



Short Commentary

Caring for Healthcare Professionals during COVID-19 Crisis: Integrating Simulation Training with Hospital System towards Actualizing Occupational Safety, Health and Well-being

Victor Kai-Lam Cheung^{1,2*}, Eric Hang-Kwong So¹, Avis Siu-Ha Leung¹ and Nam-Hung Chia¹

¹Multi-Disciplinary Simulation & Skills Centre (MDSSC), Queen Elizabeth Hospital, HKSAR, Hong Kong

²The Department of Neuroscience, Psychology & Behaviour, University of Leicester, UK

Keywords: COVID-19; Healthcare simulation; Occupational psychology; Resilience and well-being; System integration

Introduction

In January 30, 2020 the World Health Organization (WHO) declared the outbreak COVID-19 as a Public Health Emergency of International Concerns (PHEIC) to later, in March 11, 2020, declared it as a global pandemic, Hong Kong Special Administrative Region (HKSAR), a densely populated city where approximately 8-million people are residing, has been at high stake of large-scale spread in the serial waves of COVID-19 attacks. Lessons that healthcare workers (HCWs, roughly defined as “medical, nursing, and patient-care or operational staff in hospital”) learned from painful experience in the battle with Severe Acute Respiratory Syndrome (SARS) have

***Corresponding author:** Victor Kai-Lam Cheung, Multi-disciplinary Simulation and Skills Centre, F4, Queen Elizabeth Hospital, Hospital Authority, 30 Gascoigne Road, Kowloon, HKSAR, Hong Kong, E-mail: cheungklv.iop@gmail.com

Citation: Cheung VKL, So EHK, Leung ASH, Chia NH (2020) Caring for Healthcare Professionals during COVID-19 Crisis: Integrating Simulation Training with Hospital System towards Actualizing Occupational Safety, Health and Well-being. J Clin Immunol Immunother 6: 045.

Received: October 07, 2020; **Accepted:** October 15, 2020; **Published:** October 22, 2020

Copyright: © 2020 Cheung VKL, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

triggered excessive distress and fear of workplace infection, sequela of infection, and death [1]. Without considering alternative approach like herd immunity by natural infection, Queen Elizabeth Hospital (QEH), one of the major local public hospitals under the governance of Hospital Authority (HA), has been dedicated to providing all-rounded preventive measures to keep HCWs safe from harm in high risk areas, such as Accident & Emergency Department (AED), Intensive Care Unit (ICU), and Isolation and general wards.

In this short commentary, we would like to share with readers our reflection on how healthcare simulation training contributed to system integration and its translational effect on personal strengths as well as occupational well-being.

What is Healthcare Simulation Training?

Society for Simulation in Healthcare (SSiH) defined “Simulation training” as: i) the imitation or representation of one act or system by another; and ii) a bridge between traditional medical education and real-life clinical experience [2]. In healthcare setting, “simulation training” can serve as: i) an educational methodology, ii) an assessment tool for knowledge or skills acquisition, iii) a modality of hypothesis testing for how human factors, device on training, and conditions modified within training affect the effectiveness or any clinical outcomes, and iv) a system integration measure [3-6]. “Running on the fly”, an impromptu type of simulation training, is the least preferred approach during an outbreak [7]. When a “just-in-time” simulation-based infection control training for healthcare workers is being called for, comprehensive and systematic plan of curriculum and training objectives on which healthcare simulation and subject matter experts are involved in giving professional advice plant a seed for success. [6,8].

Integrating Healthcare Simulation with Hospital System

The COVID-19 outbreak triggered our defense mechanism, where infection control was identified by high management as the primary strategic direction. On the 23rd of September 2020, a multi-disciplinary taskforce against COVID-19 was established to unify and standardize hospital-wide practice and procedures to minimize cross-contamination hazard during high risk procedures, such as aerosol generating procedures (AGPs) and endotracheal intubation (Table 1). Through proactive discussion and post-trial modification (Figure 1), the taskforce finalized specific training objectives (e.g., Self-awareness of basic hazards, understanding of level of personal protective equipment (PPE) in performing AGPs, donning/doffing procedures of PPE; identification of clean and dirty zone; lapse in infection control with buddy system) and prioritized the training program for high risk departments (for details of curriculum and content of scenarios, please refer to Cheung et al.) [9].

Department/ Unit	Functionality in the COVID-19 Taskforce
High Management of Hospital Authority Head Office (HAHO)/	- Raise level of response for the region (Emergency response the highest) - Inform strategic direction for infection control measures of all hospital - Grant permission and provide managerial support to simulation training
Quality & Safety (Q&S)	- Initiate meeting to establish COVID-19 workforce
Infection Control Teams (ICTs)	- Maintain up-to-date infection control standards in line with internationally recognized professional guidelines (e.g. WHO, CDC)
Central Nursing Division (CND)	- Perform overall coordination and propose scenarios
Resuscitation Committee	- Formulate standard algorithms of aerosol generating procedures (AGPs)
Administrative Departments	- Be involved in brainstorming innovative approach to balance personal protective equipment consumption for training and for clinical use.
Clinical Departments	- Estimate training needs and release manpower for the training
Multi-disciplinary Simulation and Skills Centre (MDSSC)	- Contribute to intellectual inputs in converting conceptual ideas into feasible plan throughout the training and data management processes - Incorporate healthcare simulation training into hospital system for patient safety

Table 1: Composition of COVID-19 Taskforce.

Training Center where Personal Strengths of Healthcare Workers Blossom

Healthcare simulation training could bring prosperity to HCWs by i) refreshing knowledge in up-to-date hospital guideline and practical skills for participants and educators within or outside of their high-risk departments, and ii) facilitating the buy-in process of resilience and well-being in a professional manner [10]. As energy flows where attention goes, practical techniques, such as meditation and appreciative inquiries, could help HCWs embrace both positive and negative emotions with rational optimism to reach and maintain a serenity state of mind [11,12]. Through briefing and familiarization, simulation educators help participants suspend their disbelief on stimulated environment and mannequins for more immersive experience in scenario-based simulation. Debriefing session after the training allowed educators and participants to review their performance in line with learning objectives, reflecting on what they observe, think, feel, and learn during the scenarios on a here-and-now basis. Feedback from participants would be adopted to improve overall logistics or workflow of high-risk procedures, making the internal service guideline down to earth [4]. To mobilize the change towards system integration, our training center played a major role in handling human factors, system monitoring, psychometrics, and technical issues (Table 2).



Figure 1: Trial on Healthcare Simulation Scenarios with COVID-19 Taskforce.

Training Deliverables, Outcomes, and Sustainable Measures

Between February 5 and March 18, 2020, 1,415 HCWs in QEHL underwent our crash courses on either “in-situ” (at their own departments, real ward environment) or lab-based (at simulation center, simulated ward environment) mode. The training coverage for HCWs, who have worked or were working in isolation wards from Jan 25, 2020 to Aug 3, 2020, was over 80% (158/195). Of 749 nursing staff from the Department of Medicine or Surgery, 547 (73%) have completed the training. Strengthening infection control practice through the simulation training resulted in zero case fatality rate (CFR) and infection rate of HCWs via AGPs or other procedures handling confirmed and suspected cases of COVID-19 under Hospital Authority. Financial benefits have been reflected by cost-effectiveness analysis on costs unspent on medical treatment for infected staff, loss of manpower, and medical claims for malpractice in managing COVID-19 patients at organization level.

Role in System Integration	Specialized Training/ Rank	Function	
Human Factors	Center Directors	- Apply extensive experience in clinical practice, knowledge, and skills to develop scenario-based simulation with elements in crew resources management for patient safety climate	
	Consultant Anesthesiologist		
	Consultant Intensivist		
	Consultant Surgeon		
	Advanced Practice Nurse		
System Monitoring	Hospital Manager	Hospital administration and chain management	- Monitor process of system with training of leadership monitored the process of system - Serve as advisor in system monitoring, and as a communication hub with the high management
	Executive Officer	Health Services Management, lean six-sigma green-belt	
		Senior nursing manager from CND	
Psychometrics	Research & Training Officer	Industrial/ Organizational Psychologist in-training; Qualified assessor of British Psychological Society (BPS)	- Provide well-rounded support in service statistics, quality assessment, and data analysis and visualization for education and research purposes - Offer professional assistance on advanced statistical analytic methods/ organization-level clinical outcomes
		Statistical Officer from QEHL	
Technical Support	Senior Simulation Technician	Certified Healthcare Simulation Operations Specialist (CHSOS), Society for Simulation in Healthcare	- Provide technical support in operating simulation training
		Senior Technician	- Provide Information technology/ audio-visual support
		Executive Assistants	- maintain training and evaluation records

Table 2: Multi-disciplinary Simulation and Skills Centre’s Role, Specialized Training and Function in System Integration.

To maintain sustainability of infection control measures, a bi-directional feedback system keeps all stakeholders informed of the evaluation of training effect, clinical and operational outcomes, and sharing on subsequent strategic direction. For instance, a monitoring mechanism for staff proficiency records on regular basis, expansion of training scope from adult wards to pediatric wards, and videos of endotracheal intubation for suspected or confirmed case of COVID-19 circulated to all internal staff have been on the list of action plan or implemented already. Our seamless collaboration demonstrates the spirit of Gestalt principle: The whole is always greater than sum of its parts.

Translational Effect of Healthcare Simulation on Occupational Safety, Health Psychology and Well-being

Identifying the extent to which a simulation training program yields positive outcomes of personal strengths has high theoretical and practical values in the fight against COVID-19, and can be translational to clinical management of Aerosol-generating Procedures (AGPs) with other pathogens comparable to the SARS-CoV-2 [13,14]. One of our studies provided evidence that COVID-19 specific simulation training statistically significantly enhanced HCWs' level of assertiveness, mental preparedness, self-efficacy, internal locus of control, and internal locus of responsibility, and such improvement could lead to satisfactory clinical and organization outcomes [9].

Stress-induced syndromes are highly associated with infection rate of HCWs due to compromised immune system, and can be exacerbated by organizational and political issues, exposure to highly stressful situations, and poor team experiences [10]. As a result, our simulation training prevented HCWs from suffering occupational and moral distress, burnout, and infection for several reasons:

- i. Bi-directional feedback system with all-level communication and transparency throughout the COVID-19 workgroup development and implementation of simulation training reduced misunderstanding, reluctance to change, and potential political concerns at organization level timely.
- ii. Effective manpower management from high management and respective head of department and flexibility in mode of simulation training ("lab-based" for isolation and general wards; "in-situ" for staff from ICU and AED with high intensity of work) reduced excessive stress from extra time for training.
- iii. Inter professional simulation (IPS) enabled doctor, nurse, and supporting workers to strengthen core competencies of their own roles and understand functionalities of other disciplines under highly realistic controlled environment [7]. Situational awareness of the unexpected deterioration of patients under care, close-loop communication with teammates, assertiveness and mutual support in practicing doffing of PPE under buddy system and procedural guideline could be largely enhanced through IPS.

In a long term, strengthening resilience and well-being through simulation training may probably fulfill HCWs' needs of occupation health and safety, as well as transformation from work engagement to employee engagement reflected by positive change in vigor (enthusiastic, energetic and persistent despite setbacks), dedication (maintaining significant drive to goals), and absorption (concentrating

on tasks with positive emotions) [15]. Future scientific studies, such as addressing occupational aspects of HCWs to predict psychological well-being and patient safety climate using structural equation models, could be a silver lining of COVID-19 pandemic in a favorable light of contemporary lifestyle medicine and positive occupational health psychology.

Acknowledgements

We would like to express our heartfelt gratitude to the Hospital Authority Head Office (HAHO) and Queen Elizabeth Hospital (QEH) high management, QEH Quality & Safety (Q&S) Department, Infection Control Teams (ICTs), Central Nursing Division (CND), Resuscitation Committee, all administrative and clinical departments, as well as technical staff members from the Multi-disciplinary Simulation and Skills Centre (MDSSC) for their unflinching support throughout the healthcare simulation training.

References

1. Wong J, Cheung EPT, Cheung V, Cheung C, Chan M, et al. (2004) Psychological responses to the SARS outbreak in healthcare students in Hong Kong. *Med Teach* 26: 657-659.
2. [https://www.ssh.org/About-SSH/About-Simulation](https://www.ssh.org>About-SSH/About-Simulation)
3. Dieckmann P, Torgeisen K, Qvindelund SA, Thomas L, Bushell V, et al. (2020) The use of simulation to prepare and improve responses to infectious disease outbreaks like COVID-19: Practical tips and resources from Norway, Denmark, and the UK. *Adv Simul* 5: 3.
4. Abrahamson SD, Canzian S, Brunet F (2006) Using simulation for training and to change protocol during the outbreak of severe acute respiratory syndrome. *Crit Care* 10: R3.
5. Choi GYS, Wan WTP, Chan AKM, Tong SK, Poon ST, et al. (2020) Preparedness for COVID-19: In situ simulation to enhance infection control systems in the intensive care unit. *Br J Anaesth* 125: e236-e239.
6. Dubé M, Kaba A, Cronin T, Barnes S, Fuselli T, et al. (2020) COVID-19 pandemic preparation: Using simulation for systems-based learning to prepare the largest healthcare workforce and system in Canada. *Adv Simul (Lond)* 5: 22.
7. <https://www.ahrq.gov/patient-safety/resources/simulation/terms.html>
8. Tabatabai S (2020) Simulations and Virtual Learning Supporting Clinical Education During the COVID 19 Pandemic. *Adv Med Educ Pract* 11: 513-516.
9. Cheung VKL, So EHK, Ng GWY, So SS, Hung JLK, et al. (2020) Investigating effects of healthcare simulation on personal strengths and organizational impacts for healthcare workers during COVID-19 pandemic: A cross-sectional study. *Integr Med Res* 9: 100476.
10. Hancock J, Witter T, Comber S, et al. (2020) Understanding burnout and moral distress to build resilience: A qualitative study of an interprofessional intensive care unit team. *Can J Anaesth* 67: 1541-1548.
11. Wald HS (2020) Optimizing resilience and wellbeing for healthcare professions trainees and healthcare professionals during public health crises: Practical tips for an "integrative resilience" approach. *Med Teach*. 42: 744-755.
12. Lake J (2020) Locus of Control and COVID-19: The benefits of shifting our internal narrative in times of crisis. *Psychology Today*.
13. Li L, Lin M, Wang X, Bao P, Li Y (2020) Preparing and responding to 2019 novel coronavirus with simulation and technology-enhanced learning for healthcare professionals: Challenges and opportunities in China. *BMJ STEL* 2: 1-3.

14. Brazil V (2017) Translational simulation: Not “where?” but “why?” A functional view of in situ simulation. *Adv Simul (Lond)* 2: 20.
15. Andrianto H, Alsada Y (2019) The conceptual framework of employee: Engagement to vigor, dedication, and absorption. *Int J Soc Relevance& Concerns* 7: 11-14.



- Advances In Industrial Biotechnology | ISSN: 2639-5665
- Advances In Microbiology Research | ISSN: 2689-694X
- Archives Of Surgery And Surgical Education | ISSN: 2689-3126
- Archives Of Urology
- Archives Of Zoological Studies | ISSN: 2640-7779
- Current Trends Medical And Biological Engineering
- International Journal Of Case Reports And Therapeutic Studies | ISSN: 2689-310X
- Journal Of Addiction & Addictive Disorders | ISSN: 2578-7276
- Journal Of Agronomy & Agricultural Science | ISSN: 2689-8292
- Journal Of AIDS Clinical Research & STDs | ISSN: 2572-7370
- Journal Of Alcoholism Drug Abuse & Substance Dependence | ISSN: 2572-9594
- Journal Of Allergy Disorders & Therapy | ISSN: 2470-749X
- Journal Of Alternative Complementary & Integrative Medicine | ISSN: 2470-7562
- Journal Of Alzheimers & Neurodegenerative Diseases | ISSN: 2572-9608
- Journal Of Anesthesia & Clinical Care | ISSN: 2378-8879
- Journal Of Angiology & Vascular Surgery | ISSN: 2572-7397
- Journal Of Animal Research & Veterinary Science | ISSN: 2639-3751
- Journal Of Aquaculture & Fisheries | ISSN: 2576-5523
- Journal Of Atmospheric & Earth Sciences | ISSN: 2689-8780
- Journal Of Biotech Research & Biochemistry
- Journal Of Brain & Neuroscience Research
- Journal Of Cancer Biology & Treatment | ISSN: 2470-7546
- Journal Of Cardiology Study & Research | ISSN: 2640-768X
- Journal Of Cell Biology & Cell Metabolism | ISSN: 2381-1943
- Journal Of Clinical Dermatology & Therapy | ISSN: 2378-8771
- Journal Of Clinical Immunology & Immunotherapy | ISSN: 2378-8844
- Journal Of Clinical Studies & Medical Case Reports | ISSN: 2378-8801
- Journal Of Community Medicine & Public Health Care | ISSN: 2381-1978
- Journal Of Cytology & Tissue Biology | ISSN: 2378-9107
- Journal Of Dairy Research & Technology | ISSN: 2688-9315
- Journal Of Dentistry Oral Health & Cosmesis | ISSN: 2473-6783
- Journal Of Diabetes & Metabolic Disorders | ISSN: 2381-201X
- Journal Of Emergency Medicine Trauma & Surgical Care | ISSN: 2378-8798
- Journal Of Environmental Science Current Research | ISSN: 2643-5020
- Journal Of Food Science & Nutrition | ISSN: 2470-1076
- Journal Of Forensic Legal & Investigative Sciences | ISSN: 2473-733X
- Journal Of Gastroenterology & Hepatology Research | ISSN: 2574-2566
- Journal Of Genetics & Genomic Sciences | ISSN: 2574-2485
- Journal Of Gerontology & Geriatric Medicine | ISSN: 2381-8662
- Journal Of Hematology Blood Transfusion & Disorders | ISSN: 2572-2999
- Journal Of Hospice & Palliative Medical Care
- Journal Of Human Endocrinology | ISSN: 2572-9640
- Journal Of Infectious & Non Infectious Diseases | ISSN: 2381-8654
- Journal Of Internal Medicine & Primary Healthcare | ISSN: 2574-2493
- Journal Of Light & Laser Current Trends
- Journal Of Medicine Study & Research | ISSN: 2639-5657
- Journal Of Modern Chemical Sciences
- Journal Of Nanotechnology Nanomedicine & Nanobiotechnology | ISSN: 2381-2044
- Journal Of Neonatology & Clinical Pediatrics | ISSN: 2378-878X
- Journal Of Nephrology & Renal Therapy | ISSN: 2473-7313
- Journal Of Non Invasive Vascular Investigation | ISSN: 2572-7400
- Journal Of Nuclear Medicine Radiology & Radiation Therapy | ISSN: 2572-7419
- Journal Of Obesity & Weight Loss | ISSN: 2473-7372
- Journal Of Ophthalmology & Clinical Research | ISSN: 2378-8887
- Journal Of Orthopedic Research & Physiotherapy | ISSN: 2381-2052
- Journal Of Otolaryngology Head & Neck Surgery | ISSN: 2573-010X
- Journal Of Pathology Clinical & Medical Research
- Journal Of Pharmacology Pharmaceutics & Pharmacovigilance | ISSN: 2639-5649
- Journal Of Physical Medicine Rehabilitation & Disabilities | ISSN: 2381-8670
- Journal Of Plant Science Current Research | ISSN: 2639-3743
- Journal Of Practical & Professional Nursing | ISSN: 2639-5681
- Journal Of Protein Research & Bioinformatics
- Journal Of Psychiatry Depression & Anxiety | ISSN: 2573-0150
- Journal Of Pulmonary Medicine & Respiratory Research | ISSN: 2573-0177
- Journal Of Reproductive Medicine Gynaecology & Obstetrics | ISSN: 2574-2574
- Journal Of Stem Cells Research Development & Therapy | ISSN: 2381-2060
- Journal Of Surgery Current Trends & Innovations | ISSN: 2578-7284
- Journal Of Toxicology Current Research | ISSN: 2639-3735
- Journal Of Translational Science And Research
- Journal Of Vaccines Research & Vaccination | ISSN: 2573-0193
- Journal Of Virology & Antivirals
- Sports Medicine And Injury Care Journal | ISSN: 2689-8829
- Trends In Anatomy & Physiology | ISSN: 2640-7752

Submit Your Manuscript: <https://www.heraldopenaccess.us/submit-manuscript>