OPEN ACCESS *Review Article*

Management strategy for control and prevention of SARS-CoV-2 infection in hospital settings - a brief review

Ishrat Binte Aftab[1], Akash Ahmed[2*], Sinthia Kabir Mumu[3], M Mahboob Hossain[2]

[1]*Department of Sports and Health Science, Technical University of Munich, Munich, Germany,*
[2]*Department of Mathematics & Natural Sciences, BRAC University, Dhaka, Bangladesh,*
[3]*Department of Biology, Purdue University Fort Wayne, Fort Wayne, IN, USA.*

Abstract

The current pandemic of COVID-19 has spread worldwide rapidly. Many countries are struggling with the third pandemic wave despite having the vaccine distribution to frontline workers and people at high risk. Several studies have suggested a high possibility of hospital-acquired COVID-19. Therefore, it is vital to have proper recommendations and guidelines to prevent COVID-19 transmission in hospitals. Eliminating hospital-acquired infection is impossible, but reducing the rate and severity is possible by following appropriate guidelines. This paper reviews the strategies and recommendations that can be helpful for a hospital authority to control and prevent SARS-CoV-2 infection among the patients and healthcare workers.

IMC J Med Sci 2022; 16(2): 006. DOI: https://doi.org/10.55010/imcjms.16.016

Introduction

Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has spread worldwide at an exponential rate since its detection in Wuhan, China in December 2019. By March 2022, about 500 million people around the world had COVID-19 and among them, there were 6.2 million deaths [1]. Globally, vaccines are distributed yet the cases and death continue to exist. Leaders and policymakers are already claiming to have scarcity of intensive care units and other healthcare facilities even in developed countries.

Even though there is not enough empirical evidence suggesting hospital as a transmission spot for COVID-19, there are case study analyses that show evidence of hospital acquired Covid-19. Marago and colleagues [2] conducted a retrospective case analysis in the General District Hospital in the North West of England and found the prevalence of hospital-acquired COVID-19 up to 16.2%. In a meta-analysis of cases from China-based databases, Zhou et al. showed [3] that the proportion of COVID-19 acquired in a hospital setting was 44%. The majority of the infected person was healthcare workers [3]. In another retrospective study performed by Rickman et al. [4] at a University Hospital London, 11% (47/435) Covid-19 cases were confirmed hospital-acquired and among them, the mortality rate was 36%. An observational study with COVID-19 cases showed among 1564 patients admitted, 12.5% were hospital-acquired where the mortality rate was 27% [5]. Even though these studies have few limitations, it is evident from the official data that 12-15% COVID-19 cases were nosocomial in origin [6].

Therefore, to prevent the transmission of COVID-19 among the hospital patients and healthcare workers, hospitals all over the world have taken different measures based on their local resources. The WHO (World Health Organization) and CDC (Centers for Disease Control and Prevention) have published recommendations on control of SARS-CoV-2 infection. Unfortunately, most of the recommendations are based on previous SARS (Severe Acute Respiratory Syndrome) and MERS (Middle East Respiratory Syndrome) outbreaks. However, specialists, scientists, front-line doctors working with COVID-19 patients

***Correspondence**: *Akash Ahmed, Department of Mathematics & Natural Sciences, BRAC University, Dhaka, Bangladesh. Email: akash.ahmed@bracu.ac.bd*

have made recommendations to prevent spread of COVID-19 in hospital settings. The aim of this paper is to review the available recommendations and information that can help preventing hospital-acquired COVID-19 transmission.

Methods

A thorough search was conducted on Google scholar and MEDLINE through specific keywords, e.g. “hospital management during COVID-19”, “infection control in hospital during COVID-19”, “COVID-19 transmission in hospital”, “lab considerations during corona outbreak”, “healthcare worker safety in COVID-19”. Papers were also handpicked from references.

Administrative control

In a healthcare facility, it is important to have a strong administrative control to keep the workflow uninterrupted and modify if and when necessary. It is the most essential level of hierarchy to reduce the COVID-19 exposure to uninfected people [7]. Its responsibility includes, reminding staff to take necessary precaution and monitoring them when they are on duty [8]. Some hospitals have established real time monitoring where the monitoring is done on computer screen in a separate room [9]. Lai et al [7] suggest, in the time of COVID-19, it is crucial for administrators to reduce the patient attendance as much as possible and suspend the elective clinical services to avoid viral transmission. It is also essential for keeping the resources available such as inpatient beds, staff and medical equipment to fight against emergency outbreak [7]. In addition, unique shifting system such as, working at different time and location, doing long shifts and keeping backup staff ready can limit exposure, save protective equipment and keep workflow uninterrupted [10-12]. All medical documents such as, physicians’ order, medical records, consent form, lab results and nursing materials is better to make paperless, as explained by Huang et al [9].

Screening and zoning

In order to keep the health workers and uninfected patients safe, a thorough screening process is important. A triage station should be set up to identify fever patients before they enter the clinical area or outpatient gateway [7,12]. Patients or hospital staff entering the hospital should be screened for fever using infra-red thermometers [7]. The clinical area of important department should be divided into clean, semi-contaminated and contaminated zones depending on the patient occupancy time, ventilation condition and risk of exposure [12].

Safety of health workers

Health workers are the most important asset in COVID-19 pandemic and during any disease outbreak or epidemic [8,13]. Therefore, it is crucial to protect them first from acquiring infection for the greater benefit of whole population. It is recommended that healthcare worker should report any symptoms that may be associated with COVID-19 and their travel history after returning from vacation [7]. A large tertiary hospital of Singapore measures and records electronically the body temperature of their medical staff twice a day [14]. Huang et al. [8] believe education regarding infection control and personal safety should reach every medical personnel. The safety information includes use of personal protective equipment (PPE), hand hygiene, ward disinfection, medical waste management, and sterilization of patient-care devices and management of occupational exposure [9]. The Joint Task Force of the Chinese Society of Anesthesiology and the Chinese Association of Anesthesiologists mention in their recommendation that highest level of personal precautions includes a disposable surgical cap, test-fit N95 masks or respirators, gloves, goggles or face shield, gown, and fluid-resistant shoe covers [13]. The key element of this precaution is the full coverage of the head and facial skin. However, Bourouiba [15] in his article suggests that mask and other protective equipment should be able to withstand high-momentum multi-phase turbulent gas cloud ejected with a sneeze or a cough where the virus is trapped. A surgical mask along with N95 in addition with goggles and face shield works well as protection [8,13]. Some clinicians made the suggestion of using powdered air-purifying respirator (PAPRs) in aerosol generating conditions, although poses limited evidence and logistical

challenges [16]. Even though laboratory study shows that N95 mask gives higher protection than FFP2 and FFP3 (filtering facepiece**)**, a recent meta-analysis shows no significant difference [17]. It is advisable to use double-gloving as a standard practice to minimize spread through fomite after intubation [18]. There is a potential risk of contamination during the donning (putting on) and doffing (removing) of PPE, thus, requires thorough training (using teaching video, infographic etc.), as explained by Phua and colleagues [16]. Health worker who are pregnant should have special attention and work in a clean zone [8,10].

Infection control in hospital

Anesthesia and operating room (OR) management of a hospital play a big role in the infection control procedure during an airborne viral pandemic like COVID-19. Multiple studies have confirmed that COVID-19 transmission occurs through air droplets; therefore, all aerosol-generating procedures should take place in airborne infection isolation room [18]. Aerosol generation typically occurs in operating room during tracheal intubation, noninvasive ventilation (NIV), high-flow nasal oxygen (HFNO) procedures, bronchial suctioning, airway manipulation, open airway suctioning, bronchoscopy and sputum induction [17,19].

Coccolini [19] suggests that during a general anesthesia, a HEPA (high-efficiency particulate air) filter to connect to the patient end of breathing circuit and another one between expiratory limb and anesthetic machine. Also, regional anesthesia is preferable over general one. Even though not possible during the time of pandemic, it is not advisable to take the patient to the post anesthesia care unit because it may induce contamination, rather they should recover in the room where they had surgery [11].

Awake intubation should be avoided as it has risk of patient coughing or vomiting which is a potential source of infection for healthcare workers [19]. Cheung and his team [18] recommend avoiding bag mask ventilation as it generates aerosol. They recommend using methods like bed-up-head-elevated position, airway adjunct or positive end expiratory pressure valve. However, if bag masking is unavoidable, they advise to use supraglottic device rather than bag mask ventilation, although no robust evidence is available for this recommendation but this process is easy and requires less medical staff. On the other hand, Coccolini [19] suggests using rapid sequence intubation (RSI) in order to avoid manual ventilation. In addition, turning off the gas flow and clamping the endotracheal tube using forceps during the switching between portable device and ventilator may reduce aerosolization.

For COVID-19 patients, a negative pressure environment for operating room (OR) is recommended to reduce the spread of virus outside the room [19]. An evidence-based study by Dexter and colleagues [11] suggest that typical hand hygiene is insufficient to control infection in operating room. They also suggest that a multilayered approach such as improved hand hygiene, environmental cleaning, vascular care, patient decolonization, and surveillance optimization can minimize perioperative infection for bacterial and viral pathogens. In addition to that, high air exchange cycle rate (25 cycles/h) can significantly downscale the viral load within ORs. After the surgery, patient is advised to recover in the OR so that the contamination stays in one room; however, during this pandemic it may not be possible to institute such measure in all hospitals. To eliminate the risk of circuit contamination, the anesthetic breathing circuit and the canister of soda lime needs to be discarded after completion of surgery [19].

Along with the aforementioned procedures, there are other aerosol generating processes in the ICU such as, administration of nebulized treatment, endotracheal intubation, disconnecting the patient from the ventilator, non-invasive positive pressure ventilation, tracheostomy, and cardiopulmonary resuscitation (CPR) [20]. Recent reports show that acute cardiac injury can happen in 7% patients with COVID-19 [21]. Also, their treatment poses infection risk. Active CPR may generate aerosols of respiratory secretions that may result in spread of infection. Therefore, Alhazzani and colleagues have suggested considering WHO recommendation of using negative pressure rooms with 12 air changes minimum per hour or at least 160 L/ second/patient

in facilities with natural ventilation. Furthermore, they suggest doing the endotracheal intubation by experienced personnel to reduce the risk of infection by minimizing the number of attempts [18,20]. Restriction on ICU visits is important, and in case of emergency, video calling is preferable.

Radiology department plays a significant role in the management of COVID-19 patients during this pandemic. Therefore, contamination in this area has larger consequences in viral spread in hospital. In order to reduce the hospital spread of SARS-CoV-2, radiology department may be divided into four zones namely contaminated, semi-contaminated, buffer and clean zones and each zone should be separated from each other [8]. A provision for negative pressure CT room is also recommended [10].

Immuno -suppressed patients

Immuno-compromised patients are in increased risk of acquiring SARS-Cov-2 infection during their visit and stay in hospitals. Shamsi et al. [22] states that cancer patients are considered as immune-suppressed, however, there are limited data available related to cancer survivors and COVID-19 infection. They suggest, for some selective patients, delaying elective surgery will be appropriate for early asymptomatic small breast cancer tumors detected on routine screening mammograms. It is recommended to defer breast surgery for 3 months in case it is for atypia, prophylactic/risk-reducing surgery, reconstruction, or benign conditions [23]. They further recommend that all uncomplicated, elective and early-stage cancer surgery should be deferred. However, delaying elective surgery is complex idea depending on the fact that every cancer has different disease pattern each of which requires unique oncological multidisciplinary approach and decision [22]. Therefore, even if there are recommendations available, decisions on surgery should be made on case-by-case basis.

Elective surgeries in patients with type-2 diabetes are advised to be deferred in COVID-19 pandemic situation [24]. Type-2 diabetic and obese patients are at high risk of COVID-19 complications due to the surgical stress in recovery period. In a retrospective study, Cao and colleagues [25] explain, pregnant women are more susceptible to respiratory pathogens due to maternal physiologic changes and immune suppression. Therefore, it is important to screen pregnant women for SARS-CoV-2 before admission to reduce the transmission of virus among the hospital staff and other patients [17,25]. Furthermore, during labor, increased ventilation may accelerate airborne transmission, especially if the pregnant woman has symptoms of COVID-19 lung sequelae [17]. Limited data suggest that transplacental transmission is unlikely in women with COVID-19, therefore, neonates are considered safe. However, to remain safe, early cord clamping and temporary separation of the mother and newborn for minimum of 2 weeks is recommended to reduce transmission of COVID-19 from infected mother to the newborn. Also, breast feeding is not recommended if the mother is infected, instead, pumped breast milk can be given [26].

Laboratory considerations

In an early experience of managing emerging COVID-19 in Singapore's tertiary institution, Tan et al. [27] have stated that laboratory specimens should neither be delivered by hand nor sent through pneumatic tube as it has the risk of spillage. They have suggested the use of universal transport medium for nasopharyngeal and oropharyngeal swabs where the swabs are dipped within 3ml of fluid. Furthermore, they have also recommended transporting tightly capped specimens in biohazard zip-lock bags, within a cryobox (leak-proof) which is labeled clearly as biohazard. They have also made the recommendation of adopting WHO guidelines of "triple packaging system" during the pandemic to prevent the transmission. This packaging system includes a receptacle, a watertight and leak-proof packaging to protect the receptacle and an outer layer to reduce physical damage in transit [27].

Environment and equipment cleaning

Environment and equipment cleaning are of paramount importance, especially in places where immune-suppressed patients are handled, e.g. ICU, radiotherapy unit, OR, etc. Improved cleaning of environment and equipment using surface disinfection and UV-C approach is recommended as

use of UV-C only may result in shadowing [11]. Huang and colleagues [8] recommend disinfecting object surface with 1,000 mg/L chlorine-containing disinfectant and wiping twice with 75% ethanol for non-corrosion resistant surface, once in every 4 hours. For disinfecting equipment, they suggest to use 2,000 mg/L chlorine-containing disinfectant. For disinfection of room air, in general air condition is advised to turn off to reduce transmission. When the room is suspected of being contaminated, they recommend ventilating it well once in 4 hours. Also, their radiotherapy department uses the spraying of ambient air with 1,000 mg/L chlorine-containing disinfectants. Ground disinfection is done with 1,000 mg/L chlorine-containing disinfectant, once every 4 hours. Catheterization laboratory, OR and every other area exposed to COVID-19 patient are recommended to follow terminal cleaning after each use [11,12]. Electro-medical equipment such as ventilator and different radiological equipment must be cleaned (rinsed and dried) with 0.1% chlorine-based solution [19]. After an operation, OR utensils should be cleaned with sodium hypochlorite 1000 ppm and hydrogen peroxide vaporization or UV-C irradiation. Hydrogen peroxide vaporization is effective against various viruses including transmissible gastroenteritis coronavirus of pigs and UV-C irradiation kills or inactivates aerosolized viruses [19].

Hospital waste management

About 87% of a hospital's total waste is infectious [28]. Therefore, proper technologies should be used when managing hospital waste and waste water, especially during a pandemic. Some of the common infectious wastes in the hospital are the feces, vomit, and urine of the infected patients. The feces of COVID-19 infected patients have been confirmed to contain the RNA strands of the virus and it is believed that the fomites of the infected container to be a source of transmission [29]. Wang and his team [28] suggest that the waste water discharged from hospitals treating COVID-19 patients also needs to be regulated as it can contaminate the entire drainage system and even cause aerial transmissions. The large amount of waste produced by the hospitals must be disinfected according to strict procedures to prevent new infections among medical staffs and patients. Any sort of waste that may have been in contact with infected patients should be placed in easily identifiable containers for infectious-risk health waste (IRHW). The containers must be closed and sealed before transferring them to inactivation points. Medical staffs handling these containers should wear personal protection equipment all times. The process of inactivation of SARS-CoV-2 is still a relatively less studied topic. In this case, the best action would be to adhere to the techniques used during the SARS epidemic since the COVID-19 share significant similarities with the SARS-CoV-1. An effective method for the inactivation of any SARS virus is the use of more than 0.5 mg/L residual free chlorine or 2.19 mg/L residual chlorine dioxide. Chlorine and UV-C irradiation were found as the most effective disinfectant for SARS virus. Methods involving chlorine dioxide were second in term of performance. These findings are in line with the recommendation made by the Ministry of Ecology and Environment of China for treating the waste water of hospitals built for COVID-19 patients. Chlorine base disinfectants such as liquid chlorine, chlorine dioxide and sodium hypo-chloride with about 50mg/L of chlorine were suggested for disinfection process. Disinfectants containing 20g/L chlorine should be used for up to two hours to avoid all sorts of transmissions. Pharmaceutical and chemical wastes need to be incinerated. The choice of disinfectant and procedures will depend on the economic and feasible factors such as amount of wastewater, existing infrastructure, cost of operation, scope of investment and availability of the disinfectants [28].

Limitations of the study

All the papers included in this review are not peer-reviewed due to COVID-19 situation. Additionally, safety recommendations are changing frequently as this is an ongoing pandemic. Therefore, consistency in the information may differ with time.

Conclusion

There is no fixed precaution that can eliminate the possibility of hospital-acquired COVID-19. However,

many recommendations can be adopted to reduce the transmission. Despite all the recommendations mentioned in this review, it is advisable to formulate and modify the hospital management system according to the hospital's infrastructure, budget, available manpower, and area of location. The rate of hospital-acquired COVID-19 is not only distressing, but it is also posing a big threat to the healthcare system and healthcare-seeking behavior of mass people. The scenario will soon be out of hand if appropriate procedures are not practiced.

Authors' contributions

ABM and SKM: Wrote the original draft. AA: Idea of the review and supervision, MMH: Edited and finalized the manuscript.

Conflicts of interest/Competing interests

All the authors state that there is no conflict of interest.

Funding: Nil

References

1. COVID-19 Map. Johns Hopkins Coronavirus Resource Center. Available at: https://coronavirus.jhu.edu/map.html (accessed on 30 April, 2022).
2. Marago I, Minen I. Hospital-Acquired COVID-19 Infection – The magnitude of the problem. *SSRN Electron J*. 2020. doi: org/10.2139/ssrn.3622387.
3. Zhou Q, Gao Y, Wang X, Liu R, Du P, Wang X, et al. Nosocomial infections among patients with COVID-19, SARS and MERS: a rapid review and meta-analysis. *Ann Transl Med*. 2020; **8**(10): 1-14.
4. Rickman HM, Rampling T, Shaw K, Martinez-Garcia G, Hail L, Coen P, et al. Nosocomial transmission of coronavirus disease 2019: a retrospective study of 66 hospital-acquired cases in a London teaching hospital. *Clin Infect Dis*. 2021; **72**(4): 690-693.
5. Carter B, Collins JT, Barlow-Pay F, Rickard F, Bruce E, Verduri A, et al. Nosocomial COVID-19 infection: examining the risk of mortality. The COPE-Nosocomial Study (COVID in Older People). *J Hosp Infect*. 2020; **106**(2): 376-384.
6. Barranco R, Vallega BDTL, Ventura F. Hospital-acquired SARS-Cov-2 infections in patients: inevitable conditions or medical malpractice?. *Int J Environ Res Public Health*. 2021; **18**(2): 489-498.
7. Lai TH, Tang EW, Chau SK, Fung KS, Li KK. Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. *Graefe's Arch Clin Exp Ophthalmol*. 2020; **258**(5): 1049-1055.
8. Huang Z, Zhao S, Li Z, Chen W, Zhao L, Deng L, et al. The battle against coronavirus disease 2019 (COVID-19): emergency management and infection control in a radiology department. *J Am Coll Radiol*. 2020; **17**(6): 710-716.
9. Huang L, Lin G, Tang L, Yu L, Zhou Z. Special attention to nurses' protection during the COVID-19 epidemic. *Crit Care*. 2020; **24**(1): 1-3.
10. Cheng LT, Chan LP, Tan BH, Chen RC, Tay KH, Ling ML, et al. How the severe acute respiratory syndrome experience influenced a Singapore radiology department's response to the coronavirus disease (COVID-19) epidemic. *Am J Roentgenol*. 2020; **214**(6): 1206-1210.
11. Dexter F, Parra MC, Brown JR, Loftus RW. Perioperative COVID-19 defense: an evidence-based approach for optimization of infection control and operating room management. *Anesth Analg*. 2020; **131**(1): 37–42.
12. Wei W, Zheng D, Lei Y, Wu S, Verma V, Liu Y, et al. Radiotherapy workflow and protection procedures during the Coronavirus Disease 2019 (COVID-19) outbreak: Experience of the Hubei Cancer Hospital in Wuhan, China. *Radiother Oncol*. 2020; **148**: 203-210.
13. Chen W, Huang Y. To protect health care workers better, to save more lives with COVID-19. *Anesth Analg*. 2020; **131**(1): 97–101.
14. Wong J, Goh QY, Tan Z, Lie SA, Tay YC, Ng SY, 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*. 2020; **67**(6): 732-745.

15. Bourouiba L. Turbulent gas clouds and respiratory pathogen emissions: potential implications for reducing transmission of COVID-19. *J Am Med Assoc*. 2020; **323**(18): 1837-1838.

16. Phua J, Weng L, Ling L, Egi M, Lim CM, Divatia JV, et al. Intensive care management of coronavirus disease 2019 (COVID-19): challenges and recommendations. *Lancet Respir Med*. 2020; **8**(5): 506-517.

17. Odor PM, Neun M, Bampoe S, Clark S, Heaton D, Hoogenboom EM, et al. Anaesthesia and COVID-19: infection control. *Br J Anaesth*. 2020; **125**(1): 16-24.

18. Cheung JC, Ho LT, Cheng JV, Cham EY, Lam KN. Staff safety during emergency airway management for COVID-19 in Hong Kong. *Lancet Respir Med*. 2020; **8**(4): e19.

19. Coccolini F, Perrone G, Chiarugi M, Di Marzo F, Ansaloni L, Scandroglio I, et al. Surgery in COVID-19 patients: operational directives. *World J Emerg Surg*. 2020; **15**(1): 1-7.

20. Alhazzani W, Møller MH, Arabi YM, Loeb M, Gong MN, Fan E, et al. Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19). *Crit Care Med*. 2020; **46**(5): 854-887.

21. Welt FG, Shah PB, Aronow HD, Bortnick AE, Henry TD, Sherwood MW, et al. Catheterization laboratory considerations during the coronavirus (COVID-19) pandemic: from the ACC's Interventional Council and SCAI. *J Am Coll Cardiol*. 2020; **75**(18): 2372-2375.

22. Al-Shamsi HO, Alhazzani W, Alhuraiji A, Coomes EA, Chemaly RF, Almuhanna M, et al. A practical approach to the management of cancer patients during the novel coronavirus disease 2019 (COVID-19) pandemic: an international collaborative group. *Oncologist*. 2020; **25**(6): e936-945.

23. Bartlett DL, Howe JR, Chang G, Crago A, Hogg M, Karakousis G, et al. Management of cancer surgery cases during the COVID-19 pandemic: considerations. *Ann Surg Oncol*. 2020; **27**(6): 1717-1720.

24. Bornstein SR, Rubino F, Khunti K, Mingrone G, Hopkins D, Birkenfeld AL, et al. Practical recommendations for the management of diabetes in patients with COVID-19. *Lancet Diabetes Endocrinol*. 2020; **8**(6): 546-550.

25. Cao D, Yin H, Chen J, Tang F, Peng M, Li R, et al. Clinical analysis of ten pregnant women with COVID-19 in Wuhan, China: A retrospective study. *Int J Infect Dis*. 2020; **95**: 294-300.

26. Liang H, Acharya G. Novel corona virus disease (COVID-19) in pregnancy: What clinical recommendations to follow? *Acta Obstet Gynecol Scand*. 2020; **99**: 439–442.

27. Tan SS, Yan B, Saw S, Lee CK, Chong AT, Jureen R, et al. Practical laboratory considerations amidst the COVID-19 outbreak: early experience from Singapore. *J Clin Pathol*. 2021; **74**(4): 257-260.

28. Wang J, Shen J, Ye D, Yan X, Zhang Y, Yang W, et al. Disinfection technology of hospital wastes and waste water: Suggestions for disinfection strategy during coronavirus Disease 2019 (COVID-19) pandemic in China. *Environ Pollut*. 2020; **262**: 114665.

29. Ong SW, Tan YK, Chia PY, Lee TH, Ng OT, Wong MS, et al. Air, surface environmental, and personal protective equipment contamination by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) from a symptomatic patient. *J Am Med Assoc*. 2020; **323**(16): 1610-1612.

Cite this article as:
Aftab IB, Ahmed A, Mumu SK, Hossain MM. Management and prevention of hospital acquired SARS-CoV-2 infection. *IMC J Med Sci*. 2022; 16(2): 006.
DOI: https://doi.org/10.55010/imcjms.16.016