DRAFT: IFMBE CED – Every Breath Counts (EBC) Coalition – WHO Webinars 19-20 May 2021

Systems Response for Oxygen in COVID-19 Clinical Settings: Challenges & Solutions

Global NGO, Biomedical & Clinical Engineering Health Technology (HT) Perspectives

World Health Organization 2021: (1) Oxygen is an essential medicine, indispensable for COVID-19 treatment and is very much in need in all settings! Oxygen is also essential for surgery, pneumonia, trauma and any other hypoxia condition in Vulnerable groups like the elderly, pregnant women and newborns need oxygen in regular basis. (2) …Vaccines alone will not overcome COVID-19. Commodities such as medical oxygen and personal protective equipment (PPE), as well as reliable diagnostic tests and medicines are also vital. (3) Trained and qualified biomedical (/clinical) engineering professionals are required to design, evaluate, regulate, maintain and manage medical devices (including medical oxygen devices & systems, and PPE), and train on their safe use in health systems around the world.

	Wednesday 19 May, 2:00 - 3:30 pm Geneva time (CET)	***Thursday 20 May, 2:00 - 3:30 pm Geneva time (CET)***
Time	**Challenges**	**Solutions: LMIC Biomedical & Clinical Engineers' Case Studies**
CET time zone, pm	**Moderators**: Tom Judd (IFMBE CED[1]), Leith Greenslade (EBC[2])	**Moderators:** César Burgi Vieira, MD[9], Elliot Sloane, PhD (CED)[10]
2:00 – 2:10	**Welcome & Introduction:** Adriana Velazquez (WHO[3]), Robert Matiru (UNITAID)[4]	**Welcome & Introduction:** Yadin David (GCEA)[11], Ed Whiting (Wellcome)[4]
2:10 - 2:25	**WHO Oxygen Tools & Guidelines:** Alejandra Velez (WHO)	**Using WHO Inventory Tool for MOH Pakistan:** Tazeen Bukhari (EBC-WHO)[12]
2:25 - 2:35	**PATH Oxygen Needs Tracker:** Alex Rothkopf (PATH)[5]	**Gambia Developing Oxygen Treatment Centres:** Ebrima Nyassi (ESL-EBC)[13]
2:35 - 2:45	**Oxygen Clinical Impacts:** Paul Sonenthal, MD (Partners in Health-PIH)[6]	**Rwanda Biomedical Centre COVID response**: Francine Umutesi (EBC-RBC)[14]
2:45 – 2:55	**NGOs Closing the Oxygen Gap:** Jason Houdek (Clinton Health Access Initiative-CHAI)[7]	**Malawi Experience & OpenO2:** Grycian Massa[15] (EBC-Lilongwe Inst.) Timothy Mtonga[16]
2:55-3:05	**NGOs Closing the Oxygen Gap:** Jim Ansara (Build Health International-BHI)[8]	**Haiti Implementing BHI's Oxygen solution OxBox:** Steve Mtewa (EBC-BHI)[8]
	Panel & Q&A	**Panel & Q&A**
3:05 – 3:30	**All Presenters & Moderators**	**All Presenters & Moderators**
FaceBook Recordings	https://fb.watch/5AJPG6JXHJ/	https://fb.watch/5C2qqeN2I5/

[1] International Federation for Medical and Biological Engineering *Clinical Engineering Division (*IFMBE CED): https://ced.ifmbe.org/. Tom Judd is CED Board Chair, certified Clinical Engineer, and WHO HT Adviser since 1989.

[2] Every Breath Counts (EBC) Coalition https://stoppneumonia.org/about-us/. Leith Greenslade is EBC Co-ordinator.

[3] World Health Organization Medical Devices Unit https://www.who.int/health-topics/medical-devices#tab=tab_1. Adriana Velazquez is the WHO Senior Adviser, Medical Devices.

[4] UNITAID https://unitaid.org/ Robert Matiru of UNITAID is Co -Chair, *ACT-A Oxygen Emergency Task Force* https://www.who.int/news/item/25-02-2021-covid-19-oxygen-emergency-impacting-more-than-half-a-million-people-in-low--and-middle-income-countries-every-day-as-demand-surges. Ed Whiting of Wellcome is the other Co-Chair. https://wellcome.org/

[5] PATH https://www.path.org/ & Needs Tracker https://www.path.org/programs/market-dynamics/covid-19-oxygen-needs-tracker/. Zach Clemence is Program Officer: COVID-19 Respiratory Care Country Programs Lead.

[6] PIH https://www.pih.org/ and Addressing Oxygen https://www.pih.org/global-covid-response. Dr. Paul Sonenthal is Associate Director, Inpatient Medicine and Critical Care for PIH.

[7] CHAI https://www.clintonhealthaccess.org/ and Addressing Oxygen Gap https://www.clintonhealthaccess.org/transcript-of-webinar-investing-in-oxygen-to-close-the-access-gap-during-covid-19-and-beyond/. Jason Houdek is Senior Technical Advisor, Essential Medicines for CHAI.

[8] BHI https://www.buildhealthinternational.org/ **and Addressing Oxygen Gap** https://www.buildhealthinternational.org/covid-response/**. Jim Ansara is** Co-founder & Director at Build Health International. Steven Mtewa is a biomedical engineer on the BHI team in Haiti with global experience

[9] Dr. Vieira is a recent WHO Consultant & CED Collaborator. He also is a Hospital-Based Internal Medicine physician treating COVID-19 patients at Centro Hospitalar Universitário de Lisboa Central in Portugal.

[10] Dr. Sloane is a WHO/PAHO Health Technology (HT) Adviser for 40 years, a certified Clinical Engineer, University professor in Health IT, & global Digital Health leader https://villanova.academia.edu/ElliotSloane

[11] Dr. Yadin David is a WHO HT Adviser for over 30 years, a certified Clinical Engineer (CE), a CED Board member, and Leader of the Global Clinical Engineering Alliance with whom CED partners. https://www.globalcea.org/

[12] Ms Bukhari is a WHO HT Consultant, a CE, and based on her past significant experience in biomedical / clinical engineering was selected by her Ministry of Health to conduct a WHO survey across her country in 2020.

[13] Ebrima Nyassi is a biomedical engineer, currently serving a CED of Ecomed Scientific Limited in The Gambia, and co-author: *The development and implementation of an oxygen treatment solution for health facilities in low and middle-income countries (LMIC)*, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7698571/

[14] Ms Francine Umutesi is a biomedical engineer, a Health Technology Operations Specialist at RBC https://www.rbc.gov.rw/index.php?id=188, with global experience in the Health Technology Management field.

[15] Grycian Massa is a biomedical engineer, Director of Engineering Maintenance at Lilongwe Institute of Orthopaedics and Neurosurgery, see Open O2 initiative information below in References

[16] Timothy Mtonga, PhD, Malawi Director, Global Health Informatics Institute (https://www.ghii.org), whose initiative in Malawi is OpenO2 https://www.openo2.org/home.

References

An extensive list below compiled from WHO, EBC, *ACT-A Oxygen Emergency Task Force*, PATH, CHAI, PIH, BHI, etc.

References

1. **World Health Organization (WHO) Medical Devices**
    a. WHO overall Medical Device site: https://www.who.int/health-topics/medical-devices#tab=tab_2
        i. Priority medical devices for COVID prevention, diagnostic and management: https://www.who.int/teams/health-product-and-policy-standards/access-to-assistive-technology-medical-devices/medical-devices/priority-medical-devices-for-covid; https://www.who.int/activities/prioritizing-medical-devices
        ii. Priority medical devices list for the COVID-19 response and associated technical specifications https://www.who.int/publications/i/item/WHO-2019-nCoV-MedDev-TS-O2T.V2; book now available in 6 languages has more than 100 tech specs related to COVID
        iii. Publications: https://www.who.int/medical_devices/publications/en/#htm
    b. WHO re Oxygen: https://www.who.int/teams/health-product-and-policy-standards/access-to-assistive-technology-medical-devices/medical-devices/oxygen
        i. Cylinder safety: https://www.who.int/publications/m/item/oxygen-cylinder-safety
            1. Poster: https://cdn.who.int/media/images/default-source/initiatives/oxygen-access/cylinder_final_red.tmb-768v.jpg?sfvrsn=60bb2128_1
        ii. Fire mitigation: https://www.who.int/publications/m/item/medical-oxygen-fire-risk-mitigation-measures
            1. Poster: https://cdn.who.int/media/images/default-source/initiatives/oxygen-access/risk-mitigation_final.tmb-768v.jpg?sfvrsn=7f1db1b7_1
        iii. Medical gas piping: https://www.who.int/publications/m/item/medical-gas-piping-systems-safety
            1. Poster: https://cdn.who.int/media/images/default-source/initiatives/oxygen-access/piping_final_red.tmb-768v.jpg?sfvrsn=c1e3e58d_1
    c. **May 2021 WHO Guidelines and Tools for Oxygen**: *https://www.who.int/initiatives/oxygen-access-scale-up*
    d. Other Key WHO Medical Device links
        i. https://www.who.int/teams/health-product-and-policy-standards/access-to-assistive-technology-medical-devices/medical-devices
        ii. https://www.who.int/teams/health-product-and-policy-standards/access-to-assistive-technology-medical-devices/medical-devices/newsletter
        iii. https://www.who.int/teams/health-product-and-policy-standards/access-to-assistive-technology-medical-devices/medical-devices/oxygen
    e. WHO Global research re COVID-19: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/global-research-on-novel-coronavirus-2019-ncov
        i. WHO COVID-19 Technology Access Pool: https://www.who.int/initiatives/covid-19-technology-access-pool
        ii. Clinical Management: https://www.who.int/publications/i/item/WHO-2019-nCoV-clinical-2021-1
    f. WHO COVID-19 Home Care Bundle for Health Workers: https://www.who.int/publications/m/item/covid-19-home-care-bundle-for-health-care-workers

2. **WHO COVID-19 Biomedical Inventory Tool** (applied at country level): https://www.who.int/publications/i/item/WHO-2019-nCov-biomedical-equipment-inventory-2020.1
    a. Senegal: https://path.azureedge.net/media/documents/FINAL_Biomedical_Equipment_Assessment__Gap_Analysis_for_COVID_Senegal_4-19-21.pdf
    b. DRC: https://path.azureedge.net/media/documents/FINAL_Biomedical_Equipment_Assessment_Kinshasa_4-21-21.pdf
    c. Pakistan: https://ced.ifmbe.org/2021-leadership-webinars/guruPrograms/18-2021-leadership-webinars/65-inn-day1.html
    d. Ethiopia: https://stoppneumonia.org/wp-content/uploads/2020/09/COVID-19-Respiratory_Oxygen-Equipment.pdf
    e. Malawi - https://path.azureedge.net/media/documents/Malawi_Biomedical_Equipment_Assessment_Report_PATH_2021.01.25_final.pdf
    f. Zambia: https://www.path.org/resources/biomedical-equipment-covid-19-case-management-zambia-covid-19-treatment-facility-survey-report/

3. **Foundations & Industry**
    a. **Global Fund** funding for oxygen: (Call) https://www.theglobalfund.org/en/covid-19/health-product-supply/treatment-and-oxygen-equipment/ (Response) https://www.theglobalfund.org/en/our-covid-19-response/ and (How to Apply) https://www.theglobalfund.org/en/covid-19/response-mechanism/how-to-apply/
    b. **World Bank: Regional contacts for oxygen funding:** AFRO https://www.worldbank.org/en/region/afr/contacts; LA&C: https://www.worldbank.org/en/region/lac/contacts; South Asia: https://www.worldbank.org/en/region/sar/contacts; East Asia & Pacific: https://www.worldbank.org/en/region/eap/contacts; Europe and Central Asia: https://www.worldbank.org/en/region/eca/contacts
    c. Philips Foundation: https://www.philips-foundation.com/
    d. GE Healthcare: https://www.gehealthcare.com/corporate/covid-19

4. **Global Medical Gas Suppliers** https://www.gasworld.com/

5. **Every Breath Counts (EBC) Coalition** https://stoppneumonia.org/about-us/
    a. Every Breath Counts PSA "Fix List": https://docs.google.com/spreadsheets/d/1JiwNxJrJBimYkibu6joPU-TnzMmqE41c2XDjgDipSyw/edit#gid=0

6. **ACT-A Oxygen Emergency Task Force**
    a. WHO and the Task Force: https://www.who.int/news/item/25-02-2021-covid-19-oxygen-emergency-impacting-more-than-half-a-million-people-in-low--and-middle-income-countries-every-day-as-demand-surges
    b. UNITAID Resolution: https://unitaid.org/assets/R5_2021-e_Oxygen-Emergency-Support.pdf
    c. Lancet re Oxygen Crisis: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)00561-4/fulltext
    d. https://unitaid.org/news-blog/covid-19-oxygen-emergency-impacting-more-than-half-a-million-people-in-low-and-middle-income-countries-every-day-as-demand-surges/#en

7. **PATH** https://www.path.org/
    a. Oxygen Needs Tracker - https://www.path.org/programs/market-dynamics/covid-19-oxygen-needs-tracker/#:~:text=An%20interactive%20tool%20to%20help,%2Dincome%20countries%20(LMICs
    b. Access to Oxygen Resource Library - https://a2o2resources.org/ & Access to Oxygen ($A2O_2$) Resource Library. A joint effort between the COVID-19 Respiratory Care Response Coordination and the Tools for Integrated Management of Childhood Illness (TIMCI) projects, the library provides a central place to host global and country-specific tools, guidance, data, publications, policies, protocols, and advocacy resources related to oxygen delivery systems and oxygen scale-up.
    c. https://path.azureedge.net/media/documents/2021.02.10_Zambia_Oxygen_Summit_Report_Final.pdf

8. **Clinton Health Access Initiative** (CHAI)
    a. Oxygen Program approach: https://www.clintonhealthaccess.org/our-programs/oxygen/
    b. March 11 Global webinar: https://www.clintonhealthaccess.org/webinar-investing-in-oxygen/
    c. CHAI, PATH, Unitaid seek quotes to procure and supply oxygen equipment to 5 countries: https://www.clintonhealthaccess.org/chai-path-unitaid-seek-quotes-to-procure-and-supply-oxygen-equipment-to-5-countries/

9. **Build Health International** (BHI)
    a. BHI Oxygen Solution OxBox: https://www.buildhealthinternational.org/project/the-oxbox/#:~:text=BHI's%20solution%20is%20the%20Oxbox,ongoing%20primary%20and%20secondary%20care.
    b. BHI COVID-19 Response: https://www.buildhealthinternational.org/covid-response/

10. **Partners in Health** https://www.pih.org/
    a. COVID-19 Response: https://www.pih.org/coronavirus-response
    b. Clinical Management of COVID-19: https://www.pih.org/sites/default/files/PIH_Guide_COVID_Part_II_Clinical_Management_4_21.pdf
    c. COVID Clinical Protocols https://covidprotocols.org/en/

11. **Assist International**
    a. Oxygen training resources: https://www.stanesglobal.com/course?courseid=biomedical-equipment-technician-training & https://www.stanesglobal.com/course?courseid=oxygen-therapy-in-children-and-adults&msg=not-logged-in

12. **OpenO2**
    a. OpenO2 is an initiative inside the Global Health Informatics Institute (https://www.ghii.org). Gerry Douglas is the Board Chair for GHII, and the day-to-day operation of GHII is done by the Malawian Director, Dr. Timothy Mtonga. https://www.openo2.org/home
    b. The team: Gerry Douglas, PhD - https://www.openo2.org/meet-the-team. Timothy Mtonga, PhD https://www.linkedin.com/in/timothy-mtonga-67158453/ and Grycian Massa - https://www.linkedin.com/in/grycian-m-massa-52050526/ see https://www.unicef.org/malawi/stories/kamuzu-central-hospital-gets-new-oxygen-plant-help-fight-covid-19

13. **DAK Foundation** www.dak.org.au
    a. Marnie Rickards, Trustee/Founder. DAK Foundation is a supporter of One Heart Worldwide (NGO) working in maternal health in Nepal. Also involved on the Health System cluster for COVID response.
    b. See the briefing on oxygen for AIDN (India/Nepal) here: https://www.youtube.com/watch?v=OXUGx23rOt8&t=361s start at 3m 45sec

14. **Other Faculty LinkedIn**
    a. Adriana Velazquez https://www.linkedin.com/in/adrianavelazquezberumen/
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    d. Tom Judd https://www.linkedin.com/in/tom-judd-169a181/
    e. Robert Matiru https://www.linkedin.com/in/robert-matiru-38a403/
    f. Ed Whiting https://www.linkedin.com/in/ed-whiting-81aa4639/
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    o. Ebrima Nyassi https://www.linkedin.com/in/ebrima-nyassi-b87b3625/
        i. Articles re Ebrima's team's work: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7698571/ & https://pubmed.ncbi.nlm.nih.gov/27393551/ & https://drive.google.com/file/d/15Ey_QOQnsa9dHB8PK5dy9EYcCLEaKNDp/view
    p. Francine Umutesi https://www.linkedin.com/in/francine-umutesi-bmeng-78209844/ & https://www.rbc.gov.rw/index.php?id=188
    q. Steve Mtewa https://www.linkedin.com/in/steve-mtewa-09143339/
    r. Sheillah Bagayana (Uganda): https://www.linkedin.com/in/sheillah-bagayana-74a52970/ & https://freo2.org/freo2team-2020

15. **IFMBE CED-WHO 2020 webinars on Critical COVID-19 Equipment, PPE, and Oxygen, etc**.

English language

a. 1. Oxygen Systems
   COVID-19 Critical Topic Webinar hosted by WHO & IFMBE Clinical Engineering Division, with the participation of WHO and Ethiopia.
b. 2. Masks, Respirators, and Face Shields
   COVID-19 Critical Topic Webinar hosted by WHO & IFMBE Clinical Engineering Division, with the participation of WHO and Nigeria.
c. 3. CPAP-BiPAP
   COVID-19 Critical Topic Webinar hosted by WHO & IFMBE Clinical Engineering Division, with the participation of WHO, France and Benin.
d. 4. Pulse Oximetry
   COVID-19 Critical Topic Webinar hosted by WHO & IFMBE Clinical Engineering Division, with the participation of WHO and Rwanda.
e. 5. Mechanical Ventilators
   COVID-19 Critical Topic Webinar hosted by WHO & IFMBE Clinical Engineering Division, with the participation of WHO, Ireland and Rwanda.
f. 6. Season 1 Summary
   COVID-19 Critical Topic Webinar hosted by WHO & IFMBE Clinical Engineering Division, with the participation of WHO, UK, France, and USA.
g. 7. Decontamination-Disinfection of Critical COVID-19 Equipment, Health Workers, and Patients
h. 8. Global CE COVID-19 Day Webinar

French language WHO-HUMATEM-CED 2020 Webinars

i. 1 Les Systemes de Production d'Oxygene
j. 2 Creation et Organisation d'une unite COVID
k. 3 Oxygenation du patient: Les techniques de Ventilation non invasive (CPAP/BIPAP)
l. 4 Oxygenation du Patient: Les Techniques de Ventilation Invasive (ventilateurs)
m. 5 Surveillance de l'oxygenation du patient: (oxymetre de pouls)

16. **Oxygen General References**
    a. PSA vs VSA plant differences: https://www.trimechindia.com/blog/oxygen-plants-whats-difference-psa-vpsa-oxygen-plant/
    b. Malawi recommended Tee and Y connectors: https://www.amazon.com/MacCan-Pneumatic-Connectors-Connect-Fittings/dp/B0923YFS17/ref=sr_1_2_sspa
    c. Solar-powered oxygen: https://adc.bmj.com/content/106/3/224 & https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30095-6/fulltext
    d. Dr. Yadin David: Global Clinical Engineering Alliance (GCEA) www.GlobalCEA.org is working outsourcing a portal for resourcing spare parts and manuals etc to support equipment servicing.
    e. **Leith Greenslade**: Results of this 3,077 patient, 64 hospital, 10 African country study just published in Lancet very relevant to the issues raised in our webinars:
        a. https://www.thelancet.com/action/showPdf?pii=S0140-6736%2821%2900441-4
        b. Denise Grady's article in NY Times good summary: https://www.nytimes.com/2021/05/20/health/severe-covid-africa-lancet.html?smid=tw-share
        c. She notes, "For Africa as a whole, the death rate among severely ill Covid patients may be even higher than it was in the study, the researchers said, because much of their information came from relatively well-equipped hospitals, and 36 percent of those facilities were in South Africa and Egypt, which have better resources than many other African countries. In addition, the patients in the study, with an average age of 56, were younger than many other critically ill Covid patients, indicating that death rates outside the study could be higher."