

Keeping our Healthcare Workers Safe—Ebola and COVID-19

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Introduction: Over the past decade, the world has wrestled with two major pandemics: Ebola and COVID-19. While Ebola revealed that we needed a strategy, Covid-19 showed we still didn't have one. Apart from ensuring that we isolate and contain the virus, one of the major concerns in responding to a pandemic is limiting transmission to healthcare personnel.

Method: This presentation describes a clinician's experience with employing the same infection control strategies used for Ebola in a makeshift Ebola Treatment Unit in a school in Sierra Leone and at a COVID-19 alternate care facility built in a convention center in the US.

Results: Transmission control strategies used for healthcare workers during Ebola were also successful for COVID-19. Both facilities, despite grossly different access to financial resources, ensured all clinicians didn't break protocol of safety, due to rigorous donning and doffing entrances and exits, internalized individual risk, separated spaces with tape, and zoned areas.

Conclusion: Two facilities with access to vastly different resources to treat two distinct infectious diseases used the same infection control measures for staff with success. Highlighting the priority of internalization of risk by healthcare workers alongside critical infection control measures proves to be the most valuable resource over multi-million dollar facilities erected during COVID.

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Leadership Approach in a Complex Disease Outbreak Management: The Case of the Tenth Ebola Virus Disease Outbreak in the Democratic Republic of the Congo

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Introduction: The world's second largest Ebola virus disease outbreak in DRC (August 2018-June 2020) caused 3,481 cases in 29 health zones, 2,299 deaths and about 250,000 contacts traced. It occurred in densely populated vast areas, with insecurity, ongoing humanitarian crisis and community reluctance. Four hubs, sixteen sub-coordinations were set up with hundreds of experts to support local inexperienced health workers. Five health coordinators were deployed to lead more than 600 people at national and field level coordinations. This work aimed at reviewing coordinators' leadership styles using leadership theories. Recommendations were made for future complex health operations.

Method: The leadership styles of the five coordinators were reviewed retrospectively using different leadership theories. Three groups of theories: (1) Leader's traits, characteristics, and skills; (2) Leader's behaviors: behavioral, transformational, and situational; (3) Authentic and servant leadership.

Results: Analysis with the three groups of leadership theory highlighted that leaders had mixed leadership approaches.

1) Self-confident, calm, determined, extravert (one a bit shy), conscientious, motivators; Sociable and empathic while dealing with staffs affected by incidents; Few strong characters affecting interpersonal relations; Strong negotiation skills while dealing with local stakeholders; Experienced and knowledgeable in analyzing, making judgment and decisions.

2) A participative approach when supporting nationals and partners; Using transformational leadership when coaching national counterparts and mobilizing partners, Directive when teams were to comply with rules or act quickly.

3) Compassion; building trust, confidence and capacity; empowering and coaching.

Conclusion: The complex disease outbreak imposed a mixed leadership style. Leaders had specific traits and technical skills. Servant leadership style was often used to trigger participation and build capacity in support of national and international experts. Directive approaches were used to trigger urgent actions. Findings could help in selecting and training leaders for public health emergencies. It may require further empirical and operational research in emergency contexts.

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Towards the Next Pandemic—What Have We Learned? Insights of a Large Tertiary Care Hospital

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Introduction: The first cases of COVID-19 arrived in Israel in March 2020. In Israel, the first known cases were Israeli patients diagnosed with COVID-19 aboard the Diamond Princess which were repatriated.

Shortly later, additional cases were found in increasing numbers constituting the "first wave". The high number of patients put significant strain on Israeli hospitals. The initial wave was later followed by additional surges in the number of patients further straining the system. At the peak, hospitals with a total bed capacity of 800 had 135 covid-19 patients with 21 of them requiring ventilatory support.

Method: Daily and weekly multidisciplinary meetings were held and daily reports were composed. Following each wave, lessons learned and recommendations for improved preparedness were formulated. The following results and conclusion sections summarize some of the main insights and recommendations.

Results: The main challenges in Beilinson hospital during the "first wave" were a shortage of personal protective equipment (PPE) and how to best utilize the existing supplies, uncertainty regarding infectiveness, best management practices and uncertainty regarding the expected magnitude and duration of the pandemic. In retrospect, the major insights were the need for a flexible and divisible ED to safely care for changing loads of suspected and verified COVID-19 patients as well as



COVID-19 negative patients. Increasing the in-hospital stockpile of PPE as well as the regional and national stockpile and creating local production capacities. The importance of the daily multidisciplinary managerial meeting was to improve situational awareness and allow improved decision making. Staff briefing occurred on a daily basis and during times of high uncertainty at the beginning of every shift.

Conclusion: Performing structured and frequent debriefing and analysis to achieve clinical and operational insights is crucial for improved short-term performance as well as improving preparedness for future challenges.

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COVID, Co-Ventilation, and Cross-contamination

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Introduction: During the COVID-19 pandemic, consideration was given to co-ventilating multiple patients on a single ventilator. Prior work had shown that this procedure was possible by ventilating four adult-size sheep for twenty-four hours, and other groups had performed this maneuver during dire circumstances. However, no investigation had examined the safety regarding cross-contamination. The purpose of our studies was to investigate if an infection could spread between individuals who were being co-ventilated.

Method: Four sterile two-liter anesthesia bags were connected to a sterilized ventilator circuit to simulate the co-ventilated patients' "lungs." The circuit utilized Heat and Moisture Exchange filters and bacterial/viral filters, which were strategically inserted to prevent the transmission of infectious droplets. *Serratia marcescens* was inoculated into "lung" number one. The circuit was then run for 24 hours, after which each "lung" and three additional points in the circuit were cultured to see if *S. marcescens* had spread. These cultures were examined at 24 and 48 hours to assess for cross-contamination. This entire procedure was performed a total of four times.

Results: *S. marcescens* was not identified in lungs two, three, or four or the three additional sampling sites on the expiratory limb of the tubing at 24 and 48 hours in all four trials.

Conclusion: Cross-contamination between co-ventilated patients did not occur within 24 hours utilizing the described ventilator circuit configuration.

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The Vaccinodrome: How to Set up the Largest Mass Vaccination Center in Europe.

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Introduction: Covid-19 pandemic had a massive impact on the capabilities of the healthcare system. The development of the vaccines and the setup of the vaccination program of the general population required an important coordination and organizational work, from an already worn-out system.

The implementation of mass vaccination centers is known as the most efficient way of vaccinating rapidly and efficiently a large part of the population, but requires a non-negligible amount of resources. For Covid-19 vaccination, time sustainability was an important challenge to consider due to the time-span needed between boosters; unfortunately, most of the models presented up to 2020 are short duration systems.

A mass vaccination center (MVC) organizational model was proposed and staffed with only two health care workers on a daily basis, with a more than 10,000 shots a day capacity over a seven-month duration.

Method: The MVC was under the supervision of one medical coordinator, one nurse coordinator and one operational coordinator. Students (both in health and non-health studies) were the most important part of the human resources. Data concerning the population vaccinated, the number and the type of vaccines used were routinely recorded.

Results: From March 28 to October 20, 2021, 501,714 vaccines were administered at the MVC. A mean rate of 2951 ± 1804 doses was injected per day with a staff of 180 ± 95 persons working every day. The peak was reached with 10,095 injections in one day. The average time spent by a patient in the MVC was 43.2 ± 15 minutes. The average time to be vaccinated was 26 ± 13 minutes.

Conclusion: Provided with adequate supervision, an optimized organization and adequate training, the use of a student workforce allows for the implementation of a functional, efficient, and sustainable mass vaccination center.

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The Application of Information Technology in Preventing and Controlling COVID-19 Pandemic: A Bibliometric Study

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Introduction: Information Technology has been applied to respond to the coronavirus disease 2019 (COVID-19), which has attracted increasing attention. However, there is still no comprehensive bibliometrics study in the global publications on the application of Information Technology in COVID-19. This study aimed to investigate the current research status of Information Technology in preventing and controlling the COVID-19 pandemic.

Method: Relevant literature published between 2020 and 2022 was downloaded from Web of Science Core Collection (WoSCC) databases. Key search terms included COVID-19, big data, artificial intelligence, internet of things, cloud computing, etc. The data elements were as follows: year, countries/