery rooms
 - Surgical rooms
 - Intensive care units (ICU)
- Specialized hospitals
 - Outpatient units
 - Hyperbaric chambers

Some patients need oxygen in homecare and other special settings like airplanes.

This diagram illustrates examples of medical units that use oxygen. All levels in the health system require oxygen and pulse oximeters (to monitor oxygen saturation in patients). These different levels and scenarios meet different needs of oxygen systems.

Primary level (e.g. home, community care, health post, health centre)	Secondary level (e.g. district hospital)	Tertiary level (e.g. regional, specialised hospital, specialised subunit/clinic)
<ul style="list-style-type: none"> • General ward • Labour unit • Neonatal resuscitation corner • Emergency triage • Transport to referral 	<ul style="list-style-type: none"> • Emergency triage • Labour and delivery room • Neonatal care • Paediatric and/or adult ward • ICU • Operating theatre 	<ul style="list-style-type: none"> • Emergency triage • Labour and delivery room • ICU (neonatal, paediatric, adult) • Paediatric and adult wards • Surgery and recovery wards • Cardiorespiratory ward • Emergency ward

Note: Archetypal examples only, not necessarily representative of all locations.

Source: WHO-UNICEF technical specifications and guidance for oxygen therapy devices. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2019 (WHO medical device technical series).

OXYGEN SYSTEMS

- Oxygen source**
 - Compressor
 - Cylinder
- Distribution**
 - Central or sub-central piping
- Regulation and monitoring**
 - Regulator
 - Flowmeter
- Delivery**
 - Nasal cannula
 - Nasal catheter
- Patient monitoring**
 - Pulse oximeter
 - Saturation probe

Despite best device or its consist of o

Publications

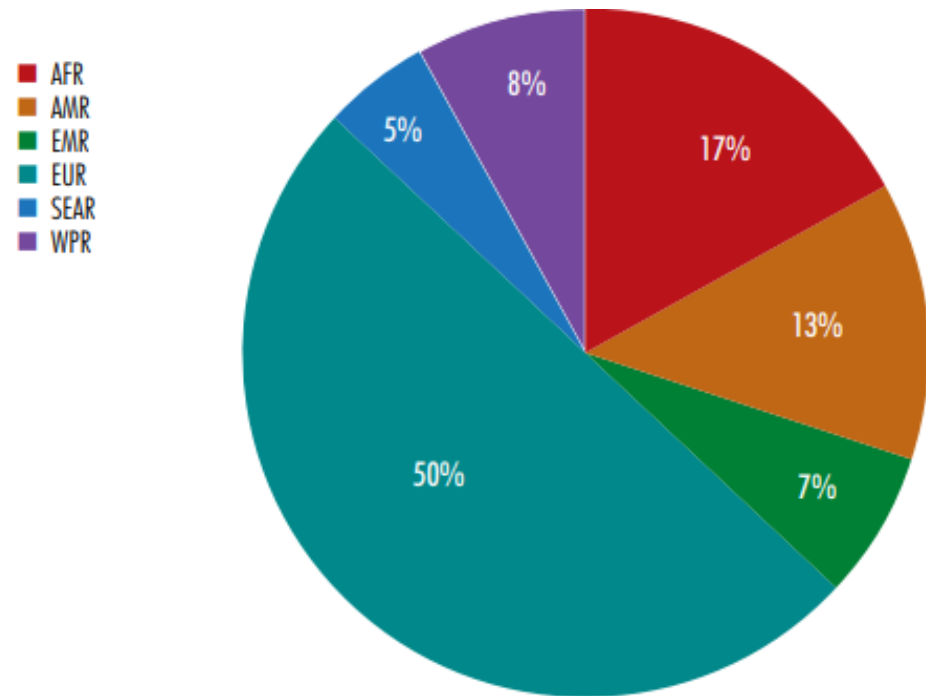
All

<p>14 July 2021</p> <p>WHO technical consultation on oxygen access scale-up for COVID-19</p> <p>Download Read More</p>	<p>19 November 2020</p> <p>Priority medical devices list for the COVID-19 response and associated technical specifications</p> <p>Download Read More</p>	<p>8 June 2020</p> <p>Technical specifications for Pressure Swing Adsorption(PSA) Oxygen Plants</p> <p>Download Read More</p>	<p>27 May 2020</p> <p>Clinical management of COVID-19</p> <p>Download Read More</p>
<p>4 April 2020</p> <p>Oxygen sources and distribution for COVID-19 treatment centres</p> <p>Download Read More</p>	<p>14 January 2019</p> <p>WHO-UNICEF Technical specifications and guidance for oxygen therapy devices</p> <p>Download Read More</p>	<p>1 October 2016</p> <p>Oxygen therapy for children</p> <p>Download Read More</p>	<p>9 September 2015</p> <p>WHO technical specifications for oxygen concentrators</p> <p>Download Read More</p>

Human Resources (Biomedical Engineers)



Countries with at least one BME professional association by WHO region



Source: Data was reported in surveys launched by WHO from 2009–2015.

Countries need biomedical/ clinical engineers to join the multidisciplinary team to care for the well-being of patients and ensure technology is appropriate.



Working together to solve local, regional and global health problems



COVID-19 GLOBAL OXYGEN

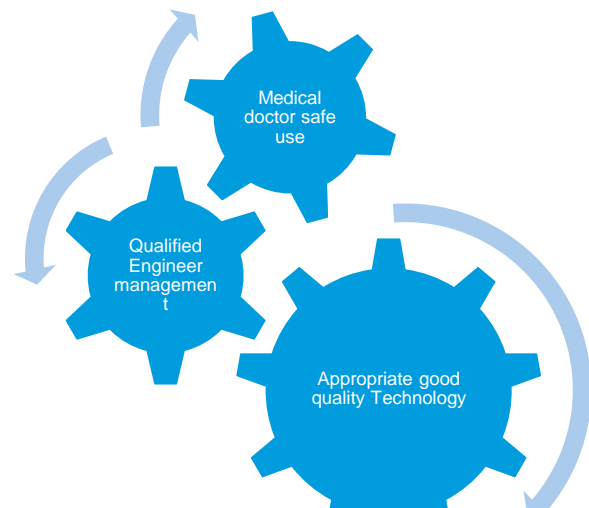
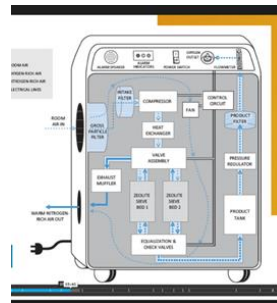
NEEDS

SOLUTIONS

Medical oxygen source, good quality

Distribution/monitoring/regulation
Pressure/volume quality

Patient receiving appropriate care safe
Good quality

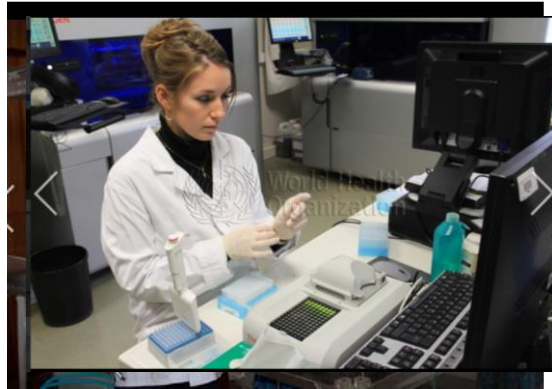


What is our role as biomedical engineers? To design, evaluate, regulate, manage medical devices that will support local, regional and global health.



And always collaborate with other health care workers in a teamwork, as today !

different settings, where we can make a difference



Why and how were these videos developed?



Pryanka Relan MD MPH CTropMed
Technical Officer
Clinical Management, WHO Health Emergencies Programme, World Health Organization
Geneva, Switzerland

February 2020: UN supply chain consortium

COVID Supply Chain System: Coordinated demand, supply, allocation and distribution mechanism



WHO African Region
@WHOAFRO


Equatorial Guinea 🇬🇵 welcomes the @UN 'Solidarity Flight' carrying #COVID19 medical supplies to support health workers. The @WHO cargo transported by @WFP includes critical protective equipment, including 10,560 masks & 19,000 pairs of gloves & 2 ventilators.






**Previous and
progressing WHO
trainings were not
enough...**

Respiratory panel



WHO Respiratory Care Expert Panel

Bios
18 May 2020



Title	Getting the device ready: XXX
Expert Panel Input	
Target Audience	Providers, such as physicians, nurses, respiratory therapists, clinical officers, etc., who are initiating or titrating oxygen therapy for adult or paediatric patients.
Format	~5 min video demonstration with a narrative voice over
Objective	Demonstrate the process of setting up a pulse oximeter
Equipment to be presented	<ul style="list-style-type: none"> • Pulse oximeter - fingertip • Pulse oximeter - handheld • Pulse oximeter - tabletop
Learning objectives	At the end of this video, the participant will be able to: <ul style="list-style-type: none"> • Identify the equipment necessary to monitor pulse oximetry • Demonstrate the process of setting up a pulse oximeter • Perform a function test on the pulse oximeter.

Storyboard with scripts:

Narrative	Scene

Demonstration video training course on full life cycle of key respiratory equipment

Equipment life cycle

Step 1
Selection of the device and accessories
 (procurement, specifications and receiving)

Step 2
Getting the equipment patient ready
 (set up, installing and testing)

Step 3
Use of the equipment
 (patient care)

Step 4
Decontamination of consumables and equipment
 (cleaning, disinfection and sterilization)

Step 5
Maintenance of the equipment
 (repair and planned maintenance)

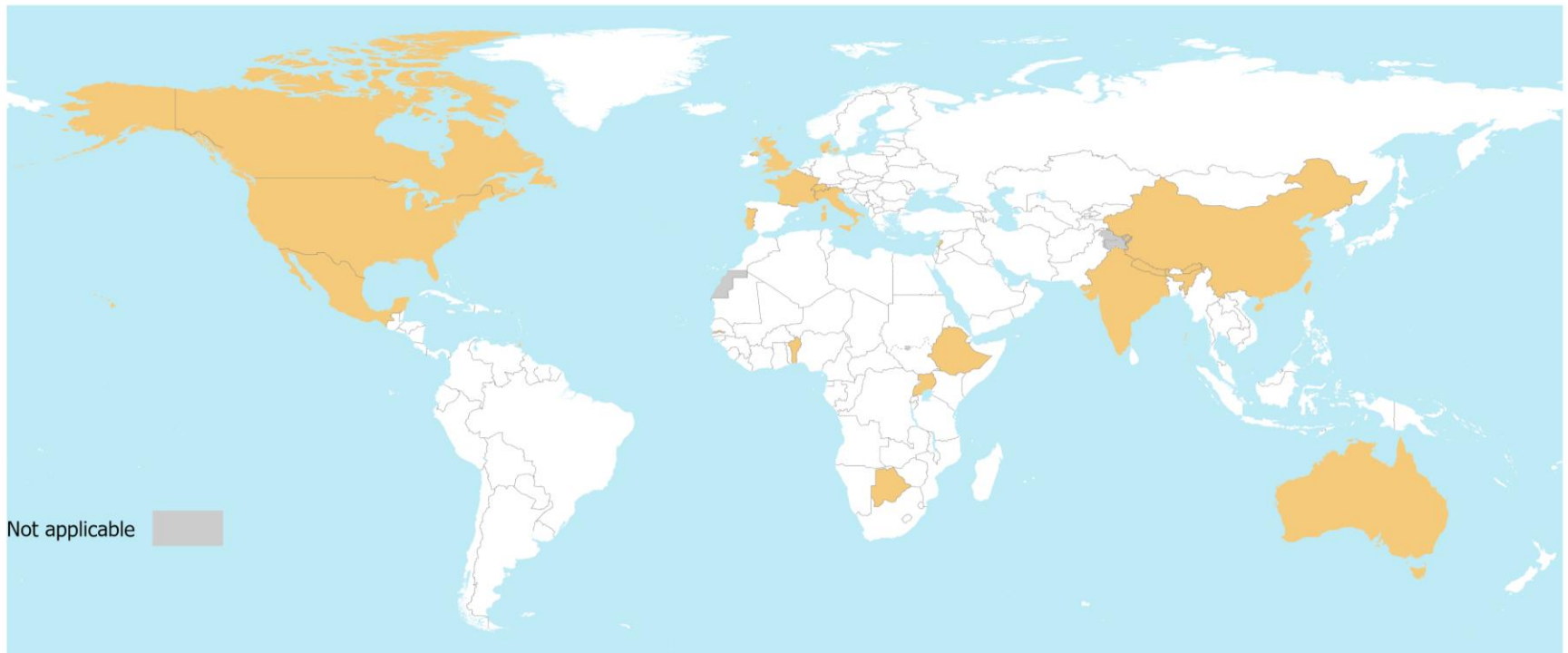
Step 6
Decommissioning of the equipment



Pulse oximetry
Patient monitors
Oxygen cylinders
Oxygen concentrators
High-flow oxygen
CPAP and BiPAP
Mechanical ventilators



Finally – over 30 videos filmed by 100+ experts in 20+ countries in all WHO regions and all income levels



The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of WHO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme

Panel 1 Selection and set up of medical equipment



13:50 to 14:15 CET, panels and Q&A

Video clip Selection

[LINK](#)

Video clip Setting up

[LINK](#)

Background and Learning Objectives

Tobey CLARK, (WHO collaborating center, U of Vermont, USA)

Health Technology management

Shauna MULLALY (Canada)

Intensive care medical doctor

Cesar VIEIRA (Portugal)

Consultant to WHO , African region office

Marta MULERWA (Uganda)

Step 1 Selecting the right medical equipment

A critical stage for achieving the value of medical equipment in healthcare

At the end of this video, the participant will be able to:

- 1. Provide a brief outline of the training course*
- 2. Identify what equipment to select for their facility or system*
- 3. Understand good medical equipment selection practice to follow when acquiring equipment;*
- 4. Identify respiratory equipment-specific best practices for equipment selection;*
- 5. Know where to look for further guidance on the subject*

Step 1: How to select medical equipment



Part 1

ALL MEDICAL
EQUIPMENT

Selecting equipment

Step 2 - Getting the medical equipment ready

Well planned and executed initial implementation leads to success

At the end of this video, the participant will be able to:

- 1. Perform incoming inspection of the respiratory equipment which includes verifying inventory, performing safety and performance testing and documenting key information for the asset;*
- 2. Assessing and preparing a clinical space for the respiratory equipment.*

Step 2: How to set up a mechanical ventilator



Step 2 - Getting the medical equipment ready:

MECHANICAL VENTILATOR

COVID-19 Respiratory equipment training course

Panel 2 Clinical use and decontamination



14:15 to 14:40 CET, panels and Q&A

Video clip Clinical use

[LINK](#)

Video clip decontamination

[LINK](#)

Background and Learning Objectives

Pryanka RELAN, (WHO)

Anesthesiologist, WHO collaborating center

Michael Lipnick (USA) video

Respiratory therapist

Hui-Ling LIN (China)

Biomedical engineer and medical doctor

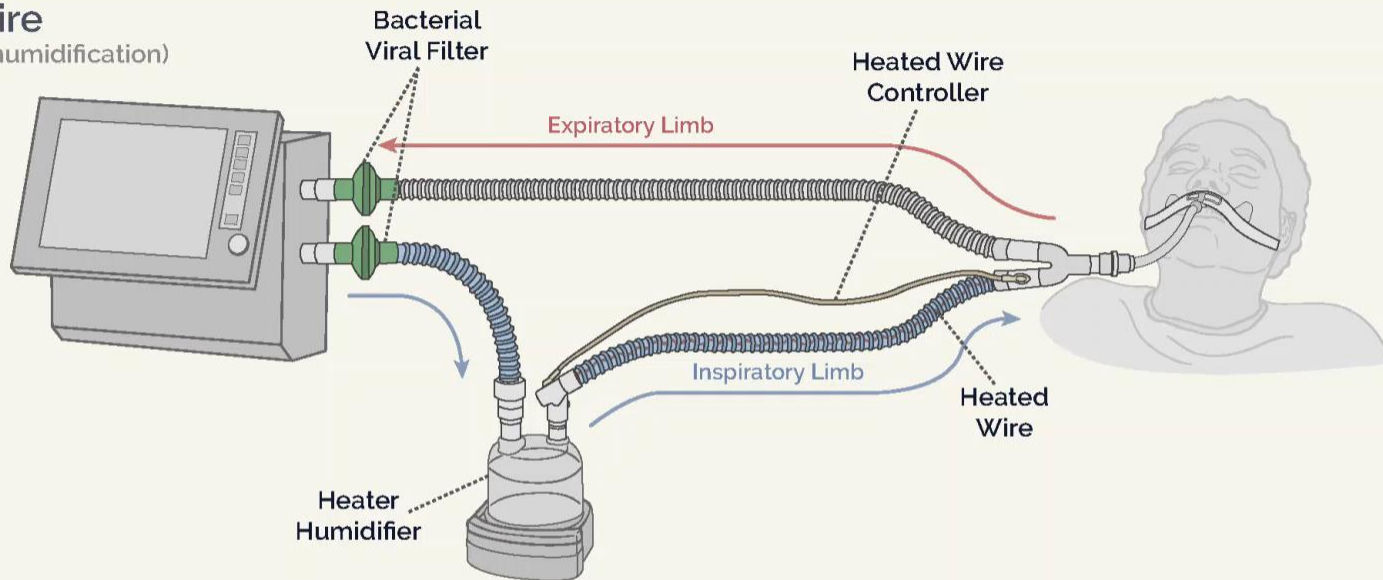
Cai LONG (Canada)

Step 3: How to clinically use a mechanical ventilator

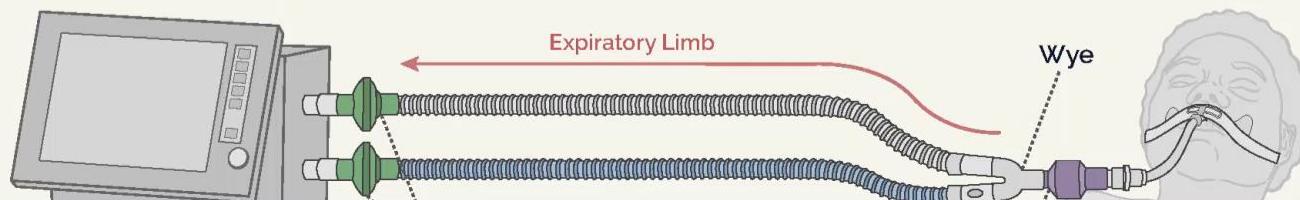
DUAL LIMB CIRCUITS

Heated Wire

(Active heat & humidification)

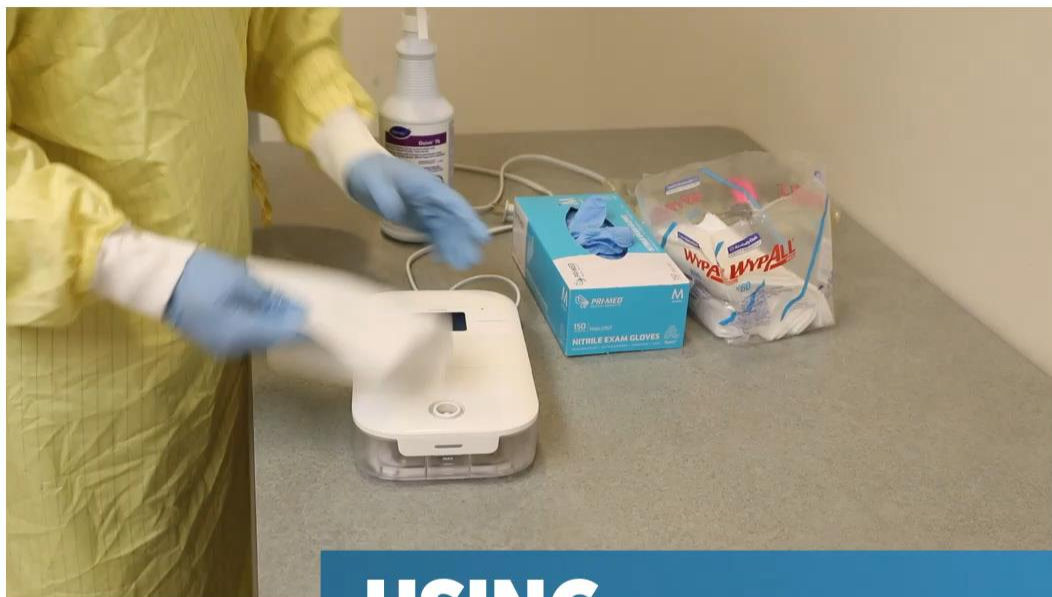


Heat Moisture Exchanger (HME)



Step 4: How to decontaminate a CPAP/BiPAP

- Different disinfectant formulations should never be used on the same device during the same disinfection step as this may produce toxic fumes



**USING
DISINFECTANTS
ON THE DEVICE**

Michael LIPNICK, (USA)

Panel 3 Maintenance and Decommissioning



14:40 to 15:05 CET, panels and Q&A

Video clip Maintenance

[LINK](#)

Video clip Decommissioning

[LINK](#)

Background and Learning Objectives

Bill GENTLES (Canada)

Biomedical engineer WHO Southeast Asia

Barun KUMAR (Nepal)

Biomedical engineer Ministry of Health

Joshua TIM (Botswana)

Biomedical engineer IFMBE (NGO)

Luis FERNANDEZ (Mexico)

Step 5: How to perform preventative maintenance on an oxygen concentrator



Step 6: How to perform corrective maintenance on a mechanical ventilator



Part 5:

MECHANICAL VENTILATOR

*Verify the the alarms on
the mechanical ventilator*



Step 7: How to decommission medical equipment



FEB
2022

REAL-TIME TRAINING ON **OpenWHO.or**

OPEN TO ALL, ANYTIME,
FROM ANYWHERE

-  [Courses on COVID-19](#)
-  [Courses on health topics](#)



What is OpenWHO.org?

Free of charge

Self paced

Accessible

Multilingual



WHO's **interactive, web-based, knowledge-transfer platform** offering online courses to improve the response to health emergencies

Launched in 2017 to facilitate the transfer of **life-saving knowledge on a massive scale** in anticipation of the next pandemic

Has served **frontline responders** in outbreaks from Ebola to plague, with rapid growth during COVID-19

OpenWHO key figures



6.4 million
total course
enrolments

140
total course
topics

43
COVID-19
courses

3.5 million
certificates

64
languages

11.4
million
words
translated

110 000
digital badges

OpenWHO clinical management learning channel



Clinical management

Providing quality, evidence-based care

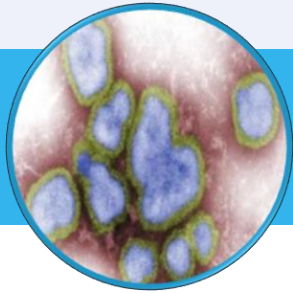
[Channel](#) hosts **10 courses** on a range of diseases, including COVID-19, Ebola, diphtheria and influenza



NEW: [WHO COVID-19 equipment training course](#)

In the context of the COVID-19 pandemic, health workers have had more demands placed on them than ever before, especially in caring for patients with respiratory disease. This course was developed to teach health workers how to manage key respiratory medical equipment safely.

COVID-19 clinical management courses on OpenWHO



WHO Clinical Care Severe Acute Respiratory Infection Training

[Arabic](#) - [English](#) - [French](#) - [Indonesian](#) - [Kazakh](#) - [Macedonian](#) - [Portuguese](#) - [Russian](#) - [Sinhalese](#) - [Spanish](#) - [Tetum](#) - [Vietnamese](#)



Clinical management of patients with COVID-19
Clinical Management channel

Clinical management of patients with COVID-19: General considerations
[Albanian](#) - [Dutch](#) - [English](#) - [Indonesian](#) - [Kazakh](#) - [Macedonian](#)



Clinical management of patients with COVID-19: Rehabilitation of patients with COVID-19
Clinical Management channel

Clinical management of patients with COVID-19: Rehabilitation of patients with COVID-19
[Albanian](#) - [Chinese](#) - [English](#) - [French](#) - [Macedonian](#) - [Russian](#)



Clinical management of patients with COVID-19: Initial approach to the acutely ill patient
Clinical Management channel

Clinical management of patients with COVID-19: Initial approach to the acutely ill patient

[English](#) - [Somali](#) - [Spanish](#)



Clinical management of patients with COVID-19: Investigations and care for mild, moderate and severe disease
Clinical Management channel

Clinical management of patients with COVID-19: Investigations and care for mild, moderate and severe disease

[English](#) - [Hindi](#) - [Kazakh](#) - [Maithili](#) - [Nepali](#) - [Vietnamese](#)

COVID-19 clinical management enrolment snapshot

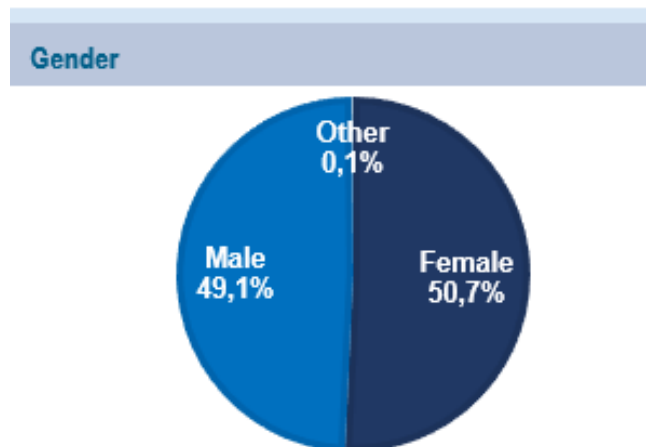
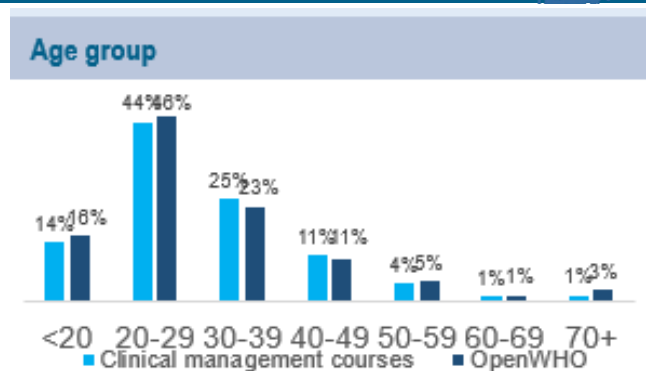
COURSE	Enrolments	Number of languages	First published
WHO Clinical Care Severe Acute Respiratory Infection Training	175 687	12	February 2020
Clinical management of patients with COVID-19: General considerations	35 198	6	October 2020
Clinical management of patients with COVID-19: Rehabilitation of patients with COVID-19	34 313	6	January 2021
Clinical management of patients with COVID-19: Initial approach to the acutely ill patient	19 506	3	May 2021
Clinical management of patients with COVID-19: Investigations and care for mild, moderate and severe disease	21 340	6	June 2021
TOTAL	286 044		

Clinical management learners' backgrounds



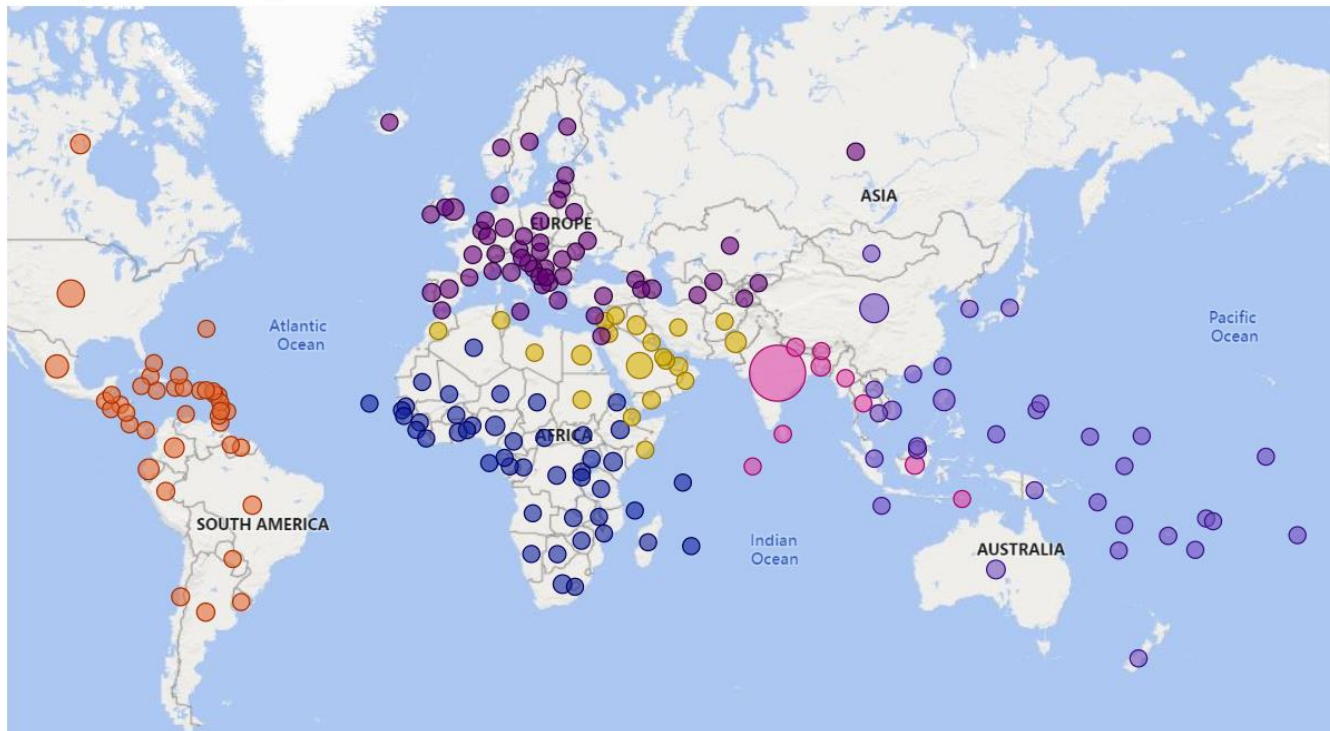
358 300
enrolments

Affiliation	%
1 Health care professional	35.5%
2 Student	32.3%
3 Other	12.4%
4 Volunteer	6.0%
5 Health ministry	4.8%
6 NGO	2.3%
7 Health expert	2.0%
8 Other ministry	1.7%
9 WHO staff	1.4%
10 Health institute	0.9%
11 International organization	0.5%
12 UN country team	0.3%
13 GOARN	0.1%



Clinical management learners' geographic distribution

WHO region ● AFRO ● AMRO_PAHO ● EMRO ● EURO ● SEARO ● WPRO



Top user countries



OpenWHO: Advancing equity through online learning



The COVID-19 pandemic expanded OpenWHO learning to previously **underrepresented** groups, including women, learners age 70+ and learners younger than 20.



Online learning participation has shifted toward **low-and middle-income countries**, which make up nearly $\frac{3}{4}$ of learners compared to $\frac{1}{2}$ before the pandemic, driven by surging demand in middle-income countries.



When population is taken into consideration, **small island states** bring the highest proportion of learners. 16 out of the 20 top countries, territories and areas based on per capita enrolments are island states.

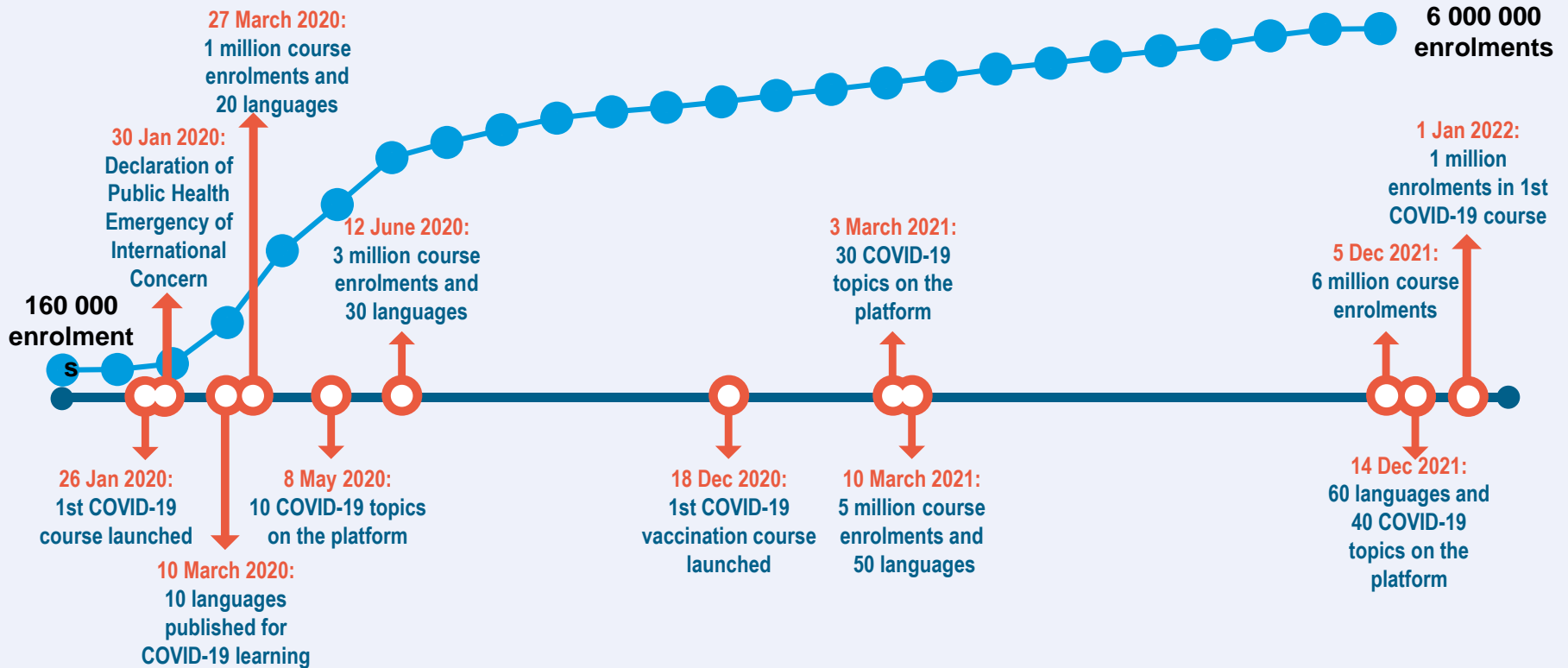


OpenWHO translates COVID-19 courses into as many **languages** as possible. Access to materials in preferred languages has been proven to enhance learning uptake and retention.



OpenWHO prioritizes **multi-use formats** so materials can be adapted to local contexts and offline demands, creating a multiplier effect that reaches additional audiences.

OpenWHO: 2 years of pandemic learning response



For more information

Learning and Capacity Development
WHO Health Emergencies Programme

outbreak.training@who.int

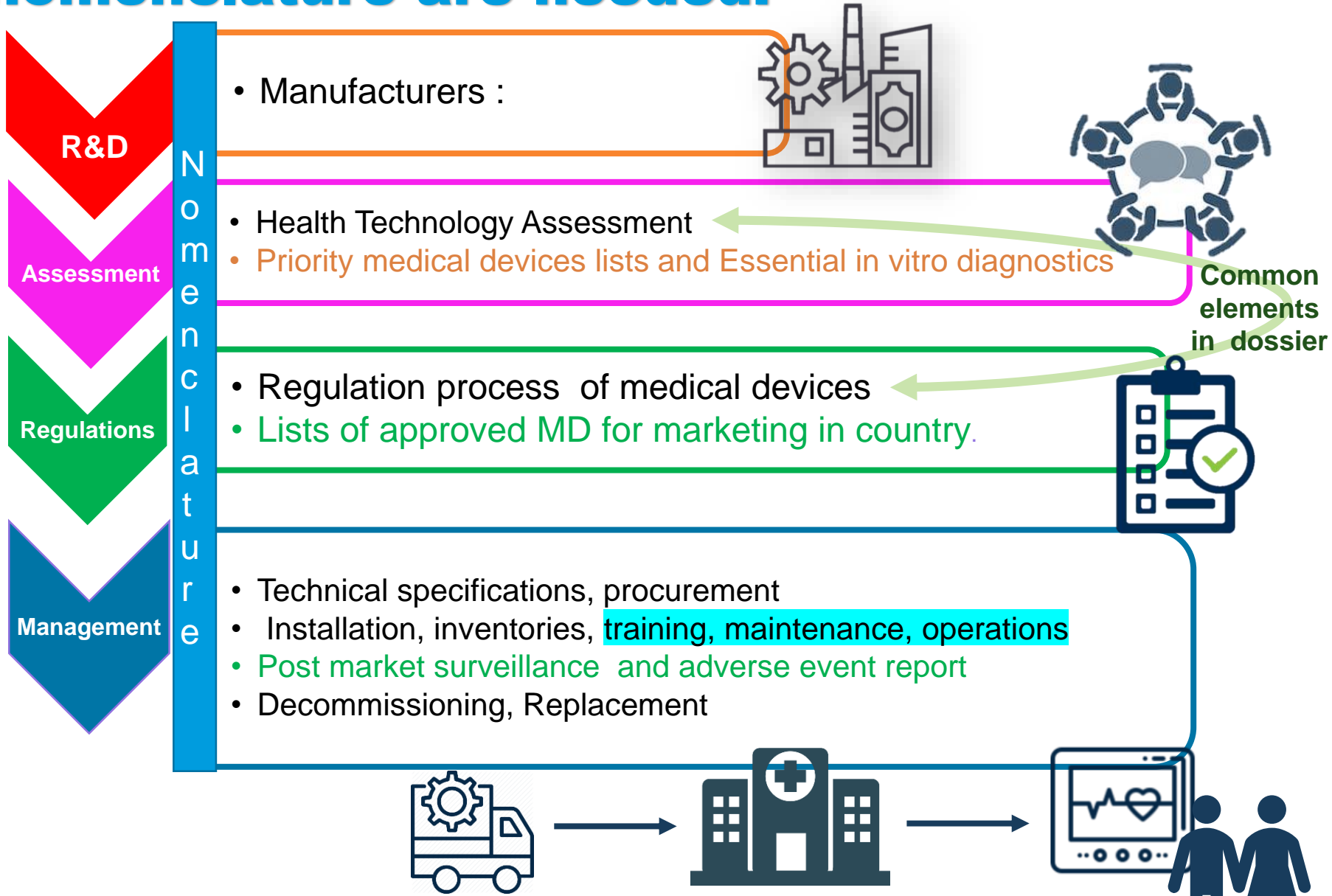
<https://OpenWHO.org>

Next steps Medical devices for oxygen delivery



Continue providing input in ACT-A, Oxygen task force, support to countries, technical specifications,...

To ensure improved access of safe, quality medical devices, names and nomenclature are needed:



MeDevIS: WHO Priority Medical Devices Information System



<https://medevis.who-healthtechnologies.org/>

The MEDEVIS platform is currently under active development. It only includes medical devices listed in the WHO publications, limited to specific diseases, health conditions and health care settings. This is a Beta version.



MEDEVIS

Priority Medical Devices Information System

Search by name, indication or test purpose

Browse by the following categories and note that MEDEVIS will be continuously expanded to other medical devices for added health conditions and diseases.

WHO list of priority medical devices



Cancer



Cardiovascular diseases
and diabetes



COVID-19



Reproductive, maternal,
newborn and child
health

Healthcare unit

Service delivery platform

Type of medical device

[New version in preparation: https://medevis-nomenclaturemapping.test.evidenceprime.com/](https://medevis-nomenclaturemapping.test.evidenceprime.com/)

New version of MeDevIS will include: training material, images, more tech specs, updated classification for health care units... by end of March.



The MEDEVIS platform is currently under active development. It only includes medical devices listed in the WHO publications, limited to specific diseases, health conditions and health care settings. This is a Beta version.

The screenshot shows the MeDevIS web interface. At the top, there is a search bar with the text 'Search by name, indication or test purpose' and a magnifying glass icon. Below the search bar, there is a navigation menu with a back arrow and the text 'Patient monitor multiparametric, advanced'. To the right of the search bar, there is a button labeled 'Export device'. The main content area is a form with several sections:

- Specific details:** A text input field containing 'NO'.
- Alternative names:** A text input field containing 'Patient monitor multiparametric: advanced - for ECG, CO2, invasive blood pressure (IBP), non-invasive blood pressure (NIBP), oxygen saturation (SpO2), respiratory rate (RR) and temperature (TEMP) (with accessories)'.
- WHO list of priority medical devices:** Two buttons labeled 'Cancer' and 'COVID-19'.
- Various conditions or disease specific:** A button labeled 'Various'.
- Particular indications (ICD-11):** A button labeled 'Multiple'.
- Organ or system related according to ICD-11:** A button labeled 'Many'.
- Interventions (non-exhaustive list):** A grid of buttons including 'Ambulatory blood pressure monitoring', 'Assessment of cardiovascular function', 'Assessment of functions of the respiratory system', 'Cardiac electrophysiological monitoring', 'Contrast injection procedures', 'General endoscopic procedures', 'General surgical procedures', 'Measurement of body temperature', 'Monitoring respiration function', 'Radionuclide injection', 'Radiotherapy treatment delivery', and 'Treatment delivery, brachytherapy'.

To the right of the form, there is a photograph of a patient monitor displaying vital signs on its screen.

System: Electrodes, ECG, reusable, adult and paediatric; EGG headset; Disposable oxygen saturation sensor; Cuffs, blood pressure;

Training materials

<https://www.who.int/teams/health-product-policy-and-standards/assistive-and-medical-technology/medical-devices/management-use/trainings>

General technical specifications and guidance

[Technical specification to download](#)



https://medevis-nomenclaturemapping.test.evidenceprime.com/devices/COM_340

Next steps for training material

Initial dissemination and lessons learned

OpenWHO courses, Future Translations

Future training videos for other types of priority medical devices.

**Thank you to all those engineers,
doctors, technicians, administrators,
that made this project possible!**



OpenWHO training series trailer



**Thank you !
Gracias
Merci
Obrigada
Xie xie**



**World Health
Organization**

WHO

20, Avenue Appia
1211 Geneva

Switzerland