Situation

Three AIMBE Fellows created and lead an extensive global COVID-19 (C19) information and training program. The global Coronavirus pandemic (C19) is a crisis that demands agile worldwide response, not only by countries and their health systems, but also by most individuals on the planet. This has been a time of incredible suffering, of new challenges, and also unprecedented opportunity for the clinical engineering (CE)/health technology (HT) global community to come together and share experiences - as well as learned and improvised best practices - for medical device management and related tools used to address the prevention, diagnosis, and treatment of C19. CED provides this information at no charge to its global network of over 15,000 CE/HT colleagues.

Background

In response to this crisis and the World Health Organization (WHO’s) request in March 2020, three AIMBE Fellows launched a program of free global webinars and information tools sharing clinical engineering (CE) learnings related to the COVID19 pandemic. COVID-19 continues to be a rapidly changing situation presenting new challenges to CEs on the front lines all over the world. These events and the need to implement a CE knowledge network - that can quickly respond to and guide implementation of practical solutions - has been driven by conversations with CED, WHO, and international colleagues. The network and its platform has facilitated both immediate communication via texts as well as planned training sessions via video conferencing like Zoom. The international community continues to search for practical solutions during these times to assist decision makers in their various health systems. CED’s knowledge network includes at least five components/channels that contribute to each other, see Table 1.

1. Monthly WHO-CE/D global webinars (WB) on Critical COVID19 topic (ventilators, CPAP, pulse oximeters, oxygen, PPE, disinfection), in April https://ced.ifmbe.org/blog/covid19day-2020.html, to July (https://ced.ifmbe.org/blog/who-ced-covid19-townhalls.html), attended by over 100 countries. These global Townhalls (TH) have also assisted and encouraged many similar country or regional level events. Table 2 illustrates the key Townhall CE-related discussion issues, and Table 3 shows the program for the July 16 latest WHO-CED Townhall, and Table 4 a regional C19 program.
   o CED’s other monthly Unique CE Competency 2020 Webinars have also begun to take on relevant COVID19 stories as applications, eg, See CE Innovation (India, Mexico, South Africa re C19 Ventilator) Webinar - http://www.youtube.com/playlist?list=PLhnffEvoohI1sX1ykRqjpkMe6rSwqX_F9
   o All Webinars persist online for broad global training, and are supplemented with new, updated information as conditions change.

2. Monthly WHO Medical Devices Newsletter – e.g., July 2020: https://ced.ifmbe.org/blog/who-newsletter-jul-2020.html; WHO has connected CED to WHO’s many NGO/funding partners, eg, Every Breath Counts-EBC Coalition with World Bank, Gates Foundation, etc. Typically, WHO & CED have had weekly updates during this time, allowing us responsive to one another in timely fashion. Distributed to over 15,000 global CE/HT leaders.

3. Weekday daily CED Hacking COVID19 eNewsletter and Blog, and the CED COVID19 Resource page - https://ced.ifmbe.org/blog/covid19-resources.html; begun in March 2020., Hacking COVID19 is sent daily to over 6,000 global subscribers (Engineers, MoHs, WHO, etc), and just published its 80th edition. It provides timely relevant COVID19 CE information and is also posted daily via Social Media outlets (FaceBook, Twitter, LinkedIn, Instagram, YouTube) segmented into WHO Medical Device Unit’s recommended categories. Examples: General Information; CE at Forefront; AAMI, ECRI, FDA, CDC, NLM, NIH, and corresponding international resources; Tools & Resources for COVID19 Strategies; Medical Equipment for Clinical Management; Telehealth; PPE, Laboratory Tests; Innovation; Executives (C-Suite), etc. Over 400 of these citations are included on the Resource page, as well as access to past Hacking COVID19 daily newsletters.

4. Daily COVID-19 Expert Q&A and problem-solving on a global CED WhatsApp group, begun in 2019, but rapidly scaled up since February 2020 to now include 130 subscribers from nearly 50 countries. Typically, CED limits country individuals so they in turn can represent and pass on relevant information to other local networks in their country or Region, eg, Brazilian colleagues who pass this info in their own WhatsApp group or the subscriber from Cameroon with a French-speaking WhatsApp group across the African Region.

5. Monthly CED Board & Collaborator (B&C) meetings with a WHO COVID19 focus since March. Challenges, ideas, and innovations are shared, volunteer experts identified, and upcoming requirements are discussed and plans made. See B&C members at https://ced.ifmbe.org/about-us/who-we-are.html.

Assessment

Here is a sample of high-level COVID19 (C19) issues and solutions raised through the CE Network, Table 1:

<table>
<thead>
<tr>
<th>Channel</th>
<th>Global CE WhatsApp</th>
<th>Hacking Blog</th>
<th>CED B&amp;C</th>
<th>WHO-CE/D</th>
<th>WHO</th>
</tr>
</thead>
<tbody>
<tr>
<td>March</td>
<td>Forecasting critical C19 equipment, accessories, &amp; ICU beds needed</td>
<td>Established reliable C19 info on variety of CE-relevant sources</td>
<td>Identified global needs &amp; volunteer CE experts</td>
<td>Began enhanced partnership through regular B&amp;C and weekly updates</td>
<td>Identifying latest guidelines</td>
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<tr>
<td>April</td>
<td>Oxygen delivery and C19 Decontamination (Decon) issues</td>
<td>Identified global CE C19 educational programs &amp; websites</td>
<td>Initiated with Adriana to have May C19 THs</td>
<td>Global C19 CE Day: CE in 10 countries share Lessons learned; <a href="https://ced.ifmbe.org/blog/co-/covid19day-2020.html">https://ced.ifmbe.org/blog/co-/covid19day-2020.html</a></td>
<td>CED joins EBC with WHO; assists C19 emergency facility planning</td>
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<tr>
<td>May</td>
<td>Shared access to recent and upcoming country C19 WBs</td>
<td>Daily examples with photos as global CEs addressed C19</td>
<td>Six THs doubles CED global contact countries</td>
<td>Townhalls: Oxygen, PPE, CPAP, Pulse Oximetry, Ventilators: 97 countries</td>
<td>Initiate global C19 device inventory</td>
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<td>June</td>
<td>Gives voice to our Africa colleagues Q&amp;A as their C19 rates increased</td>
<td>Global CE C19 innovations in spotlight; LMICs hire new CEs</td>
<td>New TH: C19 Decon &amp; Disinf.: People, Assets</td>
<td>C19 generic training video prep., as CED provides 2 graduate interns to WHO</td>
<td>Global device inventory results</td>
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<tr>
<td>July</td>
<td>Dissemination of global articles for early warning re latest C19 science</td>
<td>Continue to promote CE profession &amp; our C19 response</td>
<td>Review impact of WHO-CE/D C19 partnership</td>
<td>7/15: CE C19 Innovation competency WB</td>
<td>Newest global C19 related guidelines</td>
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Table 2: WHO-CED May 2020 Critical Topics Townhall discussion items

1. Clinical requirements
2. Supply of necessary equipment & accessories, and operation/support
3. Availability of support/maintenance materials,
   a. eg, Operator and Service Manuals in correct language,
   b. Including related donation issues, language, accessories, etc.
4. Training for operation and support
5. Coordination of various Critical Topic activities at care delivery & national levels
6. Systems approach and safety management for all of the above

Table 3: July 16 WHO-CED Townhall: Decontamination-Disinfection of C19 Equipment-Accessories, Health Workers and Patients

https://ced.ifmbe.org/covid19/guruPrograms/16-covid19/16-covid19-townhalls-decontamination.html
170+ registrants, 40+ countries, 460 FaceBook views so far; presentations posted
Co-Moderators: Kathy Wayre – [link to LinkedIn] and Elliot Sloane, PhD, FAIMBE – [link to LinkedIn]

2. **Environment expert focus on surfaces** (assets & people), Ruth Carrico, PhD, RN (10 min); see [linkedin.com/in/drruthcarrico](https://linkedin.com/in/drruthcarrico) and [Infection Prevention Institute](https://infectionpreventioninstitute.org)
3. **Environment expert focus re airborne** (assets & people), Maureen Spencer, Med, BSN, RN, FAPIC (10 min); see [linkedin.com/in/maureenspencer](https://linkedin.com/in/maureenspencer) and [Infection Prevention Consultants](https://infectionpreventionconsultants.com)
4. **ECRI clinician perspective**, Andy Furman, MD, Executive Director for Clinical Excellence (10 min); see [https://www.ecri.org/covid-19-resources-clinical-care](https://www.ecri.org/covid-19-resources-clinical-care)
6. **LMIC Case Study (Brazil)** re Ventilators and Anesthesia Machines, Benedito Fernandes de Lima, Clinical Engineer, Albert Einstein Hospital, Sao Paolo, Brazil (10 min); see [linkedin.com/in/benedito-fernandes-de-lima-748aa8a3](https://linkedin.com/in/benedito-fernandes-de-lima-748aa8a3)
7. **Q&A** (whole audience, May Townhalls averaged 200 registrants from 60 countries each) – 30 min

Table 4: July 22 WHO-EMRO and MENA Countries C19 Challenges and Lessons Learned

- Oxygen delivery systems
- PPE
- CPAP/BiPAP
- Pulse Oximetry
- Ventilators

Recommendations

1. Rapid and significant changes require the field of Clinical Engineering to network and share knowledge more than ever before.
2. It is critically important that, in spite of challenges - eg, language - everyone is engaged. CED is very gratified to see so many responses/initiatives from so many global colleagues during C19.
3. The search for and use of guidelines for the management of health technology should be reviewed by appropriate expertise, and then uniformly adopted.
4. This is also the time to promote the Clinical Engineering profession and show the value of our contributions to Ministries of Health, other healthcare team members, and the public.
5. CED invites and encourages the global CE Community to propose additional initiatives to address the COVID19 crisis and to improve patient outcomes. **Together We Can Make It Better!**