Program

9:00 – 9:10 am (New York time)  
Brief Introduction: message from Adriana Velazquez (WHO), Tom Judd & Yadin David  
Listen at: https://www.youtube.com/watch?v=OEJkRMQHqYI

9:10 – 9:15 am  
Where can CEs find answers to key challenges? Hacking COVID19 and CED  
WhatsApp group deliberations  
Elliot Sloane

9:15 – 10:15 am  
1. Li Bin, China  
2. Umberto Nocco, Italy  
3. Jitendar Sharma, India  
4. Riad Farah, Lebanon  
5. Mladen Poluta (South Africa) & Ashenafi Hussein (Ethiopia), Africa  
6. Claudio Meirovich, Spain  
7. Roberto Ayala, Mexico  
8. Doug Dreps, USA  
9. Bruno Roma, Brazil

10:15 – 10:30 am  
Q&A from Participants plus closing comments from Facilitators & Adriana Velazquez (WHO)
Where can CEs find answers to key challenges? Hacking COVID19 & CED WhatsApp group deliberations

Elliot Sloane, PhD, CCE
ebsloane@gmail.com
Key Links Recommended

- Two weeks ago, CED started a week-day “Hacking Coronavirus” Daily Update; check it out
  - Subscribe: http://eepurl.com/gXOqlz
- CED also has a WhatsApp ongoing group, with about 100 participants from 60+ countries
  - https://web.whatsapp.com/
  - Send Tom and Kallirroi your mobile number to join.
  - https://ced.ifmbe.org/; https://ced.ifmbe.org/blog/covid19-resources.html

Key Links

- https://www.myesr.org/covid-19-resources; https://www.who.int/news-room/q-a-detail/q-a-coronaviruses;
- https://newyork.cbslocal.com/2020/04/03/coronavirus-sterilizing-n95-masks-long-island-nyc/;
- https://twitter.com/HackingCovid19;
- https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#!/bda7594740fd40299423467b48e9ecf6;
- https://www.linkedin.com/in/ebsloane/
Some ask where I source US/global info; here's a partial list of free Coronavirus COVID-19 resources

- https://jamanetwork.com/journals/jama/pages/coronavirus-alert;
- https://www.myesr.org/covid-19-resources;
- https://www.nature.com/search?q=Coronavirus+COVID-19+COVID;
- https://www.nejm.org/coronavirus;
- https://www.outlookindia.com/outlooksearch; (manually search for “coronavirus”, then for “covid”);
- https://www.raps.org/public-safety;
- https://www.rsna.org/covid-19;
Closing Thoughts

● Elliot: FYI, all, if you would like to see my frequent daily updates about the Coronavirus battle, please simply follow my two pages: www.linkedin.com/in/ebsloane and www.facebook.com/elliotsloane!

● You will get a notice of every update that I post at either site! YOUR input is welcome there, too! ALSO, please feel free to SHARE any post with others who may benefit.

● We are #oneworldcoronavirus #hackingcoronavirus #clinicalengineering #notgoingdownwithoutafight.

● The MAIN reason we are sending the weekday Hacking Coronavirus / COVID-19 update it to help you/us have a central resource of reputable information to reduce the information overload, AND to curate the many sources where information is available to you/us/me.

● Tom: As Elliot notes, many sites:
  ○ CED Covid Resource site: https://ced.ifmbe.org/blog/covid19-resources.html
What are the top three (3) lessons learned?

What are the top three (3) challenges you are facing?
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Practices of Shanghai Clinical Engineer in the fight against COVID-19

Libin
Shanghai 6th people’s hospital, shanghai China
2020.04.09
The PPE is an important measure to reduce hospital infection

This nosocomial infection of new coronary pneumonia is a concern, and personal protection is an important measure.

On January 24, Wuhan Union Hospital issued a notice seeking protection materials.
The important role of CE is to find the right PPE

### III. COVID-19 Related Personal Protection Management

<table>
<thead>
<tr>
<th>Protection Level</th>
<th>Protective Equipment</th>
<th>Scope of Application</th>
</tr>
</thead>
</table>
| **Level I protection** | • Disposable surgical cap  
                          • Disposable surgical mask  
                          • Work uniform  
                          • Disposable latex gloves or and disposable isolation clothing if necessary | • Pre-examination triage, general outpatient department |
| **Level II protection** | • Disposable surgical cap  
                          • Medical protective mask (N95)  
                          • Work uniform  
                          • Disposable medical protective uniform  
                          • Disposable latex gloves  
                          • Goggles | • Fever outpatient department  
                          • Isolation ward area (including isolated intensive ICU)  
                          • Non-respiratory specimen examination of suspected/confirmed patients  
                          • Imaging examination of suspected/confirmed patients  
                          • Cleaning of surgical instruments used with suspected/confirmed patients |
| **Level III protection** | • Disposable surgical cap  
                          • Medical protective mask (N95)  
                          • Work uniform  
                          • Disposable medical protective uniform  
                          • Disposable latex gloves  
                          • Full-face respiratory protective devices or powered air-purifying respirator | • When the staff performs operations such as tracheal intubation, tracheotomy, bronchoscopy, gastroenterological endoscope, etc., during which, the suspected/confirmed patients may spray or splash respiratory secretions or body fluids/blood  
                          • When the staff performs surgery and autopsy for confirmed/suspected patients  
                          • When the staff carries out NAT for COVID-19 |
CE needs to understand the performance of various PPE

**N95 mask**

Sealed, aerosol filtration rate ≥95%
The outermost layer prevents blood and body fluids from splashing

**KN95 mask**

Sealing, aerosol filtration rate ≥95%
No protection against blood and body fluid splashes

**Surgical mask**

Not sealed, aerosol filtration rate ≥ 30%
The outermost layer has protection against blood and body fluid splashes
Doctors and nurses who directly contact infected persons in the ICU and isolation wards need to use N95 mask
Strengthen the transformation of protective clothing into medical protective clothing in case of emergency

The zipper placket of the 600-type protective clothing and the splicing seams of various fabrics are sealed with adhesive strips, meeting the requirements of the national standard for filtering efficiency of disposable medical protective clothing,

The 400-type protective clothing is based on the fact that there is no glue strip sealing at the zipper placket and the splicing seams of various fabrics. The aerosol containing virus may infiltrate from the zipper and the splicing seams,
Strengthen the transformation of protective clothing into medical protective clothing in case of emergency.

Select suitable single-sided tape and 3M double-sided tape, ball and kettle as recommended materials. The zipper on the 400 type non adhesive protective clothing and each seam shall be sealed with adhesive tape, and the neckline sealing tape shall be added. And make operation video for training.

The reformed protective clothing was used in the isolation ward of fever clinic of 110 fever clinics in Shanghai.
The modified protective clothing was tested by Shanghai Medical Equipment Testing Institute in comparison with the technical standards of national protective clothing, and the filtration efficiency of five key parts and splicing joints was tested. The test results showed that the filtration efficiency of all sample suture sticking parts was more than 70%.
Construction of new fever outpatient isolation ward in 20 days

28 3mx6m containers were used to assemble the two-story building
New fever clinic observation ward is close to the original fever clinic. The first floor of the two-story building is equipped with special CT and DR examination rooms. The second floor is the fever patient isolation ward, which has 10 isolation rooms and 14 beds in total. It has become the standardized fever clinic isolation ward of “Shanghai version”, “registration, Laboratory examination, inspection, drug taking, treatment and isolation ward”
One week completed the installation of special CT and Dr with X-ray shielding machine room. Ge engineers and medical equipment personnel of our college fought day and night, and only spent two days to complete the installation and commissioning of CT and DR.
On the second floor, the perimeter of the isolation ward is the patient corridor.

The interior of the isolation ward on the second floor is designed as a doctor's corridor.
The isolation ward has independent doctor and patient access, and is divided into clean area, semi polluted area and polluted area.
The ward is equipped with independent fresh air system, independent air conditioning, independent bathroom, medical equipment belt, call system, access control system, WiFi, monitoring probe and other facilities, equipped with central patient monitor, ventilator, defibrillator and other first-aid equipment, so as to realize the long-range monitoring of patients staying. Each medical area is equipped with ultraviolet disinfection lamp.
All ward bedside, washroom, nurse station and doctor's office are equipped with convenient buttons to realize one button call and emergency alarm functions.

The ward is also equipped with a delivery cabin from which the patient's food and medicine will be delivered. The ultraviolet system in the delivery cabin is used for disinfection to avoid infection.
1、medical equipment configuration of fever clinic:

（一）基本诊疗检查设备。
听诊器、血压计、超声波身高体重秤、体温计（耳温计）、额温仪、一次性压舌板、一次性注射器、一次性输液器等。

（二）检验检查设备。
血液分析仪、C反应蛋白检测仪、尿液分析仪、移液器、显微镜、离心机、超净台（有条件区域配置全排生物安全柜）等。

（1）Basic diagnosis and treatment equip. Stethoscope, sphygmomanometer, ultrasonic height scale, thermometer (ear thermometer), forehead thermometer, disposable tongue depressor, disposable syringe, disposable infusion set, etc.

（2）Inspection and inspection equipment. Blood analyzer, C-reactive protein detector, urine analyzer, pipette, microscope, centrifuge, super clean platform (equipped with full row of biosafety cabinets in conditional areas), etc.
（三）影像检查类设备。
DR□,移动式X光机,
CT。16层及以上，优选人工智能诊断功能及隔室操作功能。

（四）生命支持类设备。
心电图机、监护仪、呼吸机、便携式超声。

（五）消毒设备。

（3）Image inspection equipment.
Dr., Mobile X-ray, CT. For 16 floors and above, with the artificial intelligence diagnosis function and compartment operation function are preferred.

（4）Life support devices.
Electrocardiograph, monitor, ventilator, portable ultrasound.

（5）Disinfection equipment.
Circulating air plasma air disinfector, mobile ultraviolet vehicle (ultraviolet lamp), mobile hand washing facilities, dry hand facilities and other sterilization and disinfection facilities.
（六）基本抢救器械。
开口器、气管插管、喉镜、气管切开包、吸引器、呼吸气囊、抢救车、供氧设备等，吸痰管、吸氧管和各种医用管道。

（七）防护用品。
医用防护服、隔离衣、医用防护口罩、医用口罩、医用外科口罩、护目镜、防护面屏、工作帽、防护鞋套、医用手套等。

（八）消毒用品。
快速手消液、84消毒液、75%酒精、氢过氧消毒巾、0.2%~0.5%过二氧乙酸和其他消毒剂。

（6）Basic rescue equipment.
Mouth opener, endotracheal intubation, laryngoscope, tracheotomy bag, aspirator, breathing air bag, rescue vehicle, oxygen supply equipment, etc., sputum suction pipe, oxygen suction pipe and various medical pipes.

（7）Protective equipment. Medical protective clothing, isolation clothing, medical protective mask, medical mask, medical surgical mask, goggles, protective screen, working cap, protective shoe cover, medical gloves, etc.

（8）Disinfection supplies. Quick hand disinfectant, 84 disinfectant, 75% alcohol, hydrogen peroxide disinfectant towel, 0.2% ~ 0.5% Peracetic Acid and other disinfectants.
2. Suggestions on medical equipment and facilities in isolation ward

（一）隔离病房设施。
1. 设备带。设有中心供氧、中心吸引、压缩空气、病人呼叫系统、对讲系统等。
2. 传递窗。医务人员通道与各病房间传递物品。
3. 信息系统。接入HIS、PACS等系统，远程会诊系统等。
4. 视频监控。
5. 门禁系统。各通道出入口管控。
6. 紫外线消毒灯。覆盖隔离病房和污染区和半污染区走道。

(1) Isolation ward facilities.
1. Equipment belt. Equipped with central oxygen supply, central suction, compressed air, patient call system, intercom system, etc.
2. Transfer window.
3. Information system. Access to his, PACS and other systems, remote consultation system, etc.
4. Video monitoring.
5. Access control system. Access control of each channel.
6. Ultraviolet disinfection lamp.
2、 Suggestions on medical equipment and facilities in isolation ward

（二）生命支持类设备。
配置中央监护系统、输液泵、注射泵、除颤仪、呼吸机、心肺复苏机等抢救设备。

（三）消毒灭菌设备。配置高压灭菌器、床单位消毒器、循环风等离子空气消毒机、移动式紫外线消毒车（紫外线灯）、感控消毒机器人

（2）Life support devices.
Equipped with central monitoring system, infusion pump, injection pump, defibrillator, ventilator, cardiopulmonary resuscitation machine and other rescue equipment.

（3）Sterilization equipment.
Equipped with high-pressure sterilizer, bed unit sterilizer, circulating air plasma air sterilizer, mobile ultraviolet disinfection vehicle (ultraviolet lamp), sense control disinfection robot
Covid-19 Lessons learned

Umberto Nocco
Vice President of the Italian Clinical Engineers Association
Challenges we are facing

1. **Machine availability** plus space inside the hospitals (e.g., ICU beds). The need for ventilators, monitoring systems, beds and pumps is been huge and new beds had to be set up in no time. We had a very high percentage of patients who, after a first access in ER or other wards since they seemed similar to patients affected with pneumonia, in a short time ended up in ICU, requiring space and beds in no time. The need for more beds is related to the need to keep positive patients isolated. If you don’t have ICUs with boxes etc, one single infected patient will cause you to close the ICU to not infected patients. And at the beginning of the outbreak hospitals were still working on routine patients.

2. **Organizational issues.** We had to convert wards to host infected patients. This required a major rethinking of the ward distribution and the opportunity to discharge or move patient at risk, i.e. elderly patients. After this moving was over, the new ward had to be prepared with telemetry systems (or monitor connected to a central pc), CPAPS or easy-to-handle ventilators, pumps etc. Plus all the devices needed to protect clinicians.

3. **Device procurement.** This might be a typically Italian problem, due to the fact that we should acquire using bids (that usually require long time). This timing summed up to the actual availability of devices in such a big number. We experienced that only few producers have big stock, and even when we had guarantees by vendors, we ended up without the machines most of the times because they were diverted to other sites or markets.
Lessons learned

1. Need for contingency plans to be used inside the hospitals in case of outbreaks or similar events. These should describe different patient clinical needs and which assortment of devices, supplies and space (clinical setting) is required.

2. Best use and distribution of CE staff, in order to have a correct time to response + reducing risks for CE personnel.

3. Availability of backups for systems most likely to fail, eg, oxygen delivery.

4. Availability of protocols to access and use not certified devices in case you should acquire machines from “unsual” markets
Thank you for your attention

Umberto Nocco
umberto.nocco@asst-settelaghi.it
Dr. Jitendar Sharma, CEO, AMTZ, India

Minute 33 in YouTube: https://www.youtube.com/watch?v=OEJkRMQHqYI

In response to COVID19, India has:

- Created relevant equipment & supplies Standards and Specifications
  - Including Safety Standards for Ventilators, often not well understood

- Developed/distributed across India a list of relevant equipment experts who can help
  - Including current contact information
  - Using the India Biomedical Skill Consortium database (IBSC - https://ibsc-amtz.in/)

- AMTZ - https://amtz.in/
  - Rolling out rapid IVD Test Kits for COVID 19
  - With World Bank funding, and working with 6 Ventilator manufacturers, AMTZ beginning on-site assembly of 1000s daily in mid April
Riad Farah, Saint George Hospital UMC, Beirut Lebanon

Minute 37 in YouTube: https://www.youtube.com/watch?v=OEJkRMQHqYI

Lessons learned:
● Hospital leadership has had to adapt to a rapidly changing situation
● Importance of Emergency Preparedness and Training
● Just in time Hospital ‘Stock’ doesn’t work in time of crisis

Challenges:
● Need for a national plan, as one hospital cannot address all needs
● Need a national certification by WHO for designated COVID19 vendors
● Architectural readiness for the rapidly changing situation and needs
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10:15 – 10:30 am  
**Q&A** from Participants plus closing comments from Facilitators & Adriana Velazquez (WHO)
Global CE Covid Day

African Region (snapshot)

Ashenafi Hussein (Ethiopia)
Mladen Poluta (South Africa)
Outline

● **African Region**
  ○ IFMBE WGAA & Ethiopian perspectives: Challenges and Lessons - Ashenafi

● **South Africa**
  ○ Western Cape public sector perspective: Challenges and Lessons – Mladen
THREE CHALLENGES:

● Problems with health service delivery, including infrastructure, devices, consumables, supplies…

● Crowded living conditions of many of our people; lack of sanitation, etc. (a double-edge problem)

● Aligning and managing the response to the challenge: some countries lock down, some issue a state of emergency, yet there is insufficient food (added to the pre-existing poverty burden)
LESSONS LEARNED:

- We need to have emergency preparedness
- We need to have a good alerting system (screening, triage and testing) to identify how many people are infected; only a small number of people are tested
- We need to be able to access the right information
South Africa (Western Cape) - I

- **Challenge:** Shortage of medical devices
  - Ventilators, PPEs, …

- **Response:**
  - Intra-governmental and multi-sectoral collaboration
  - SA Emergency Ventilator Project (private sector); National Ventilator Project (public sector); 3-D printer network (respirators), …
  - Long-awaited stimulus for local manufacture?
South Africa (Western Cape) - II

- **Challenge**: Identification of Needs & Assessment of Capacity/Capability
  - Ventilation, PPEs, ICU Monitors, Beds…

- **Response**:
  - Recognise need for integrated planning of resources
  - Projection of resource needs relative to availability
  - *Oops!* : constraint for ventilation likely to be staff & medical gas supply, not ventilators
South Africa (Western Cape) - III

- **Challenge**: Implementing interventions appropriate to level of care
  - CPAP or not, In-Hospital (beds, equipment, staffing) vs Additional Acute (temporary facilities), Metro vs Rural...

- **Response**:
  - Struggle for stakeholder alignment at service level
  - Responsive leadership and alignment/shortage of skills
  - Clear and regular communication (teams of teams)

- **Lesson**: It takes a village!
We wish all our colleagues, counterparts, partners and stakeholders a successful

Global CE Covid-19 Day

Thank you for taking the time to share our story …. 

Ashenafi Hussein
IFMBE WGAA Chair

Mladen Poluta
IFMBE CED Board Member
COVID-19 PANDEMIA

Lessons Learned & Challenges

Claudio Isaías Meirovich Montrull
Identified Opportunities

Increased awareness of people on the importance of medical equipment/devices

Overwhelming interest to HELP manufacturing DYI devices

Opportunity for CE community to stand up and lead
Challenges

- Countries / Hospitals / People need equipment and consumables NOW

- They are/were not available. It is like a Tsunami.

- Our procurement systems and supply chains are not designed for this kind of need and they fail to deliver.

- The same way we have now preparedness for earthquakes and tsunamis we need to set up international pandemic preparedness protocols
1. Lessons learned:
   ● Lack of proper preparation for disasters in a healthcare setting.
   ● Poor coordination between health authorities and technical experts.
   ● Need of repositories for open source material on priority medical devices.

2. Challenges now facing:
   ● Indifference from Government and Ministry of Health on the role that an expert unit like CENETEC can offer.
   ● Lack of coordination between biomedical/clinical engineering community
   ● Lack of proper guidelines for validating open-source, low cost, home made ventilators.
What are the top three lessons learned?

- Having leadership quickly assemble to have one voice for our Health System, including new policies dealing the challenges daily has been very important.
- Feeding data to system command center to look at availability of ventilators, beds, patient monitors and other medical devices. Training nurses to triage repairs for COVID19 related medical equipment.
- Knowing what areas in our hospitals could be easily converted to negative pressure rooms.

What are the top three challenges you are facing?

- Realization that not only every state, but every country is trying to acquire COVID-19 testing, PPE, ventilators, supplies simultaneously. Most items are back ordered or not available.
- Keep up with the need to pop up new COVID patient ICU and Med Surg units as cases increase. Moving monitoring and coming up with new ways to deal with these units.
- Checking in the many ventilators we are receiving from colleges, veterinary clinics and others to get certified and put into our fleet.
GLOBAL CE COVID-19 DAY
April 9th

Brazilian Society of Clinical Engineering
Bruno Roma, bruno.roma@abeclin.org.br
## Learned Lessons

<table>
<thead>
<tr>
<th>Lesson</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>We may rethink about disposal of old/broken equipment, because it is faster to repair and return to use than purchase new equipment.</td>
<td>3</td>
</tr>
<tr>
<td>Keep stock of repair parts of critical equipment, as ventilators.</td>
<td>2</td>
</tr>
<tr>
<td>Review disinfection procedures on equipment, prevention and control for EC staff</td>
<td>2</td>
</tr>
<tr>
<td>Keep more critical accessories in stock.</td>
<td>1</td>
</tr>
<tr>
<td>Better suppliers to combat moments of crisis.</td>
<td>1</td>
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<tr>
<td>Keep more equipment in the hospital than the standards recommend.</td>
<td>1</td>
</tr>
</tbody>
</table>
### Challenges

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty in purchasing and leasing equipment because they are unavailable in the market.</td>
<td>4</td>
</tr>
<tr>
<td>Lead the team to maintain control so as not to let fear and anxiety take over the team.</td>
<td>2</td>
</tr>
<tr>
<td>Abusive prices of inputs and equipment.</td>
<td>1</td>
</tr>
<tr>
<td>Lack of contingency plan against health crises</td>
<td>1</td>
</tr>
<tr>
<td>The bureaucracy of the public health service did not allow the purchase of PPE and equipment.</td>
<td>1</td>
</tr>
<tr>
<td>Financial resources to implement policies against the crisis.</td>
<td>1</td>
</tr>
<tr>
<td>Lack of a sense of urgency among decision makers has delayed important steps in the process.</td>
<td>1</td>
</tr>
</tbody>
</table>
Old ventilator and monitors being repaired to open new Intensive care units.
Questions & Answers

Q&A from participants
Appendices

Other Submissions from global colleagues

- Bangladesh (2)
- Brazil (2nd)
- Colombia (2)
- Lebanon (2nd)
- Peru
- USA (2nd)
Bangladesh: Anwar Hossain & Major Md. Ashrafuzzaman

Lessons Learned

- Provided online training to staff related to ICU equipment to ensure safe and efficient operation.
- Posted CE guidelines in Bangla and video
- Inability to understand, predict and examine the forthcoming scenario by the health care decision maker arises due to covid-19 like pandemic diseases, which creates possible disaster and loss of population that will cost the nation.
- Immediate decision to set up isolation unit and declaration of lock down could have played an important role to control the current covid-19 situation in Bangladesh.
- Late in device design and manufacturing facility development and lack of proper training to health care employees and CE practitioners made the situation difficult to handle the covid-19 situation

Challenges

- Facing shortage of trained CE human resources.
- Limited scope for CEs due to country perspectives and still we could not overcome the barrier.
- Device design and local manufacturing process are in struggle with prolonged condition, which is considered as critical failure that happened only for absence of medical device specialists (certified BME/CEs)
- Nationwide experts network in the health care sector yet to developed which is considered as the major constraint to set up temporary small to large ICU/CCU/isolation facilities to provide immediate support for covid—19 patients.
- Medical device manufacturers are not capable enough to cope up with fast changing medical industries, which is threatening the current treatment facilities to be required for swift recovery of covid-19 pandemic in Bangladesh
Brazil: Lucio Flavio Brito, Professor & CE Director

Lessons Learned:
● The importance of having friends prepared to respond to a disaster. It is important to help colleagues to react in the best way; good communication skills can fill deficit of reliable info that helps those most in need to make decisions effectively.
● The themes of CE focused on the control of nosocomial infections are extremely important and that, it is little practiced in my country in real terms. It is, therefore, an area to explore, with a great chance of success. I believe it will awaken, in some of the youngest, a taste for the paths that lead beyond routine, daily work.
● Despite everything, I am confident. In my country we have been working with infectious diseases since the death of one of our presidents. From then on, both infection control and tropical and traveler medicine gained more visibility, resources and stakeholders. We have dealt with AIDS and tuberculosis for many years and have had positive results in combating them. TB, whose transmission is, in a way, similar to the covid-19, taught us a lot how to fight them. There are really few of our colleagues working in this area. I discovered that we need to move forward and that the time is now, with speed.

Challenges:
● It is a challenge to work in the best way to group people from cities, states and countries, from different associations, organizations. Finding more prepared groups of people where CE can contribute and make a difference and play their part. …
● Acting to awaken people’s notion of attitude, seems to be one of the great interesting challenges to think about and put into practice. To help, both young beginners and old guard practitioners, to practice the motto, "together we can do it better".
● Transform seemingly difficult “things” into “things” that are easy to understand and practice. When many people want to help, unprepared, the result may not be the best possible. …The problem seems to be: how to make CE a practical thing for this moment? Something that ordinary people can see as well. See and perceive, through our attitudes, how we can and how we help. Despite the disaster that few of us can see, awaken the notion now, of preparing for future disasters, whatever they may be.
Colombia: Beatriz Galeano & Nelson J Escobar Mora

Lessons Learned:

● It was possible to understand the importance of technology as a means of support to save lives, thus such as the role of the Engineer in health care.
● In addition to the solidarity and teamwork carried out by the different countries and institutions to be able to share information and knowledge at the service of better care of patients and healthcare personnel worldwide.

Last but not least, self-care and how to teach prevention to all those interested as a tool to reduce or fight the spread of disease.

Challenges

● Integration of the technological tools known or worked on in our work as teachers and researchers and that we use in daily tasks at the service of this emergency.
● The development of a technology that will allow isolation in treatment areas by COVID19 using commonly used materials.
● Serve as mediators or coordinators between the different actors (university-Company-state) to be able to develop projects that help improve the attention of COVID19.
Lebanon: Bassam Tabshouri, American University of Beirut Medical Center

Lessons Learned

● Monitor daily more than once what is going on internationally and locally and adjust your plans and safety measures
● Get out of the box and innovate both the way you do your work and new methods, systems, and products to cover the shortage
● Share your info, knowledge and expertise within and outside your institution

Challenges

● **Availability of consumables and parts.** Some international companies are refusing / delaying the supply of kits for equipment (non-ventilators). According to one local dealer, a company suggested shipping back to it some used equipment!!!
● **Developing adequate plans to reshuffle monitors, ventilators** and other resources when the need arises. Nobody knows the magnitude of what to expect.
● **Work/ life balance** while securing good bodily and mental health of the people you interact & live with
COVID-19: Peru report

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### Casos Acumulados de Confirmados y Fallecidos

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lessons learned

● Isolation, social distancing and early detection of positive cases and their contacts are essential. First two procedures are ongoing, the implementation of the third one doesn’t work as expected yet.
● Relevance of health technology, engineers and technicians in health. In addition, the value of management of information’s improvement.
● Networking: Government, MoH, NIH, EsSalud, private health organizations, Army Forces, Municipalities are members of “Covid-19 Command”. The objective is to articulate an effective national response to the pandemic.

1. Insufficient number of respiratory ventilators available, public hospitals with problems of infrastructure, lack of human resources available, etc., determined MoH’s implementation of a Covid-19 program: 1st phase: ‘the hammer’ it will last several weeks, based on apply a rigid isolation program. 2nd phase: the ‘dance’ will continue on May, where the regions of Arequipa, Loreto; Lima, Cusco, etc: will show relapse cases of the disease.

2. Upcoming investments include: the construction of a hospital, improvement of selected hospitals in the country, acquisition and application of molecular-test and rapid-tests, and acquisition of PPE. 1 million 600 thousand Covid-19 rapid-tests were acquired, a first batch arrived on march 27.

3. The government and the army support: meals, water, re-location to safe places of vulnerable people, etc. among the country demands to avoid risks of contagion, panic, robbery or violence. Some issues were registered.

FINAL IDEAS

MoH of Peru reviews the application of hydroxychloroquine with azithromycin; also the donation of plasma from recovered patients to support covid-19 treatment is authorized. Peru will also participate in a WHO’s validation study of a treatment for covid-19. In this way the country will not only learn from others but also contributes with evidence.

USA: Wayne Morse, CE & business owner, Seattle WA

Lessons Learned
● **Ventilator companies** not allowing the biomedical professionals the tools to calibrate and maintain devices. They are very concerned about our skill levels.
● **Business before healthcare.** USA has invested in startup companies that were then bought by a large medical device manufacturer who closes down the project.
● **Lack of our voice.**

Challenges
● **Machine availability** to purchase and supplies for the devices.
● **Tools.** Lack of resources to support our clinical staff on making the right decisions about technology
● **Not in investing in preventive maintenance when devices are in storage.** Individual states fail in assuring their stockpile of devices are properly maintained while in storage.
IFMBE Clinical Engineering Division (CED)

Thank you!

Together ...

... We Can Make It Better ... Everywhere

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