

COVID-19 Crisis: A Time for Practical Assessment of Hygienic Principles Observance

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ABSTRAK

Serentak dengan pandemik COVID-19, beberapa protokol telah dihasilkan untuk mencegah infeksi. COVID-19 boleh menyebabkan lebih kematian dalam wad transplan sumsum tulang kerana pesakit dalam wad ini mempunyai sistem imun yang lemah. Penilaian bagi protokol yang spesifik dalam wad ini dan penilaian praktikal terhadap pematuhan prinsip kebersihan oleh kakitangan perubatan semasa pandemik COVID-19 boleh dijadikan sebagai satu langkah untuk menyelamatkan nyawa pesakit. Semasa pandemik COVID-19, 40 pesakit menjalani pemindahan

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sumsum tulang di Hospital Iman Reza, Kermanshah, Iran mulai Februari 2020 ke Jun 2022. Satu susulan program telah dijalankan untuk menilai kemungkinan penularan COVID-19 dan kadar pematuhan kepada protokol prinsip kebersihan oleh staf perubatan. Protokol prinsip kebersihan telah dinilai dengan menggunakan borang soal selidik melalui pemerhatian/bukan pemerhatian. 'Real time polymerase chain reaction' (RT-PCR) dijalankan untuk mengenalpasti COVID-19 dalam pesakit berdasarkan ketiga-tiga gen dalam virus. Hasil RT-PCR ialah negatif pada semua pesakit yang dimasukkan ke hospital dalam jangka kajian. Kadar pematuhan prinsip kebersihan oleh kakitangan di wad ialah 100%. Hasil kajian yang didapati dalam kajian ini ialah langkah-langkah yang dijalankan oleh kakitangan di wad pemindahan sumsum tulang. Protokol spesifik untuk wad pemiindahan sumsum tulang bertindih dengan garis panduan kebersihan umum bagi COVID-19.

Kata kunci: COVID-19, Iran, protokol, pemindahan sumsum tulang

ABSTRACT

Simultaneously with COVID-19 pandemic, numerous protocols have been developed to prevent the infection. COVID-19 can be more fatal in the bone marrow transplant ward because patients admitted to these wards have a weakened immune system. Assessment of the protocol specified for this wards and practical evaluation of the hygienic principles observance by the medical staff during COVID-19 pandemic can be a step towards saving the lives of the patients. Coinciding with COVID-19 pandemic, 40 patients underwent bone marrow transplantation at Imam Reza Hospital of Kermanshah, Iran from February 2020 to June 2022. A follow-up program was performed to evaluate the possibility of COVID-19 transmission and the rate of hygiene practice by medical staff. The principles of hygienic protocols were scored as a questionnaire in which the observance/non-observance method were applied. Real time-polymerase chain reaction (RT-PCR) based on three genes of the virus was used to diagnose the COVID-19 patients. The results of RT-PCR tests were negative in all patients who were hospitalised during the study. The rate of observance of the hygienic principles by the staff in the studied ward was 100%.The obtained result in the present study was a reflection of the step-by-step implementation of the hygienic protocol specified for bone marrow transplantation ward by the staff. The protocol specified for the bone marrow transplantation ward was highly overlapped with COVID-19 general hygienic guidelines.

Keyword: bone marrow transplantation, COVID-19, protocol, Iran

INTRODUCTION

In December 2019 a new type of coronavirus was detected in the humans with pneumonia from unknown cause and it was unresponsive to the existing vaccines and treatments (Sadeghi et al. 2020). As the number of victims crossed 1,000 individuals, the World Health Organisation (WHO) chose an official name of COVID-19 for the disease, which was abbreviated from the "corona", "virus", "disease", and "2019" (Hu et al. 2021). COVID-19 is caused by severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2). People with chronic underlying diseases or immunodeficiencies are most at risk for COVID-19 (Yaqinuddin & Kashir 2020). Due to weakened immune system, the patients who are undergoing hematopoietic stem cell transplantation (HSCT) are more susceptible to a variety of infections, including COVID-19 (Engelhart et al. 2002; Urrea et al. 2004).

Furthermore, due to systemic immunosuppression that is usually administered to prevent graft versus host disease (GVHD) (Bouchlaka et al. 2010), the reactivation of immune system in allogeneic HSCT needs longer time than autologous HSCT (Williams & Gress 2008). Generally, in the first few months after transplantation and before appearance of neutrophils in the peripheral bloodstream, the recipient has a weakened immune system hence the recovery of the immune system has an important role in the care of recipients against infections (Mehta & Rezvani 2016).

The main route of SARS-Cov-2

transmission is through inhalation of infected respiratory droplets, close contact (less than six steps or two meters) with the infected person or the patient's discharge. Infected respiratory droplets are spread into the environment through sneezing or coughing and are fallen into the mouth or nose of people who are close to the patient and subsequently are transmitted into the lungs (Huang et al. 2020). It is also possible to get infected with SARS-CoV-2 via touching an infected object or surface and the infected hands touch the mouth, nose and eyes (Stokes et al. 2020). The viable virus can sustain up to 3 hours in airborne particles, 4 hours on copper, 24 hours on cardboard, and 2-3 days on plastic and stainless steel. The average half-life of SARS-CoV-2 is about 2.7 hours in airborne particles, 13 hours on steel and 16 hours on polypropylene. Aerosol and fomite transmission of SARS-CoV-2 is also reported (van Doremalen et al. 2020). SARS-CoV-2 is very stable at 4°C and in a wide range of pH values (pH 3-10) but it is sensitive to standard disinfection methods (Chin et al. 2020).

Preventive healthcare is the most effective, affordable and desirable way to fight infection (Haque et al. 2020). Some preventive healthcare approaches are hand washing, use of personal protective equipment (PPE) (gloves, mask, goggles, gowns, etc.) and observing the hygienic principles by the patients and medical staff especially the touching environmental subjects such as surfaces and aeration systems (Dogru et al. 2010). Assessment of the environmental and personal

hygienic principles in accordance with the protocols specified for the bone marrow transplant ward can be a great help in reducing mortality from COVID-19.

MATERIALS AND METHODS

The present study evaluated the hygienic protocol specified for bone marrow transplantation ward of Imam Reza Hospital in Kermanshah, west of Iran, during COVID-19 crisis.

Patients

A total of 40 patients underwent bone marrow transplantation at Imam Reza Hospital in Kermanshah from Feb 4, 2020 to June 15, 2022 were included. Patients were screened for COVID-19 before and after bone marrow transplantation.

Patients Follow-up

The patients who underwent bone marrow transplantation are treated with chemotherapy regimens hence higher diagnostic and therapeutic considerations should be applied for them. For all patients admitted to the transplantation ward, the diagnostic methods of computerised tomography (CT) scan and real time-polymerase chain reaction (RT-PCR) PCR were done according to the principals reported by the Iran Ministry of health and Medical Education.

The Protocol Specified for the Bone Marrow Transplantation Ward

The bone marrow transplantation ward designed a protocol with five basic principles. Adhering to these principles was a priority and agenda of the ward staff. In order to evaluate these principles, a checklist was prepared and made available to the ward staff to be filled based on self-expression (Table 1).

All five basic principal were rated based on poor, moderate and strong by two teams of physicians and quality control operators. The data were collected and non-compliance cases were recorded in the special form given to the evaluation teams and then processed and corrected without delay.

Ethical Approval

This study was approved by the Institutional Review Board and Ethical Committee of Kermanshah University of Medical Sciences.

RESULTS

Patients

The mean age of the patients was 41.63 ± 17.27 years. The frequency of male and female were 66.6% and 33.3%, respectively. Out of these patients, 8 (20%) had an underlying disease (diabetes, hypercholesterolemia and kidney disease), 16 (40%) had multiple myeloma, 9 (22.5%) had acute myeloid leukemia (AML), 5 (12.5%) had Hodgkin's lymphoma (HL), 3 (7.5%) had acute lymphocytic leukemia (ALL), 2 (5%) had chronic myelogenous leukemia (CML), 2 (5%) had Non

Table 1: Bone marrow transplant protocol of Imam Reza Hospital, Kermanshah University of Medical Sciences

No.	Basic principal	Clauses
1.	Use of personal protective equipment (PPE)	Mask Gloves Disposable gown Special shoe/ slippers covers
2.	Personal hygiene	Hand washing (20 sec) Hand rub No symptoms of infectious disease (sneezing, coughing, runny nose, etc.)
3.	Environmental hygiene	Disinfection of surfaces Sterilisation and decontamination of the patient's personal belongings Safe management of wastes Proper ventilation of the room
4.	Management actions	Prepare shift programs of alternative workforces Checking essential sanitary ware Monitoring the health of medical staff Investigate the extent to which medical staff adhere to the guidelines Holding workshops for medical staff Holding educational and justification sessions for families regarding the patient's condition Providing training packages for patients and their families Establish a suitable call center infrastructure to reduce visitors
5.	Motivation	Maintaining the patient's mental relaxation (preventing stress) Good temper and patience of medical staff in dealing with patients Providing a happy and fun environment

Hodgkin's lymphoma (NHL), 3 (7.5%) had chronic lymphocytic leukaemia (CLL), and myelodysplastic syndromes (MDS), amyloidosis (1 person each). A total of 17 (42.5%) patients received allogenic HSCT transplantation and 23 (57.5%) patients received autologous HSCT transplantation.

Follow-up

The CT scan and RT-PCR results were negative in all the patients. None of

the patients had symptoms of colds such as loss of sense of smell and taste, coughing, runny nose and shortness of breath. Four patients (10%) became infected with COVID-19 virus after discharge, but none of the patients became infected with COVID-19 during the admission period until discharge.

Qualitative Results of the Control Principles of the Bone Marrow Transplant Ward

All five basic principals of the bone marrow transplantation protocol were applicable and were implemented step by step by the staff. Hand washing, observing personal and environmental hygiene were the most important principles of the protocol in the prevention of COVID-19. The evaluation team reported 100% of compliance by medical staffs to the principals, due to the meticulousness needed for the ward's patients. No non-compliance cases were reported.

DISCUSSION

On Feb 19, 2020, first two suspected cases of COVID-19 were reported in Qom by the Iran Ministry of Health and Medical Education, whom both died of pneumonia. At the same time, the first case of COVID-19 in Kermanshah province occurred on Feb 19, 2020, when the patient died four days after hospitalisation. However, due to lack of diagnostic kit in Kermanshah and need to transfer of the sample to an equipped laboratory, the test results were reported positive 10 days later on Feb 29, 2020. This time was the beginning of COVID-19 epidemic in Kermanshah province.

Following awareness of the epidemic, Imam Reza hospital in Kermanshah was allocated to accept suspicious people. Under these circumstances, many people in the community were infected with COVID-19, and all the hospital resources were diverted to the care of COVID-19 patients. On the other hand, due to shortage of all types of blood cells (white blood cells, red blood cells and platelets), patients who

undergo bone marrow transplantation need special care in the hospital.

Staff commuting, close proximity with COVID-19 patients and weakened immunity of the patients who are undergoing bone marrow transplantation increased the risk of COVID-19 in the ward. The results were negative for all the patients who were admitted to the bone marrow transplantation ward during COVID-19 epidemic. Based on the observation from current study, the special protocol in the bone marrow transplant ward had extensive overlap with the general guidelines of COVID-19 which was very effective.

Implementing the principles and methods of infection control is vital for all hospital staffs, especially nurses, and will certainly have a significant impact on improving the quality of medical services and treatment of patients. Due to the lacking of standard treatment and effective vaccines for COVID-19, the best thing to do in the current situation is to avoid infection and try to prevent its spreading. In this regard, a variety of approaches have been proposed and among the most important is maintaining a safe distance (1.5 to 2 meters).

A key property of the dispersal of infectious disease is the average spatial distance between carrying cases (Salje et al. 2016). Therefore, observing spatial distance is one of the requirements of hygienic protocols for preventing the transmission of infectious microorganisms. According to the special hygienic protocol of the transplant ward, the staff is required to avoid people who have cold

symptoms; and while those who had symptoms should not present in the ward and were exempted from the task until recovering.

Hand washing and the use of PPE are other important factors that play major roles in preventing the transmission of infectious diseases, including COVID-19 (McCarthy et al. 2020; Lockhart et al. 2020). Although these principles may seem simple, the reports indicate that the rate of transmission is less than 50% when practicing the principles. For example, the reports showed that there is a significant difference in the extent of hand washing between before and after contact with patients (Beggs et al. 2006; Lam et al. 2004; Whitby et al. 2007). The reasons of such difference may be due to many parameters as follow; paying attention of the staff to their health more than the health of patients, lack of time, large number of patients under the care of limited number of nurses, time consuming of hand washing, dryness and irritation of the skin due to frequent washing, lack of sufficient toilets in various parts of the healthcare environment, the misconception that wearing gloves eliminates the need for hand washing, and little knowledge about the importance of hand washing (Larson et al. 2005; Barrett & Randle 2008).

It is important to note that the preferred method of hand hygiene varies depending on the type of work performed and the degree of contamination; hence health professionals have a duty to assess these methods (Munoz-Figueroa & Ojo 2018). One of the factors that have

a great impact on hand hygiene is the choice of antimicrobial hand wash product. Hand wash sanitary products should be antibacterial, fungicidal and antiviral.

Since the hands of health care workers are often contaminated with blood during routine patient care, antiviral (anti coated viruses) hand wash sanitary products should be considered. Relevant authorities should also consider the level of acceptance of the product (smell, feel, skin irritation) by users and its allergenic potential (Mathur 2011). Wearing gloves may be an alternative way to control the infection, but this should only do if the gloves are replaced between each care session. Moreover, gloves can be used when there is a possibility of contact with blood, substances containing infection or mucous membranes (Verbeek et al. 2020). However, it is often to observe that staffs use a pair of gloves to care for several patients. In addition, it should not be overlooked that a suitable environment (darkness, warmness and humidity) around the gloves increases the number of microbial flora in the hands, and if the hands are not washed with soap and water after removing the gloves. These microbes will increase the risk of infections transmission (Larson 2001).

Protocols will only work if they are implemented. Therefore, one of the ways to implement them is to educate and raise the level of knowledge in the medical staffs. Lacking of implementation of knowledge will not work as they complement each other.

One of the limitations might due to some patients were delayed in seeing

a doctor due to conditions caused by COVID-19. Therefore, their follow-up was only via virtual, which may cause the incomplete information. Another limitation of our study is that not all patients were followed up equally. Therefore, some of them, especially those who were included in the last phase of our study, had been followed-up to a lesser extent.

Generally, adequate and accessible equipment, observing personal hygiene, awareness and knowledge, proper implementation of hygienic principles, positive belief in the effectiveness of hygiene in reducing infections, and adherence to professional ethics have a prominent role in preventing infection. Motivation as the final basic principles which might not important in other protocols but this principle was observed to prevent the weakening of the immune system, hence is very effective in treating the patients.

CONCLUSION

Since the special protocol of the bone marrow transplant ward overlapped with the global protocols for COVID-19, it suggests successful treatment of patients with bone marrow transplantation, despite the weak immune system and underlying disease during COVID-19. It is due to the step-by-step of the special protocol of the bone marrow transplant ward.

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