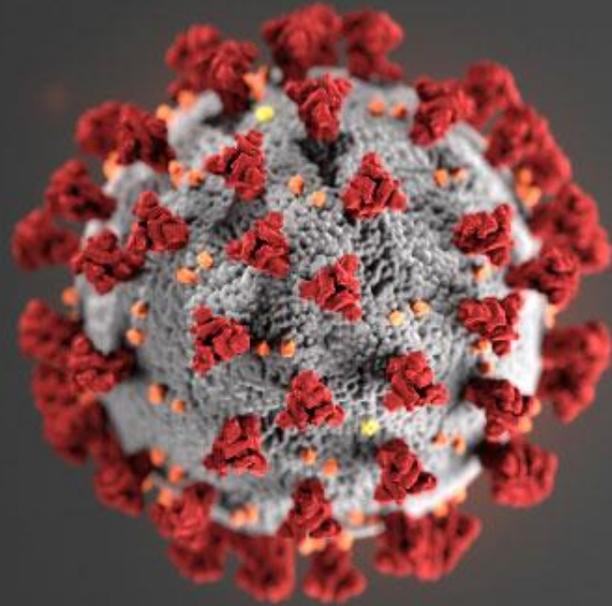# LOCAL EXPERIENCE OF USING SIMULATION TRAINING TO AUGMENT INFECTIOUS DISEASE PREPAREDNESS & INFECTION CONTROL PRACTICES

DR DANNY TONG

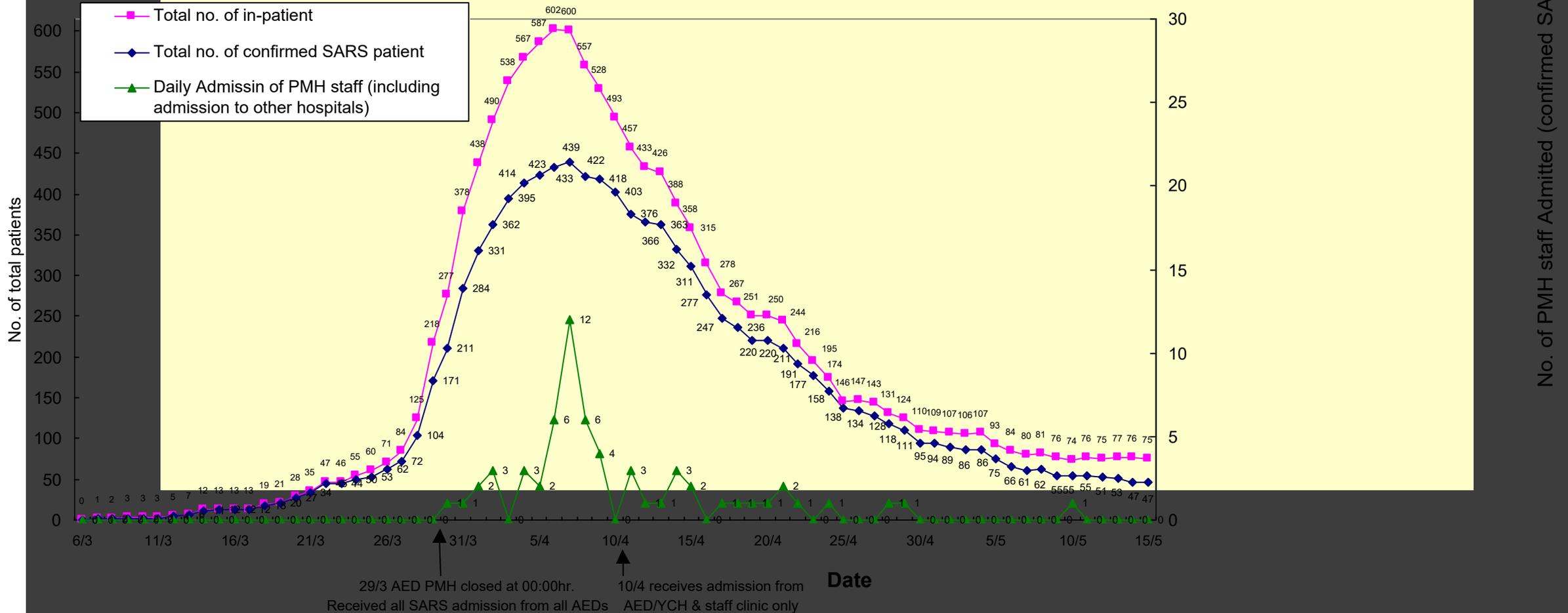**10 DECEMBER 2020**

Personal Sharing

SARS Saga at Princess Margaret Hospital

Admission of PMH staff (confirmed SARS) in relation to total no. of in-patients (suspected & confirmed SARS patients) from 6/3/03 to 15/5/03

James Lau Tai-kwan, 56
Private paediatric surgeon
Died on April 3

Lau Wing-kai, 38
Tuen Mun Hospital nurse
Died on April 26

Joanna Tse Yuen-man, 35
Tuen Mun Hospital doctor
Died on May 13

Tang Heung-may, 36
United Christian Hospital
health-care assisant
Died on May 15

Lau Kam-yung, 47
United Christian Hospital
health-care assistant
Died on May 27

Thomas Cheung Sik-hin, 58
Private doctor
Died on May 31

Wong Kang-tai, 58
Prince of Wales Hospital
ward attendant
Died on May 31

Kate Cheng Ha-yan, 30
Tai Po Hospital doctor
Died on June 1

Among the 6 Sacrificed HA Colleagues, RN Wing Kai was the 1st one to leave us…………

Death had never been so **NEAR** to me

4

LESSONS LEARNT

- SARS was the global occupational disease in the millennium with a high number of HCP-affected cases

  (Low & Silder-Smith, 2005)

- Over 1706 (21%) HCP-affected cases were reported to WHO at the end of SARS outbreak

  (WHO, 2004)

- Risk of infection in HCPs was related to:
  - Performing high risk procedure
  - Inappropriate or insufficient IC measures
  - Lack of IC training

  (Chan, Wong, Li, et al., 2004)
  (Low & Silder-Smith, 2005)
  (Ofner-Agostini, Gravel, McDonald, et al., 2006)
  (Reynolds, Anh, Thu, et al., 2006)
  (Shigayeva, Green, Raboud, et al., 2007)
  (Chen, Wang, Hsieh, et al., 2007)
  (Lai & Yu, 2010)
  (Koh & Sng, 2010)
  (Tran, Cimon, Severn, et al., 2012)

- Strongest predictor of SARS transmission from patients to HCPs was linked to aerosolization of secretions

  (Rabound, Shigayeve, McGeer, et al., 2010)
  (Tran, Cimon, Severn, et al., 2012)

Hospital Authority Infectious Disease Centre

Tertiary Referral Centre for infectious diseases in HK

First line defender

Surge capacity

Simulation Training in ID Management

INTERNATIONAL EXPERIENCES

US

Use of Simulation to Gauge Preparedness for Ebola at a Free-Standing Children's Hospital

Biddell, Elizabeth A. MD; Vandersall, Brian L. MBA; Bailes, Stephanie A. BS, RRT; Estephan, Stephanie A. BSN; Ferrara, Lori A. BSN; Nagy, Kristine M. BSN; O'Connell, Joyce L. BS; Patterson, Mary D. MD

Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare: April 2016 - Volume 11 - Issue 2 - p 94-99

West Africa

Health Worker Focused Distributed Simulation for Improving Capability of Health Systems in Liberia

Gale, Thomas C. E. BM, BS, MEd; Chatterjee, Arunangsu PhD; Mellor, Nicholas E. MSc; Allan, Richard J. MSc

Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare: April 2016 - Volume 11 - Issue 2 - p 75-81

Turkey

Developing a Simulation-Based Training Program for the Prehospital Professionals and Students on the Management of Middle East Respiratory Syndrome

Elcin, Melih MD, MSc, CHSE; Onan, Arif PhD; Odabasi, Orhan MD, MSc; Saylam, Melahat RN, PhD; Ilhan, Handan MD; Daylan Kockaya, Pinar MD; Gurcuoglu, Ilker MD; Uckuyu, Yavuz MD; Cengiz, Duygu MD; Nacar, Osman Arikan MD

Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare: December 2016 - Volume 11 - Issue 6 - p 394-403

瀝源**夫婦確診**
兩女同事弱陽性

三名**醫護**急救時
欠完整裝備**需隔離**

獨立媒體
inmediahk.net

05月31日(日) 21:12更新
17:12建立

他當時只有戴外科口罩

天水圍醫院有病人初步確診　曾於急救房接受急救

2020-08-24 HKT 22:45

天水圍醫院一名病人初步確診新型肺炎，3名醫護及1名支援人員需被隔離。（港台圖片）

天水圍醫院一名病人初步確診新型肺炎，她曾在一間急救房接受急救，3名醫護及1名支援人員需被隔離。病人現時情況危殆，在屯門醫院深切治療部留醫。

這名84歲女病人昨日傍晚因為氣促，由家人召喚救護車送往天水圍醫院，病人當時血液含氧量偏低，情況危急，需要受高濃度氧氣。醫護人員安排她進入一間正氣壓的急救房接受急救，一度插喉協助呼吸，她被轉送深切治療部後，初步化驗結果呈陽性。

4名急症室人員包括1名醫生、2名護士及1名病人服務助理，為病人進行高風險程序時，未有穿著合適的個人防護裝備，被界定為密切接觸者，需送往檢疫中心隔離14日；亦有5名曾與這名病人接觸的職員，需進行28日醫學監察，每日量體溫及留樣本檢測；另外沒有其他病人或職員逗留。

Skill
Knowledge

Visible Competencies
Easy to observe
and measure

Interpersonal Skills
Team player

Less Visible
Competencies
Less easy
to observe
and measure

Attitudes
Values
Achievement
Motivation
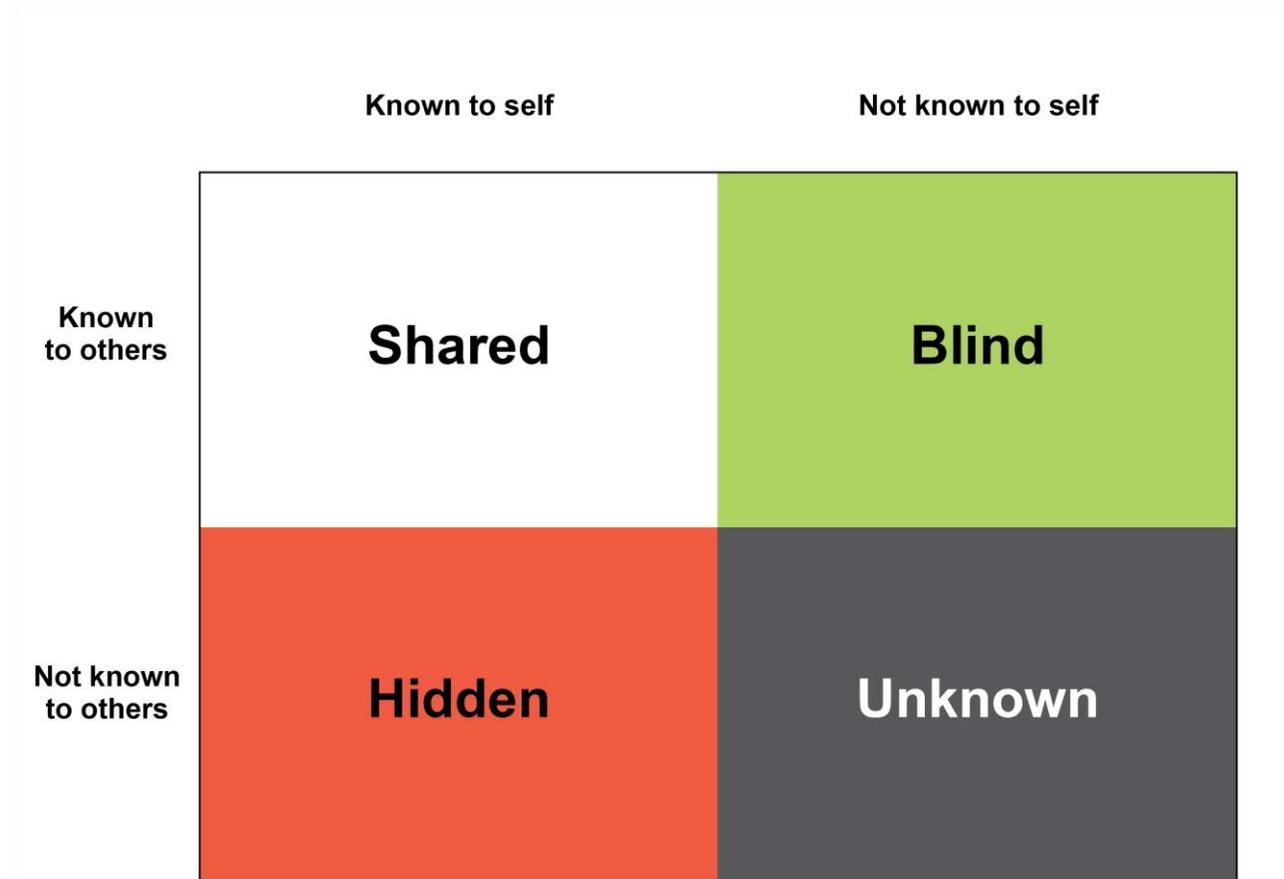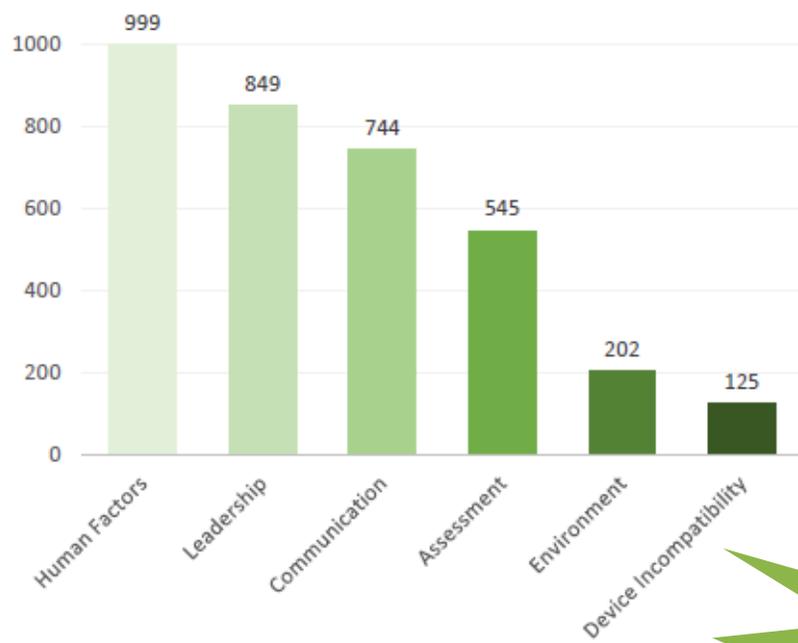
The Iceberg Model

THE JOHARI WINDOW

Developed by American psychologists Joseph Luft and Harry Ingham in 1955

'ROOT CAUSES' OF 'SENTINEL EVENTS'

- The Joint Commission (TJC) report of Sentinel Events

Figure 2. Most Frequent Root Causes of Sentinel Events 2004-2015

LEGEND: Human Factors, Leadership, Communication, Assessment, Physical Environment, Device Incompatibility

Human is to Err !

https://www.jointcommission.org/resources/patient-safety-topics/sentinel-event/sentinel-event-data-summary/

Table 1. Underlying Issues and Related JCI Hospital Standards

Underlying Contributing Issues	Related Standard(s) from the JCI 6th Edition Hospital Standards
Staffing levels and skill mix	SQE.2 (Leaders identify numbers/qualifications); SQE.6 – SQE.6.1 (Staffing strategy and ongoing review of strategy)
Staff orientation and in-service education	SQE.7 (Orientation to hospital, department/unit, specific responsibilities)
Competency assessment	SQE.3 – SQE.4 (Knowledge/skills consistent with patient needs) (Job descriptions specific to specialties)
Supervision	SQE.1.1 (Staff practicing within job description)
Other – Culture of Safety	GLD.13 – GLD.13.1 (Culture of Safety) Rushing/distraction, fatigue, complacency
Non-compliance with policies and procedures	GLD.2/GLD.3 (CEO and leadership ensure compliance with policies and procedures)
Organizational planning and culture	GLD.3 (Leadership defines mission, creates program/policies, develops staff structure re Mission)
Collaboration and integration of services	GLD.10 (Leaders integrates/coordinate services with other departments)
Performance improvements	GLD.5 (Leadership prioritizes hospital improvements) GLD.11 (Department/service leaders /identify improvements for their area)
Poor communication	IPSG.2.2 (Handover communication with/among physicians/other staff) PFR.2 – PFR.2.1 – PFR.2.2 (Communication with the patients and/or family)
Assessments for special populations	AOP.1.6 (Assessments for special populations meet patients' needs)
Care decisions based on assessments	AOP.4 (All Disciplines collaborate to analyze/ integrate patient assessments)
Clinical, laboratory, or radiology results	IPSG.2.1 (The hospital has a process for reporting critical results of diagnostic tests)
Emergency management	FMS.6 (Program for emergency management) PCI.8.1 – PCI.8.2 (Manage a sudden influx of patients with airborne infections/Response to global infections)
Fire Safety	FMS.7 – PCI.7.1 (Development/ implementation/testing of a fire/smoke safety program)
Availability of information	ACC.3 (Continuity of care and coordination of services) – ACC.4.4 (Outpatient profiles) ACC.3 – ACC.3.2 (The patient's record is available to practitioners and transferred with patient)
Medical records	MOI.10 – MOI.10.1 (Every patient has a standardized clinical record that contains sufficient information)
Data definitions	MOI.4 (Standardized abbreviations, codes, symbols, and definitions are used)
Information technology	COP.2.2 (Texting patient information) MOI.11.1.1 (Copy/paste and auto-complete) – MOI.14 (Planned and unplanned downtime)
Programs for medical equipment	FMS.8 – FMS.8.1 (Medical equipment program) FMS.11.2 ME#1 (Staff are trained to operate medical equipment) COP.3 (High risk patients and services/proper use of alarms)
Software design and other software/hardware problems	MOI.13 ME#1 (Participation in selection, implementation and evaluation of IT) MMU.5.1 (Computer software is current/updated)

HUMAN FACTORS

1. Rushing/Distraction
2. Fatigue
3. Complacency

■ If Erred : Accountability ➔ **Consequences ???**

• Human Error (a mix up)
• At risk behaviour (short cut)
• Reckless Behaviour (ignoring safety steps)

The Joint Commission (TJC) report of Sentinel Events

Sentinel Event Outcome 2005 through 2020Q2	#	%
Patient death	6550	48.7%
Permanent harm	225	1.7%
Permanent loss of function	886	6.6%
Severe temporary harm	1199	8.9%
Psychological impact	395	2.9%
Unexpected additional care	3332	24.8%
Unassigned**	47	0.3%
Unknown	5	0.0%
Other	818	6.1%
Total patients impacted***	13457	100.0%

NURSES' PERCEPTIONS ON EBOLA CARE IN THE US

- According to a qualitative analysis (Speroni, Seibert & Mallinson, 2015), the top 5 of the primary themes were:

Theme	No. of Comments (N = 3106)
1. Lack of preparedness/readiness	637 (20.5%)
• Lack of support by government, hospital/clinic, and/or administration/management	
• Lack of adequate resources	
• Lack of adequate guidelines	
• Financial constraints by hospitals	
• Waste management concerns	
• Staffing issues	
• Perceived low exposure risk; lack of readiness	
• Only select group at facility trained	
• Ancillary services not adequately trained	
• Ethics and practice committees needed	
• Lack of workplace safety	
• Lack of effective hospital screenings	
2. Need for training, education, and improved communications	504 (16.2%)
• Lack of knowledge	
• Education, training, and processes needed to ensure safe donning/doffing	
• Lack of effective communication regarding protocols and guidelines	
3. Fear of EVD transmission	477 (15.4%)
• Fear of EVD	
• Concern that EVD places healthcare providers at risk	
• Concern for spreading EVD to loved ones/other patients	
• Concern for contaminating self/dying	
• Concern for open US borders	
4. Lack of best practices regarding required PPE and infection prevention precautions	339 (10.9%)
• Lack of recommended PPE	
• Lack of effective infection prevention processes	
5. Lack of treating nurses with professionalism	214 (6.9%)
• Media disservice/political disservice as categorized by the media	
• Institution not standing behind nurses	

COVID-19

- Given the behavior of similar viruses such as severe acute respiratory syndrome (SARS, also known as SARS-CoV-1), Middle East respiratory syndrome (MERS) and the influenza viruses, there is a significant risk of airborne transmission with AGPs

(Centers for Disease Control and Prevention, 2020)
(Harding, Broom & Broom, 2020)

- HCWs were reported to comprise of:
  - 3.8% of confirmed cases in Wuhan in late February 2020
  - Nearly 10% of Italian cases in late March 2020

(Wang et al., 2020; Istituto Superiore di Sanita, 2020)

WHY USE SIMULATION?

- Simulation creating added Value in Education (Harvard Medical School, 2009)

- Education on Demand
  - Add in Risky Scenario

- Standardized Curriculum
  - Variation⬇
  - Response Time to HA Standards⬇
  - Facilitate hospital preparation and education of large numbers of healthcare professionals of various backgrounds

- Simulation "Debriefing" to critically analyze their own actions
  - Analysis of their Mistakes
  - Interactive & stimulating feedback / reflection led by experienced facilitator

(Miles, 2018)
(Dieckmann, Torgeirsen, Qvindesland, et al, 2020)
(Marrs et al, 2020)

WHY USE SIMULATION?

- Patient Safety: Practice without Risk
  - To patients, team members and oneself
  - Reduce cognitive load in staff
  - Allow the acquisition of clinical skills through deliberate practice rather than an apprentice style of learning
  - Allow practice unexpected situations
  - Early exposure and competence enhancement
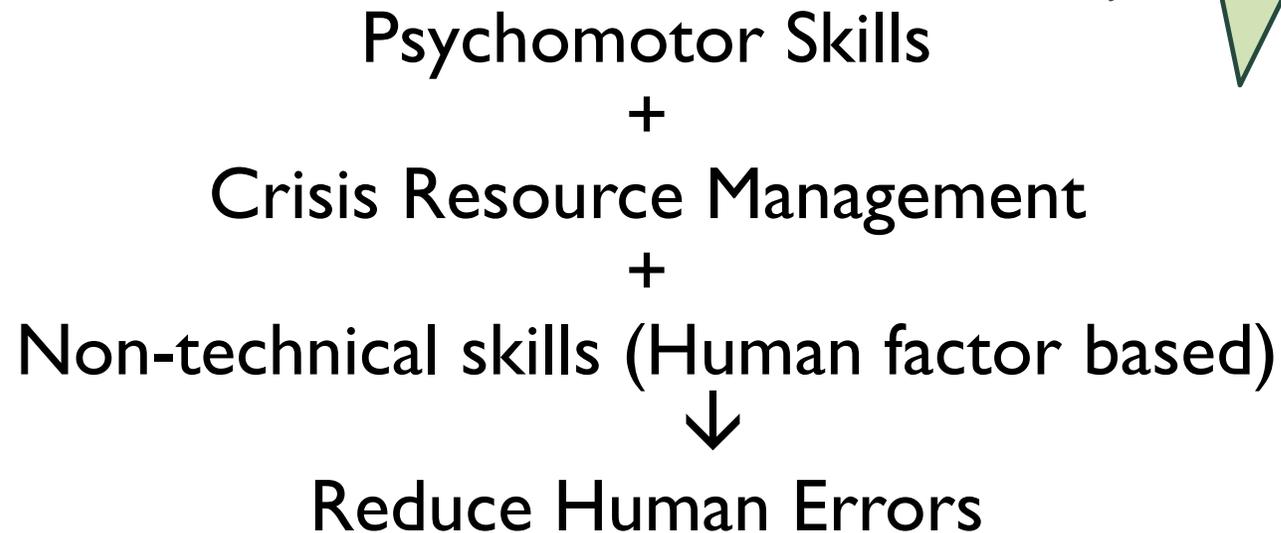 - Individual and team dynamics

(Miles, 2018)
(Dieckmann, Torgeirsen, Qvindesland, et al, 2020)
(Marrs et al, 2020)

- A quasi-experimental study concluded that health care workers who completed high consequence infectious disease training program that included simulation have a:

(Marrs, Horsley, Hackbarth, et al., 2020)

  - Significant decrease in state anxiety (P < .0001)
  - Increase in self-efficacy (P < .0001)

WHY USE SIMULATION?

- Also stressed by European Sim Campus, SESAM:

Practice Makes PERFECT

Psychomotor Skills
+
Crisis Resource Management
+
Non-technical skills (Human factor based)
↓
Reduce Human Errors

TIMELINE OF COVID-19

Wuhan Outbreak
News on 31 Dec

Activation of S2 Response Level
Jan 4

First 2 confirmed cases in HK
Jan 23

Upgrade to Emergency Response Level
Jan 25

Total 100 confirmed cases in HK
Mar 4

WHO announces Pandemic
Mar 11

December 2019

January 2020

February 2020

March 2020

Jan 16
Additional Lecture on ID nursing to PRCC participants

Jan 24
Start ID TTT Simulation Training in RTSKH (1st session)

Jan 29, 30, 31
ID TTT Simulation Training (3 sessions)

Feb 13
Resume ID TTT Simulation Training (1 session)

Feb 18
Start In-situ ID Practice Drill & Refresher Training (Total 12 sessions)

Current Training Framework is the result of the consolidated Learnings from previous Major ID Outbreaks Preparedness & Handling

- SARS in 2003
- nH1N1 in 2009
- H7N9 & MRES since 2013
- Ebola threat in 2014
- South Korea MRES outbreak in 2015

ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY

Objectives:

- To enlighten and raise nurses' consciousness of the importance in building up ID competency of their whole team through Sim method

- To better prepare frontline nurses in handling infectious patients

- To disseminate the key points in high risk procedures such as resuscitation and transportation of ID patients for frontline nurses

Content in 3 hours:

- 45-minute lecture, simulation training session, debriefing

- [Full SIM] Scenario 1. CPR and endotracheal intubation

- [Table Top Exercise] Scenario 2. Transport of the intubated infectious patient

BASIC ASSUMPTION AT HA COVID-19 SIMULATION TRAINING (MODIFIED FROM CMS HARVARD)

We believe that everyone participating in this Simulation training is

Intelligent
Capable
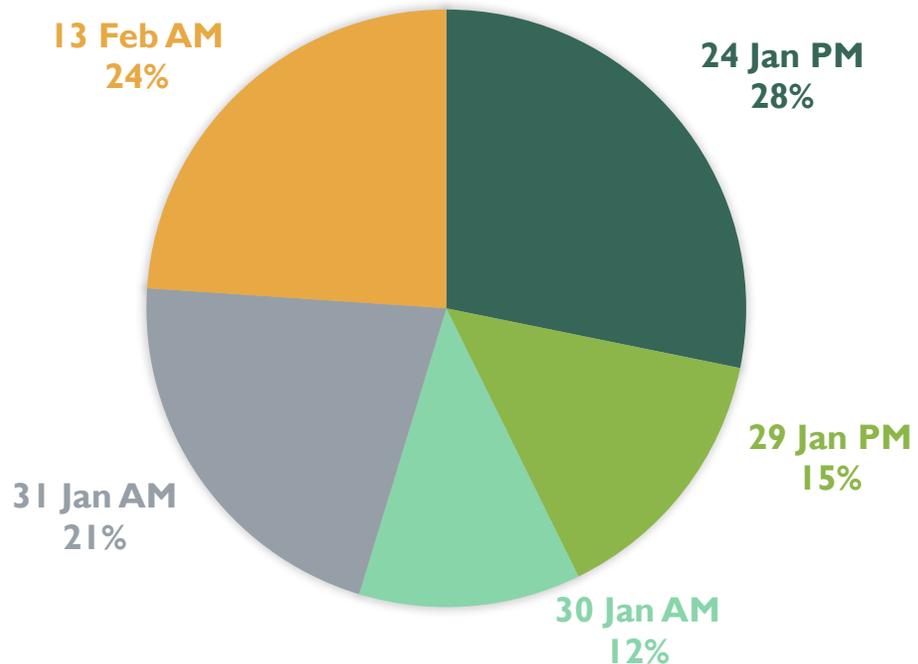Cares about doing their best
Wants to improve

Wants to well protect themselves and teammates

in COVID-19 cases handling

ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY (TRAIN-THE-TRAINER PHASE)
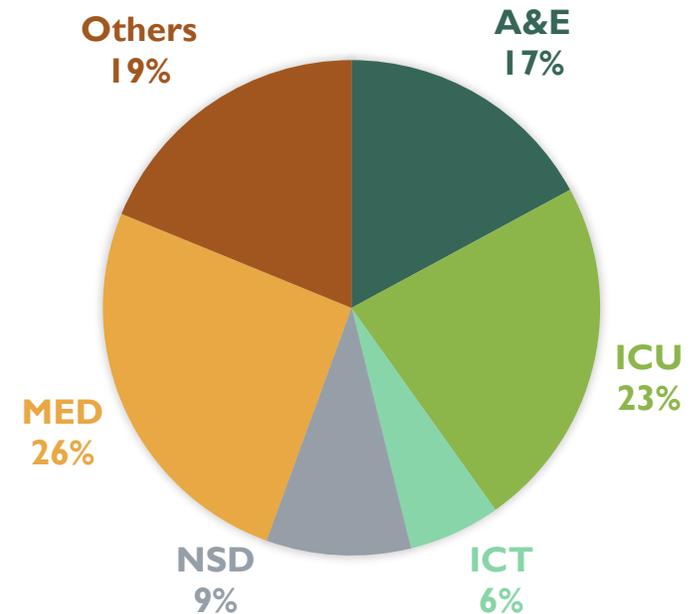
- *Date: 24 Jan, 29 Jan, 30 Jan, 31 Jan & 13 Feb, 2020*

- *Venue: RTSKH*

- *Number of classes: 5*

- *Total number of participants: 117*

24 Jan PM 28%
29 Jan PM 15%
30 Jan AM 12%
31 Jan AM 21%
13 Feb AM 24%

ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY (TRAIN-THE-TRAINER PHASE)

NUMBER OF PARTICIPANTS (BY SPECIALTY)

Others 19%
A&E 17%
ICU 23%
ICT 6%
NSD 9%
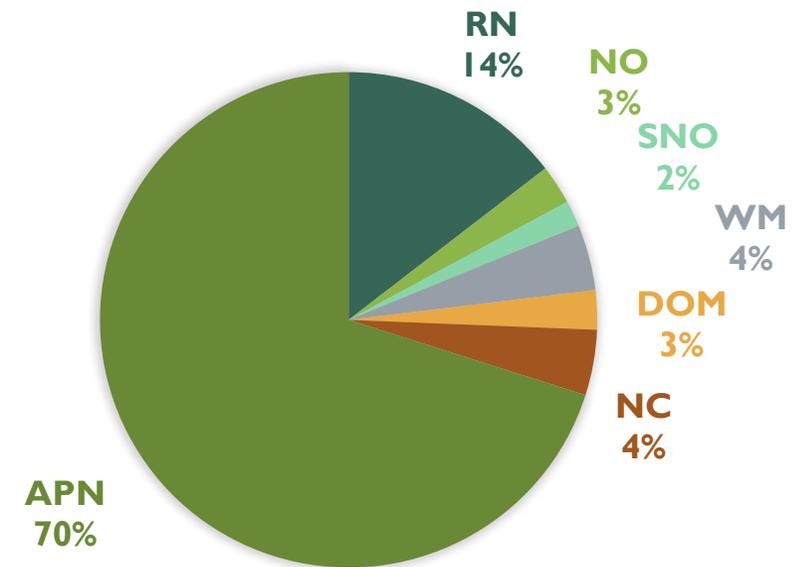MED 26%

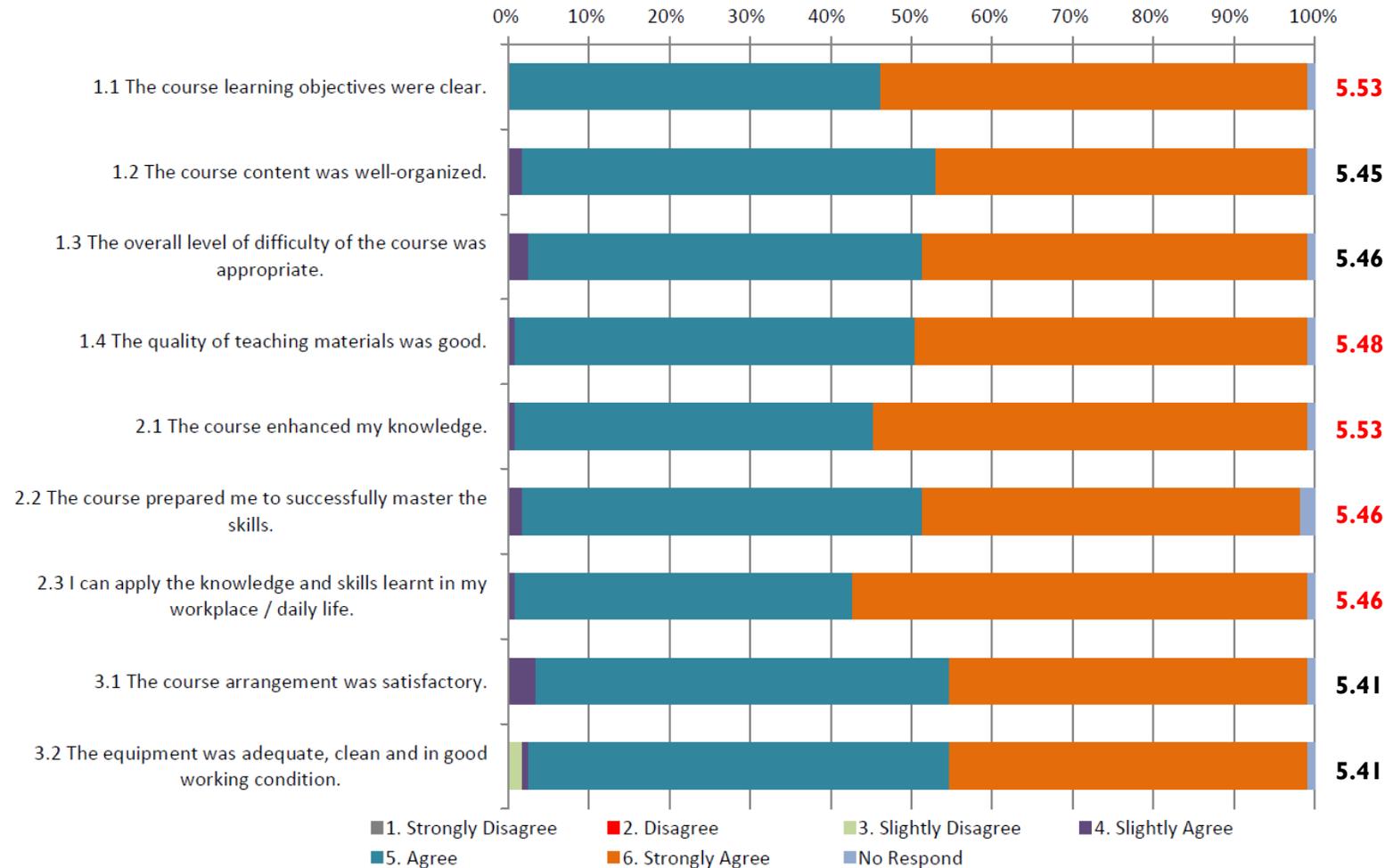# ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY (TRAIN-THE-TRAINER PHASE)

NUMBER OF PARTICIPANTS

(BY RANK)

RN 14%
NO 3%
SNO 2%
WM 4%
DOM 3%
NC 4%
APN 70%

ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY (TRAIN-THE-TRAINER PHASE)

Item	Rating
1.1 The course learning objectives were clear.	**5.53**
1.2 The course content was well-organized.	**5.45**
1.3 The overall level of difficulty of the course was appropriate.	**5.46**
1.4 The quality of teaching materials was good.	**5.48**
2.1 The course enhanced my knowledge.	**5.53**
2.2 The course prepared me to successfully master the skills.	**5.46**
2.3 I can apply the knowledge and skills learnt in my workplace / daily life.	**5.46**
3.1 The course arrangement was satisfactory.	**5.41**
3.2 The equipment was adequate, clean and in good working condition.	**5.41**

Legend: ■ 1. Strongly Disagree ■ 2. Disagree ■ 3. Slightly Disagree ■ 4. Slightly Agree ■ 5. Agree ■ 6. Strongly Agree ■ No Respond

Overall Average Rating
5.48

Remarks: The highest score for each item is 6

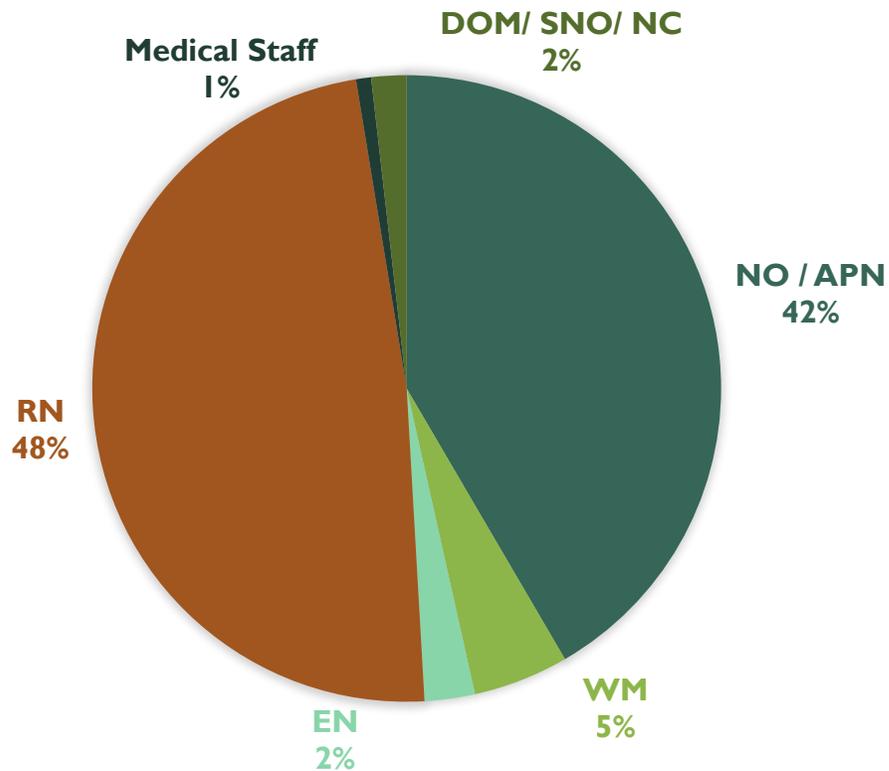# ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY (IN-SITU PHASE)

- Date: 18 Feb – 23 Mar, 2020

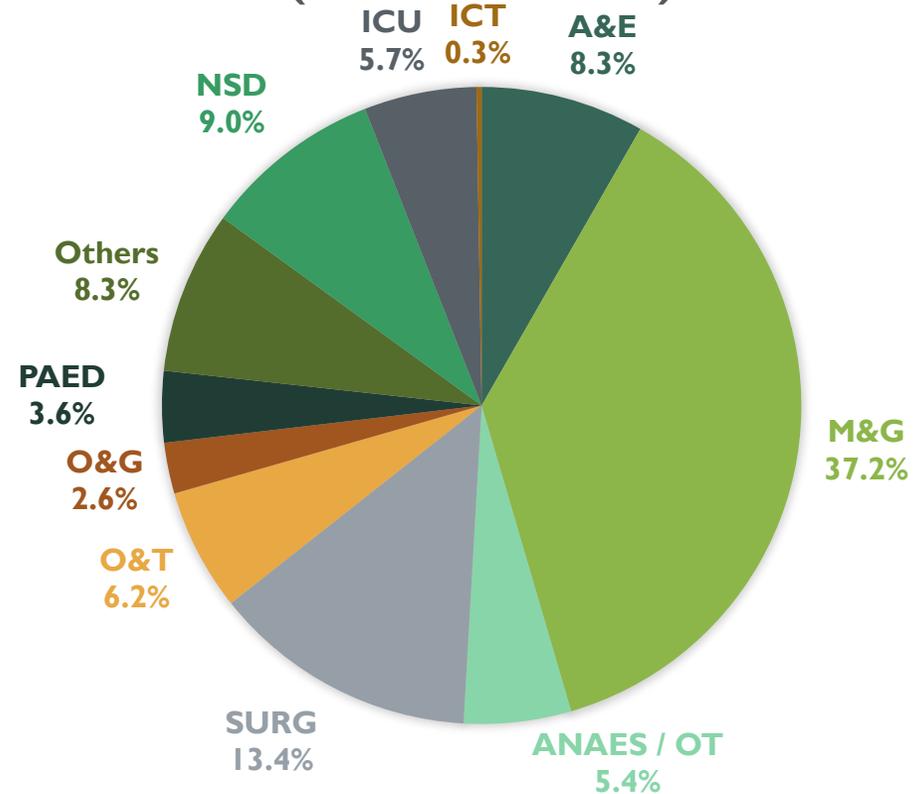- Number of classes: 12

- Total number of participants: 387

Date	Hospital	Number of participants
18 Feb	TKOH	26
21 Feb	TWH	40
24 Feb	PWH	39
25 Feb	PYNEH	29
26 Feb	PMH	24
26 Feb	UCH	24
27 Feb	QMH	26
28 Feb	RTSKH	31
3 Mar	NDH	53
5 Mar	CMC	27
6 Mar	YCH	38
23 Mar	PMH	30

ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY (IN-SITU PHASE)

NUMBER OF PARTICIPANTS (BY RANK)

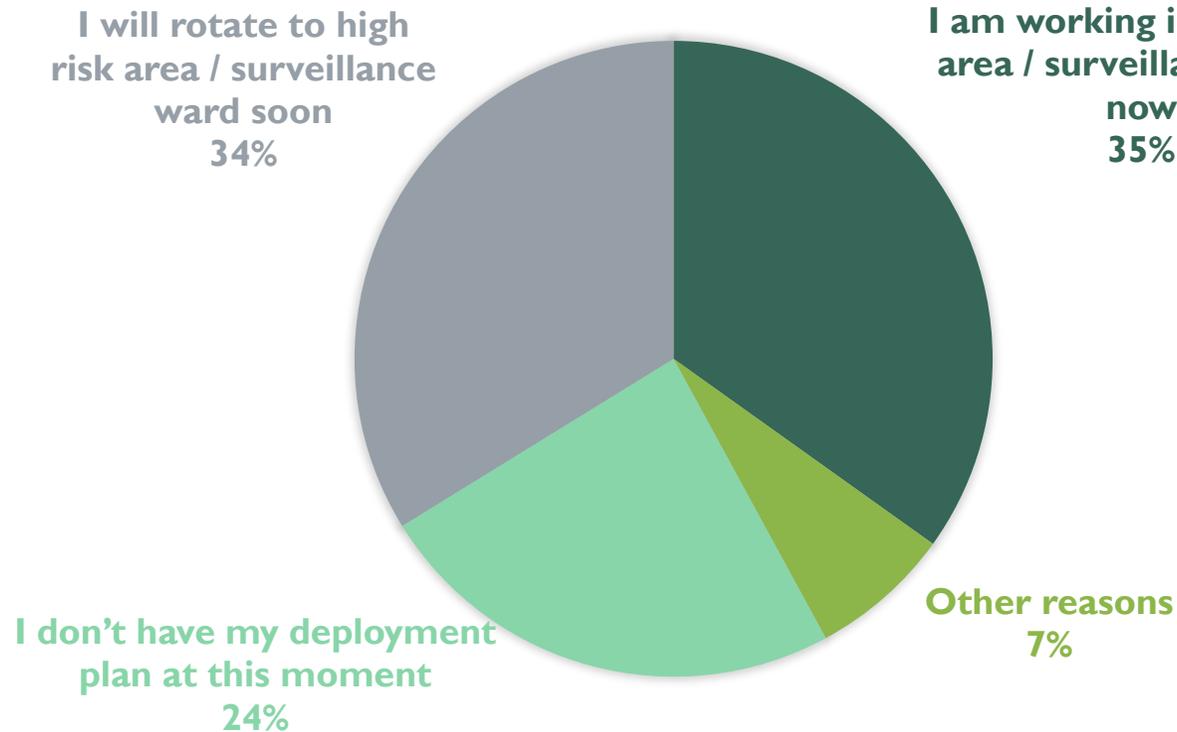- Medical Staff 1%
- DOM/ SNO/ NC 2%
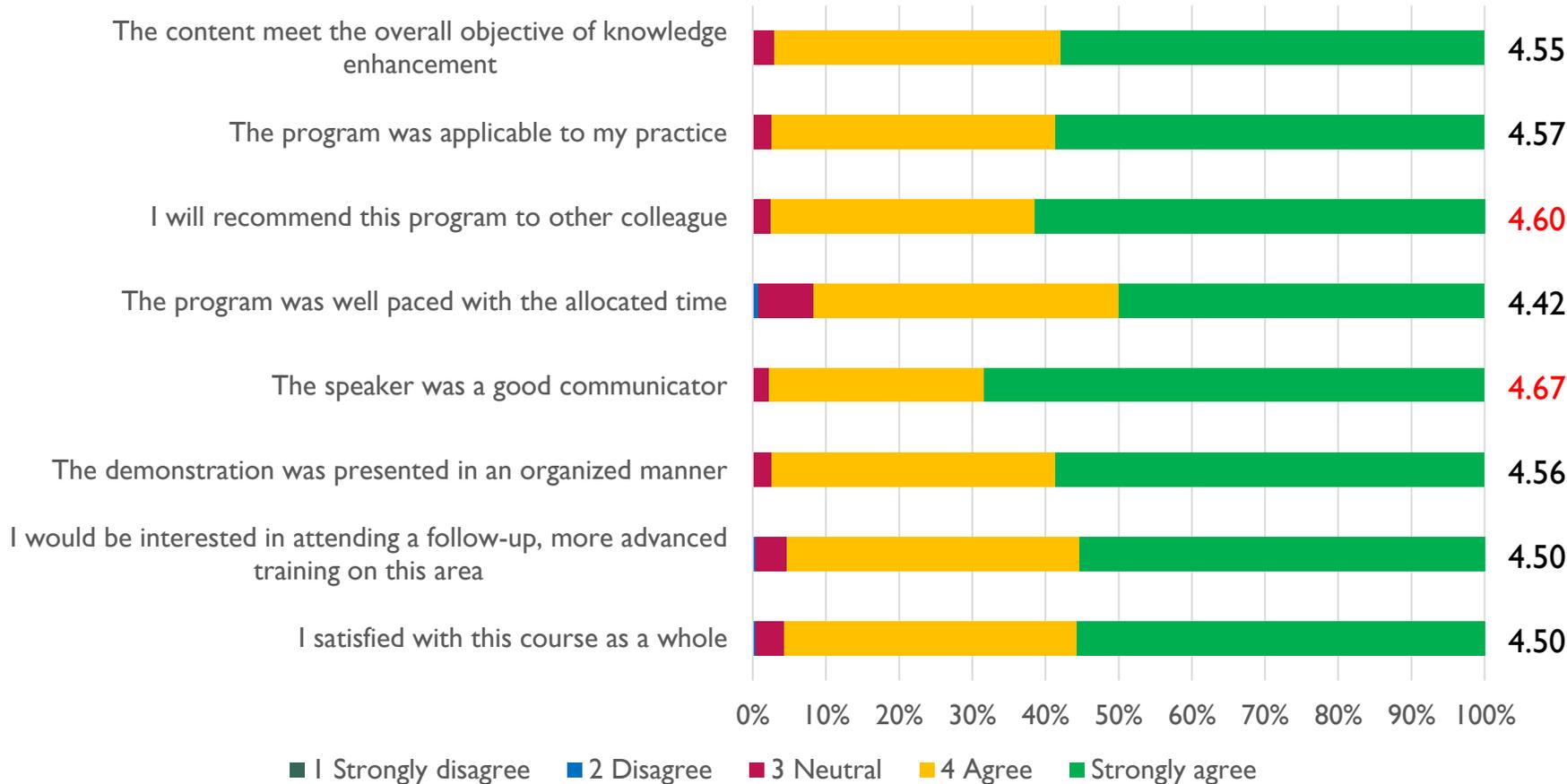- NO / APN 42%
- WM 5%
- EN 2%
- RN 48%

NUMBER OF PARTICIPANTS (BY SPECIALTY)

- ICU 5.7%
- ICT 0.3%
- A&E 8.3%
- NSD 9.0%
- Others 8.3%
- PAED 3.6%
- O&G 2.6%
- O&T 6.2%
- SURG 13.4%
- ANAES / OT 5.4%
- M&G 37.2%

ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY (IN-SITU PHASE)

TRAINING NEED

I will rotate to high risk area / surveillance ward soon
34%

I am working in high risk area / surveillance ward now
35%

I don't have my deployment plan at this moment
24%

Other reasons
7%

ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY (IN-SITU PHASE)

Item	Rating
The content meet the overall objective of knowledge enhancement	4.55
The program was applicable to my practice	4.57
I will recommend this program to other colleague	4.60
The program was well paced with the allocated time	4.42
The speaker was a good communicator	4.67
The demonstration was presented in an organized manner	4.56
I would be interested in attending a follow-up, more advanced training on this area	4.50
I satisfied with this course as a whole	4.50

Legend: 1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, Strongly agree

Overall Average Rating 4.55

Remarks: The highest score for each item is 5

ID PRACTICE DRILL & REFRESHER TRAINING ON COVID-19 BY SIMULATION METHODOLOGY

- Total participants in the training = **504**
  - TTT Phase in RTSKH (5 sessions): 117
  - In-situ Phase: 387(12 sessions)
- Estimated coverage of nurses after the TTT phase = **1039**
  - QMH 220
  - QEH 400
  - KEC 160
  - PMH 135
  - IDC 104
  - NTWC 20
- Therefore, there are **>1500** nurses received training

COVID-19

- As at December 1 2020, there were 62,662,181 confirmed cases and 1,460,223 deaths worldwide

    (World Health Organization, 2020)

- While most people with COVID-19 develop only mild (40%) or moderate (40%) disease, approximately 15% develop severe disease that requires oxygen support, and 5% have critical disease with complications such as respiratory failure

    (World Health Organization, 2020)

- The average infected person transmits the virus to 2.2-3.6 other people

    (Lai, Shih, Ko, et al, 2020)

COVID-19

The director of the National Hospital Infection Management and Quality Control Centre suggest that the considerable number of early healthcare infections and deaths may have been due to a combination of:

- Inadequate PPE due to lack of awareness early in the epidemic

- Large-scale exposure to infected patients

- Shortage of PPE

- Inadequate infection prevention training

付强　研究员
- 国家卫生健康委卫生发展研究中心研究员、副主任
- 国家医院感染管理专业质控中心主任

Shanghai International Forum for Infection Control and Prevention. Rationale, scientific, and standardized protection: the core of infection prevention and control of COVID-19 in medical institutions [in Chinese] (2020)

Retrieved from: https://mp.weixin.qq.com/s/G5Nwdd9kW9yVD-hTdwsKtg

SIMULATION TRAINING FOR COVID-19 (INTERNATIONAL)

Singapore

Process-Oriented In Situ Simulation Is a Valuable Tool to Rapidly Ensure Operating Room Preparedness for COVID-19 Outbreak

Lie, Sui An; Wong, Loong Tat; Chee, Marianne; Chong, Shin Yuet

Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare. 15 (4):225-233, August 2020.
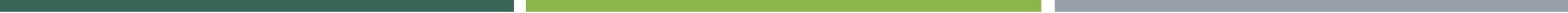
Lebanon

In Situ Simulation: An Essential Tool for Safe Preparedness for the COVID-19 Pandemic

Sharara-Chami, Rana; Sabouneh, Rami; Zeineddine, Rida;

Simulation in Healthcare: The Journal of the Society for Simulation in Healthcare. 15(5):303-309, October 2020.

WAY FORWARD

ID/IC Simulation Training as NEW NORMAL modality

IDCTC, HO NSD, CICO & HA IDC joint venture to further develop and provide ID/IC Simulation/ Innovative training

A Nurse's Prayer

Dear Lord,

This work is truly a gift from You, Serving those in pain. In the daily giving of ourselves, We are the ones who gain.

Whenever patients need our care, May we welcome them with grace. Gentleness & Compassion. May they see on every face.

Help us do the best we can, Alert at every hour, Round the clock, tireless be, And from duties, never cower.

Be our strength & guidance, Lord, Let us work as a team, Heal, work miracles where we are as hard as they may seem.

For all these Lord I pray to You. Make me steadfast as I envision. You say,

"Well done, faithful servant……You've fulfilled your life's mission. Amen
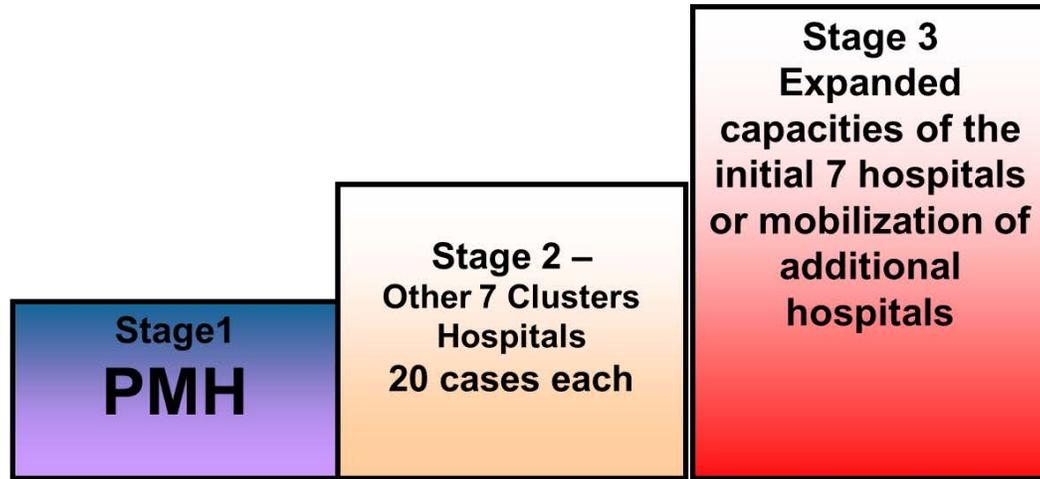
SARS十年之復活金句
「即使再有疫症，香港醫護人員仍會義不容辭投入工作，我肯定。」

高永文
當年暫掌醫管局的食衛局局長高永文肯定本港醫護人員的情操，面對疫症定必義不容辭

Is our Job Meaningful ?

I do believe that we share the same Mission and Vision

HA Mobilization Plan

Stage1
PMH

Stage 2 –
Other 7 Clusters
Hospitals
20 cases each

Stage 3
Expanded
capacities of the
initial 7 hospitals
or mobilization of
additional
hospitals

Take Home Messages

- Appointment with DESTINY !

- Learn from HISTORY ?

- Pragmatic but also be STRATEGIC !

THANK YOU