

COVID-19- Redesign of Hospital Screening Area for PPE Conservation



GGHH Agenda Goals

1. Leadership
2. Chemical
3. Waste
4. Procurement

Hospital Goal

- Reduce usage of personal protective equipment (PPE) at the hospital to cope with supply shortage, especially during the COVID-19 pandemic
- Expand the use of the screening area to other close contact processes with patients to protect the safety of healthcare staff
- Reduce waste from overuse of disposable PPEs

Progress Achieved

- The hospital invested less than TWD\$10,000 (USD\$350) to repurpose a meeting room to a COVID-19 screening counter.
- Since the implementation on 25th March 2020, we have been able to reduce the use of PPE and bleach (for disinfectant use). The hospital is planning to use PPE inventory to monitor savings in cost and reduction in waste.
- Initial results demonstrate that the screening area has resulted in a reduction of 45-59% of waste per testing.
- To our knowledge, it is the first hospital in Taiwan implementing this innovation to address the PPE shortage, offers protection to our healthcare workers as well as the environment.

The Issue

As frontline health workers march forward to tackle this pandemic, their own health is threatened due to shortages in Personal Protection Equipment (PPE), including gowns, gloves, face shields

and masks. Hospitals are 'days away' from running out of masks and we see healthcare workers sewing their own PPE to protect themselves against COVID-19¹.

In Italy, 1 in 5 healthcare workers were infected and more than 3300 confirmed cases and at least 22 had died in China². One of the issues across the world has been on how to reduce the use of PPE without compromising the safety of frontline health workers. As PPE guidelines change when new evidence appears, the supplies might not be able to keep up with the increase in higher standards. We see hospitals practice daily allotments or rationing of PPE to units or departments to cope with this issue.

The interim report (World Health Organization, 27 Feb 2020)³ on rational use of PPE recommends the use of physical barriers to reduce exposure to the COVID-19 virus, such as glass or plastic windows.

Implementation Process

Set-up phase:

- Use acrylic glass to build a window with two fixed gloves to collect throat or nasopharyngeal swabs. (Full diagram published in *The American Journal of Emergency Medicine*⁴)
- Cost: less than USD\$350, which included a walkie talkie and acrylic window and gloves.
- Risk communication with all involved staff.
- Note that a negative pressure room is not required, but it is vital to keep this as a sealed isolated space.

Step-by-step procedure:

1. Observe contact and droplet precautions for clinical assessment and collection of specimens from a patient under investigation (PUI), being suspected with a confirmed case, with mild respiratory symptoms, or for clinical consultation of a patient with symptoms due to some other condition.
2. An examiner inside the glass barrier/window wearing a mask will conduct the swabbing and a clinician with standard PPE will provide assistance outside examination station.
3. The examiner must wash hands or ensure hand hygiene before putting on surgical mask and gloves. The clinician must check the functionality of the fixed gloves before handing over the test kit to the examiner. The fixed gloves can be changed every two weeks.
4. The examiner must carefully perform the swabbing and place the specimen into a bag. The bag must be sealed before handing over to the clinician.

¹ 'Doctors Are Sewing Their Own PPE to Tackle COVID-19 | The Canberra Times | Canberra, ACT', accessed 27 March 2020, <https://www.canberratimes.com.au/story/6698991/doctors-are-sewing-their-own-ppe-to-tackle-covid-19/>.

² The Lancet, 'COVID-19: Protecting Health-Care Workers', *The Lancet* 395, no. 10228 (21 March 2020): 922, [https://doi.org/10.1016/S0140-6736\(20\)30644-9](https://doi.org/10.1016/S0140-6736(20)30644-9).

³ 'Rational Use of Personal Protective Equipment for Coronavirus Disease 2019 (COVID-19)', Interim Guidance (World Health Organization, 27 February 2020), https://apps.who.int/iris/bitstream/handle/10665/331215/WHO-2019-nCov-IPCPPE_use-2020.1-eng.pdf.

⁴ Connie Cai Ru Gan, Yu-Chi Tseng, and Kuan-I. Lee, 'Acrylic Window as Physical Barrier for Personal Protective Equipment (PPE) Conservation', *The American Journal of Emergency Medicine* 0, no. 0 (17 April 2020), <https://doi.org/10.1016/j.ajem.2020.04.044>.

5. The clinician must disinfect the examination area including the fixed gloves with alcohol then walk to the buffer zone to place the specimen bag into a box without touching the box.
6. The clinician must remove the outer layer of gown and gloves, close the lid of the box, and bring it to the designated location for further examination.
7. All surfaces that are possibly contaminated (eg. waiting-area, X-ray and screening area) must be wiped with disinfectant by a person wearing gloves and surgical mask.

Images of Screening Area





Tracking Progress

Intervention	Period	Hazardous waste (kg)	COVID-19 Testing	Waste weight per testing
Before	March 17 – 23	49.1	55	0.89
After	March 25 – 31	27.2	56	0.49
	*April 01 – 30	110.0	305	0.36

*Mass testing for patients with symptoms of pneumonia.

- Waste: Reducing the use of PPE for clinician who collects throat or nasopharyngeal swabs for each medical procedure includes water-resistant gown, gloves, disposable face shield, N95 facemask, haircap and shoe covers.
- Less chemical use in disinfectant
- Reduction of frequent putting on and removing of PPE, reduced risk of self-contamination⁵.
- The hospital will explore tracking PPE inventory for specific departments going forward.

Challenges and Lessons Learned

This set-up needs to identify a suitable location (air flow, wall materials, patient and clinician flow) within the hospital compound. Air quality inside the room is critically important. We would suggest building an independent testing chamber if the air flow can't be guaranteed. Moreover, we would also need to communicate to the patient so that his/her head won't fall back while performing the swab. This is also not applicable to patients who are lying on bed.

⁵ Chih-Han Lin et al., 'Protection Effectiveness of a Building-Integrated COVID-19 Sampling Station That Uses a Sealed Acrylic Window as a Physical Barrier', *Annals of Emergency Medicine*, 11 May 2020, <https://doi.org/10.1016/j.annemergmed.2020.05.010>.

Next Steps

Hospitals can implement this set up in areas of the health care facility where patients will enter such as triage areas, the registration desk at the emergency department or at the pharmacy window where medication is collected. Currently, we are building a second counter and plan for other applications such as blood draw, injections, and wireless stethoscope examinations.

Taichung Tzu Chi Hospital is committed to developing strategies to move towards climate-smart healthcare. We advocate for sustainable ways to minimise medical waste while maintaining high quality of healthcare.

Demographic Information

Taichung Tzu Chi Hospital is located in Tanzi District of Taichung City (Central part of Taiwan), spanning over 184,921 square-metres and holds a 1081 beds capacity, with a staff more than 1,500. We provide holistic health care and preventive medicine services through community, home visits and health counselling.

Taiwan R.O.C - COVID-19 status (1st April 2020)

First case: 21st January 2020

Total testing: 33,733

Confirmed cases: 329

Death cases: 5

Links:

<http://taichung.tzuchi.com.tw>

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Quotes:

“This could prevent doing harm to patients, ensure our healthcare workers safety, and also protect our environment.” Superintendent, Dr Sou-Hsin Chien.

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