



REVIEW ARTICLE

Outbreak Response Measures for the Pediatric COVID 19 Ward at the Philippine General Hospital

Marimel G. Reyes-Pagcatipunan, MD, FPPS, FPIDSP

* University of the Philippines, College of Medicine,
Philippine General Hospital

Correspondence:

Dr. Marimel G. Reyes-Pagcatipunan

Email: mrpagcatipunan@yahoo.com

The authors declare that the data presented are original material and has not been previously published, accepted or considered for publication elsewhere; that the manuscript has been approved by all authors, and all authors have met the requirements for authorship.

An outbreak caused by the novel SARS-CoV-2 was declared by the World Health Organization (WHO) on January 30, 2020 as a public health emergency of international concern.¹ In the Philippines, the first identified COVID 19 case was on January 16, 2020. On March 11, 2020 the WHO determined that it reached pandemic classification with widespread community transmission across the world.¹ On March 16, 2020, an enhanced community quarantine (ECQ) was initiated in the National Capital Region (NCR) in the Philippines as a measure to control the spread of COVID -19 infection.

The Philippine General Hospital (PGH) being the biggest tertiary multispecialty hospital in the Philippines was made as one of the Covid-19 Referral Hospital in the NCR.

Understanding the SARs-CoV-2 possible modes of transmission which include respiratory droplets, contact, fomites, fecal-oral route and airborne via aerosol-generating procedures,² the PGH-Department of Pediatrics instituted outbreak response measures. The goals were to establish an area to cohort and care for the patients with known or suspected COVID -19 infection and to prevent the risk of transmission amongst the patients, healthcare workers and allied health staff. Several infrastructure changes, setting modification of workflow and process, formulation of clinical guidelines for management of patients with COVID 19 infection and measures of infection control and environmental cleaning were made.

HOSPITAL MEASURES RELATED TO MEDICAL MANAGEMENT OF PEDIATRIC COVID PATIENTS

Infrastructure Changes

The Philippine General Hospital was built more than 100 years ago and the structure of the main wards have high ceilings and big dome shaped windows that regularly admit around 50 pediatric patients per main ward. The main pediatric ward 9, limited the admission to 20-25 patients wherein a distance of 2 meters between patients is observed as part of the infection control measure described as social distancing. Several exhaust fans were installed to direct the airflow outside.

A new pediatric COVID ward equipped as an intensive care unit comprising of 3 small wards with a capacity of 4 beds per room were designated at the 5th floor of the hospital to prevent mixing of non-COVID patients at Ward 9. Likewise, a new pediatric neonatal intensive care unit (NICU) COVID ward comprising of 3-4 bed capacity rooms at 4th floor was opened to admit all neonates born in the hospital during the pandemic.

Management of patients, staff and visitors

All new patients for admission starting April 1, 2020 were limited to life-threatening cases only. All these patients were referred to the infectious Disease Service for screening using a standard questionnaire and nasopharyngeal swab (NPS) or endotracheal (ET) aspirate were sent for SARS-CoV 2 reverse transcriptase polymerase chain reaction (RT-PCR). Patients who were suspected to have COVID infection were admitted to the COVID ward.

Teams caring for the COVID patients were not assigned to other wards until after a 14- day quarantine after their 7 days rotation in any COVID ward. They were also asked to monitor themselves for fever and other respiratory symptoms daily through web-based forms. They were advised to consult the health services for development of any symptom and assessed for the risk of transmission and appropriate management.

Only one parent and/or guardian was allowed to be in the unit as a patient's caregiver for the entire duration of hospitalization. They were asked to sign a waiver and they should be cleared of Covid-19 infection by having a negative NPS-RT PCR result, likewise, they were provided with proper personal protective equipment. Those parents who cannot stay in the unit were contacted and updated every morning through text messaging or personal as necessary. Visitors were not allowed anytime in any of the units.

FORMULATION OF CLINICAL PATHWAYS AND GUIDELINES FOR COVID MANAGEMENT

Clinical pathways on the admission of patients presenting at the Emergency Room were made. The patient will initially be assessed at pediatric emergency room triage. If the patient is assessed to have mild disease, the patient will be sent home for home quarantine x 14 days and advised. For severe/critical patients or for life-threatening/emergency cases that are

non-COVID, the patient will be assessed at the pediatric emergency room for resuscitation and will be admitted to Ward 9. For cases with respiratory symptoms, especially those assessed to have pneumonia who have exposure to a COVID (+) caregiver or a household with clusters of influenza-like illness will be referred to pediatric infectious disease service for evaluation. Specimens either nasopharyngeal swab and /or endotracheal tube aspirate for COVID-19 RT PCR should be taken aseptically. These patients will be admitted to the COVID ward.

Treatment guidelines for COVID-19 probable and confirmed cases was made with the use of experimental drugs along with parental informed consent.

MEASURES ON INFECTION CONTROL AND PREVENTION Personal Protective Equipment

Hospital-wide comprehensive program for the use of PPE was implemented led by the Hospital Infection Control Unit (HICU). The Division of Pediatric Infectious Disease medically cleared, monitored and trained all its healthcare personnel on the use of PPE in the different pediatric areas. They were all fitted with the National Institute of Occupational Safety and Health (NIOSH)-certified N95 respirators. Deviations from the recommended PPE doffing protocol by CDC which could increase the risk of self-contamination on HCW's clothing and skin after providing care for patients is common. Errors were seen mostly during doffing practices with respect to the doffing sequence and technique, and/or use of appropriate PPE.^{3,4} Safety officers were then assigned in all donning and doffing areas. They were trained to assist and identify possible break in the observance of infection control while a staff is putting on and taking off their PPEs. The presence of safety officers was perceived by the staff as a good measure to assure them that their PPE is of optimal use.



Figure 1. From left to right: Posters for PPE, Fit testing of N95 masks, Training on Donning and Doffing and as Safety officers

Installation of Dry Hydrogen Peroxide Machines

The 3 pediatric COVID ward rooms with 4 bed capacity each observing the 2 meter distancing between patients were equipped as an Intensive Care Unit. Daily cleaning and disinfection of the rooms and medical devices were observed with the use of sodium hypochlorite.⁵ Since the wards cannot be closed for admission and prolonged stay of critical patients was observed, A Dry Hydrogen Peroxide (DHP) machine, a new technology by Synexis™ was installed per room. A “No-touch” decontamination device are increasingly used as an adjunct to standard cleaning and disinfection in health care facilities. There is convincing evidence that decontamination devices reduce contamination and some evidence that their use may reduce colonization and infection with health care-associated pathogens. It has shown that at low concentrations, it disinfects more slowly but safe enough to disinfect occupied areas and does not harm electronics or other materials in the area.⁶ DHP does not overwhelm the lung enzymes and has been judged by Western IRB to be a non-significant risk technology suitable for continuous use in areas occupied by patients and staff.^{6,7} Further studies are needed to prove its efficacy during pandemics and other emerging infectious diseases.



Figure 2. Dry Hydrogen Peroxide (DHP) Synexis™ Machines inside Pediatric COVID wards

Infection Control when Caring for Covid-19 patients

Standard precautions are observed with the minimum PPE required for any staff caring for patients at the COVID wards include a fitted, NIOSH-certified N95 respirator, eye protection (either goggles or full-face shield), cap, gowns or hazmats, shoe covers and gloves. Double gloves was required and the outer pair should be changed between handling of patients or when contaminated. All staff were instructed to shower after doffing of PPEs and change into clean street clothes before leaving the hospital.

The patients whenever possible wears a surgical mask, and when transported should be on a designated route with minimal contact with other patients.

Selected designated equipment and supplies were brought to the COVID wards. Charting are done electronically with touch-screen devices and monitors, laptop computers, monitoring machines, 2D echo and ultrasound machines all covered with plastic wrap to decrease the risk of contamination and facilitate decontamination. Surfaces of all medical devices are cleaned regularly.



Figure 3. From left to right. Inside the COVID ward with a patient wearing appropriate PPE, medical devices covered with plastic wrap, transport of a COVID patient with decontamination of the designated route.

Pandemic outbreak involves different hierarchy of controls and modification of infrastructure and processes. Multiple stakeholders should be involved with regular meetings and constant communication to be able to institute changes in protocol and formulate hospital policies. For the past 2 months since the ECQ, the pediatric COVID ward remains to have an average of 6-9 patients per day. No nosocomial infections have been identified nor nosocomial transmission of COVID infection amongst the patients and healthcare staff at the wards. Challenges remains to be mitigated which is mostly the staff who are vulnerable to fatigue, prone to be infected with constant exposure, who needs constant assurance and support and the steady supply of the PPEs. It is therefore prudent to put containment measures as soon as the outbreak is declared to provide quality care and reduce the risk of transmission to other patients or healthcare workers.

REFERENCES

1. World Health Organization. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). Available from URL: [https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news-room/detail/30-01-2020-statement-on-the-second-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov))
2. Li Q, Guan X, Wu P, W, et al. Early Transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* 2020; DOI: <https://doi.org/10.1056/nejmoa2001316>.
3. Wong, J., Goh, Q.Y., Tan, Z. et al. Preparing for a COVID-19 pandemic: a review of operating room outbreak response measures in a large tertiary hospital in Singapore. *Can J Anesth/J Can Anesth* 67, 732–745 (2020). <https://doi.org/10.1007/s12630-020-01620-9>
4. Linh T. Phan, Dayana Maita, Donna C. Mortiz, Rachel Weber, Charissa Fritzen-Pedicini, Susan C. Bleasdale, Rachael M. Jones & for the CDC Prevention Epicenters Program (2019) Personal protective equipment doffing practices of healthcare workers, *Journal of Occupational and Environmental Hygiene*, 16:8, 575-581, DOI: 10.1080/15459624.2019.1628350
5. Effectiveness of ultraviolet devices and hydrogen peroxide systems for terminal room decontamination: Focus on clinical trials Weber D.J., Rutala W.A., Anderson D.J., Chen L.F., Sickbert-Bennett E.E., Boyce J.M. (2016) *American Journal of Infection Control*, 44 (5) , pp. e77-e84.
6. Dilute Hydrogen Peroxide Technology for Reduction of Microbial Colonization in the Hospital Setting; Charles K. Herman, Jennifer Hess, Carmine Cerra *American Journal of Infection Control*, Vol. 43, Issue 6, S25–S26
7. Cheng, V. C. C., Chau, P. H., Lee, W. M., Ho, S. K. Y., Lee, D. W. Y., So, S. Y. C., ... & Yuen, K. Y. (2015). Hand-touch contact assessment of high-touch and mutual-touch surfaces among healthcare workers, patients, and visitors. *Journal of Hospital Infection*, 90(3), 220-225.