The Response of Medical Doctors and Hospital Administration to Infection Prevention and Control in the Health Care of Suspected/Confirmed COVID-19 Patients

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Background: The outbreak of novel coronavirus infection emerged in and spread from China to other countries. Health care workers are at significant risk of infection from this virus in medical settings. We aimed to explore and evaluate the response of medical doctors and hospital administration to infection prevention and control of suspected or confirmed COVID-19 patients.

Methods: This cross-sectional study included 108 doctors who had exposure to suspected/confirmed COVID-19 patients in public hospitals.

Results: The doctors were aged 24 to 53 years, working in general hospitals (72.2%), primary health centers (23.1%), and a special coronavirus hospital (4.6%). One third (33.3%) reported that their hospitals had established a clinical triage station at the entrance to the facility. Suspected COVID-19 cases were immediately placed in an area separate from other patients (63.9%). The doctors ensured that patients covered their nose and mouth with a tissue to cough or sneeze (53.7%), and they performed hand hygiene after patient contact (98.1%). A medical team designated to care exclusively for suspected or confirmed COVID-19 cases was reported by 50.9%. The screening equipment was shared among patients (56.5%). The doctors avoided moving and transporting patients out of their room or designated area (83.3%). Many hospitals (76.9%) limited the number of medical staff and visitors who come in contact with suspected or confirmed patients. Most hospitals (72.2%) did not have a surveillance process for acute respiratory infections. Only 51.9% reported that staff collecting specimens used appropriate personal protective equipment.

Conclusions: The doctors reported that we adhere to infection prevention in providing health care, in contrast with hospital administration.

Key Words: severe acute respiratory syndrome coronavirus 2, surveillance, hand hygiene

The outbreak of novel coronavirus infection (2019-nCoV, commonly known as COVID-19) emerged in and spread from Wuhan, China, to other countries beginning in December 2019.1 Coronavirus has been reported in several other countries since it was first detected. The European Centre for Disease Prevention and Control and the US Centers for Disease Control and Prevention reported 21,896,155 cases and 774,539 deaths in 29 countries on 5 continents.2 The World Health Organization (WHO) expressed deep concern about the spread and severity of this pandemic.4

Health systems are faced with the rapidly increasing demands resulting from the COVID-19 outbreak. They are being overwhelmed, both directly from the coronavirus outbreak and indirectly from vaccine-preventable and treatable medical conditions. It is important to maintain the population’s trust in the capability of the health care system to safely provide essential medical needs and to control the risk of infection in health settings. The control of infection risk is considered key to ensuring proper care-seeking behavior and adherence to public health advice. Countries need well-organized and prepared health care systems to establish equitable access to essential medical service delivery in an emergency and to minimize direct and indirect mortalities. During the 2014 to 2015 Ebola outbreak, deaths caused by measles, malaria, human immunodeficiency virus/acquired immune deficiency syndrome, and tuberculosis attributable to health system failures exceeded deaths from Ebola.5,6

With a relatively limited health system load of COVID-19 cases, health systems may have sufficient capacity to maintain regular service delivery while managing COVID-19 cases, but when the load increases and/or the health care force is diminished because of infection of health care workers (HCWs), it is crucial to support the system’s own HCWs, especially medical doctors, during an outbreak.

The central question, as the coronavirus outbreak spreads across different locations in this region, is how HCWs protect themselves while assisting patients with COVID-19 in increasingly harrowing circumstances. It is estimated that 3000 HCWs became infected by this virus and 22 died in China.7

This study aimed to explore and evaluate the response of medical doctors and hospital administration to infection prevention and control during health care provided to suspected COVID-19 cases in Iraqi Kurdistan.

PARTICIPANTS AND METHODS

Study Design, Sampling, and Participants

Doctors who dealt with suspected or confirmed cases of COVID-19 in different geographical locations of the Duhok governorate (Northern Iraq) were invited to participate in the present study. They were recruited by sending out an online Google form. The link to the Google form was sent to their phone numbers or social media accounts between March 22 and 27, 2020.

The physicians were invited regardless of age, experience, and other sociodemographic factors and from different medical specialties and educational levels. The specialties of radiology, ophthalmology, psychiatry, oncology, rheumatology, dermatology, dentistry, pharmacology, and laboratory diagnosis were excluded. The question items were designed as required in the Google form to avoid missing information.

Data Collection and Assessment

The doctors’ general information was collected in the first part of the questionnaire, including age, sex, job ranking, experience in medicine, and work setting. The job rankings were categorized as general practitioner, junior or senior house officer, specialist, and consultant. Professional experience was counted...
in years since graduation from medical college (MBChB). The work settings were categorized as a general hospital, primary health center (PHC), or the corona hospital. The former burn and plastic surgery hospital has been changed to a corona hospital since the outbreak of coronavirus infection in this region.

The response of medical doctors and hospitals administration to infection prevention and control during health care for suspected/confirmed COVID-19 patients was evaluated based on the WHO guide called “infection prevention and control during health care when COVID-19 is suspected; interim guidance” released on March 19, 2020. The question items were designed based on the principles of infection prevention and control (IPC) strategies associated with health care for suspected COVID-19 patients. The items were closed-ended binary questions with yes or no answers.

1. Ensuring triage, early recognition, and source control
   - Setting up a clinical triage station at the entrance to the facility
   - Isolating suspected COVID-19 cases immediately to an isolated separate area
   - Using the screening questionnaires according to the case definition
   - Disseminating the signs and symptoms of symptomatic COVID-19 patients

2. Applying standard precautions for all patients
   - Ensuring that patients cover their nose and mouth with tissue to sneeze or cough
   - Offering a medical mask to patients
   - Are doctors performing hand hygiene after contact with respiratory secretions?

3. Implementing additional empirical precautions
   3.1. Contact and droplet precautions
   - Placing patients in adequately ventilated single rooms (For general ward rooms with natural ventilation, adequate ventilation is considered to be 60 L/s per patient. The procedure are:
     - Placing patients’ beds at least 1 m apart
     - Separating suspected patients from other patients
     - Designating a team of medical staff to care exclusively for suspected/confirmed cases of COVID-19
     - Using personal protective equipment (PPE) while giving care
     - Sharing screening equipment between patients with suspected or confirmed cases of COVID-19
     - Cleaning and disinfecting shared screening equipment
     - Avoiding touching eyes, nose, or mouth with potentially contaminated gloved or bare hands
     - Avoiding moving and transporting patients out of their room or designated area
     - Performing hand hygiene and wearing appropriate PPE
     - Cleaning and disinfecting surfaces in the hospital routinely
     - Recording all persons entering a patient’s room.
   3.2. Airborne precautions for aerosol-generating procedures
   - Limiting the number of persons who come in contact with patients
   - Performing the procedures in an adequately ventilated room
   - Performing cleaning and disinfecting procedures consistently and correctly
   - Collecting and handling laboratory specimens from patients suspected of COVID-19
   - Using appropriate PPE while collecting specimens
   - Training staff who transport specimens

After the questions, we suggested that participants offer comments and recommendations about infection control in their hospitals.

Statistical Methods
The descriptive characteristics of the doctors are presented in mean (standard deviation), median (interquartile), and number (percentage). The adherence of doctors and hospital administration to infection prevention and control protocols in the health care of suspected COVID-19 patients in Iraqi Kurdistan was determined in numbers and percentage. Statistical analyses were performed by the Statistical Package for Social Sciences, version 25 (SPSS Statistics for Windows, V. 25.0, IBM Corp., Armonk, NY).

RESULTS
The mean age of participants was 33.20 years (standard deviation, 5.70 years), ranging between 24 and 53 years, both men (68.5%) and women (31.5%). Their median years of experience was 6.0 (1–28 years) as general practitioners (15.7%), junior house officers (15.7%), senior house officers (34.3%), specialists (31.5%), and consultants (2.8%). Most worked in a general hospital (72.2%), followed by PHC (23.1%), and a special corona hospital (4.6%) (Table 1).

Ensuring Triage, Early Recognition, and Source Control
A small percentage of participants (33.3%) reported that their hospitals established a clinical triage station at the entrance to the hospital (Table 1).

| TABLE 1. General Characteristics of Doctors |
|---------------------------------------------|
| Doctors’ Characteristics (n = 108)         |
|                                             |
| Statistics                                 |
|                                             |
| Age (range: 24–53 years)                   | 33.20 | 5.70 |
| Sex                                         |       |      |
| Male                                        | 74    | 68.5 |
| Female                                      | 34    | 31.5 |
| Experience in medicine (Range 1–28 years)  | Median: 6.0 | Interquartile: 7.0 |
| Job hierarchies                             |       |      |
| GP                                          | 17    | 15.7 |
| Junior house office                         | 17    | 15.7 |
| Senior house officer                       | 37    | 34.3 |
| Specialist                                 | 34    | 31.5 |
| Consultant                                 | 3     | 2.8  |
| Working setting                             |       |      |
| General hospital                            | 78    | 72.2 |
| PHC                                         | 25    | 23.1 |
| Corona hospital                             | 5     | 4.6  |

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facility attended by trained staff. However, 63.9% reported that suspected COVID-19 cases are immediately isolated in an area separate from other patients. They reported using a screening questionnaire according to the case definition for early recognition of COVID-19 (70.4%). The hospitals have disseminated the signs and symptoms of symptomatic COVID-19 patients to alert health and medical staff (79.6%) (Table 2).

### Application of Standard Precautions for All Patients

More than half the doctors ensured that patients cover their nose and mouth with tissue or flexed elbow when coughing or sneezing (53.7%). Similarly, about half (50.9%) of the doctors/hospitals offered a medical mask to patients with suspected COVID-19 to use in waiting/public areas or in cohort rooms. Most doctors (98.1%) reported that they perform hand hygiene after contact with respiratory secretions (Table 2).

Participants reported that patients confirmed with COVID-19 are placed in adequately ventilated single rooms (77.8%), but only half (50.0%) reported that patients were placed in a separate room from other patients. Only 58.3% of the doctors reported that the patients’ beds were placed at least 1 m apart regardless of whether they were suspected of having COVID-19. Also, 50.9% of doctors reported that a team of medical staff had been designated to care exclusively for suspected/confirmed cases of COVID-19. Most doctors (56.5%) reported that the screening equipment is shared between patients, and only 61.1% disinfected or cleaned the shared screening equipment (Table 3).

### TABLE 2. Adherence to Implementing Empiric Additional Precautions

| Doctors’ Characteristics (n = 108) | Statistics, n (%) |
|----------------------------------|-------------------|
| 1. Ensuring triage, early recognition, and source control | | |
| Does your hospital have a clinical triage station at the entrance to the facility, supported by trained staff? | 36 (33.3) 72 (66.7) |
| Are the suspected cases of COVID-19 immediately isolated in an area separate from other patients? | 69 (63.9) 39 (36.1) |
| Do you use the screening questionnaires according to the case definition for early recognition of COVID-19? | 76 (70.4) 32 (29.6) |
| Has your hospital disseminated the signs and symptoms of symptomatic COVID-19 patients to alert health and medical staff? | 86 (79.6) 22 (20.4) |
| 2. Applying standard precautions for all patients | | |
| Do you ensure that patients cover their nose and mouth with a tissue when coughing or sneezing? | 58 (53.7) 50 (46.3) |
| Do you offer a medical mask to patients with suspected COVID-19 while they are in waiting/public areas or in cohorting rooms? | 55 (50.9) 53 (49.1) |
| Do you perform hand hygiene after contact with respiratory secretions? | 106 (98.1) 2 (1.9) |

### TABLE 3. Adherence to Implementing Empiric Additional Precautions

| Statistics, n (%) |
|-------------------|
| 3. Implementing additional empiric precautions |
| 3.1 Contact and droplet precautions | |
| Are confirmed patients with COVID-19 placed adequately ventilated single rooms? | 84 (77.8) 24 (22.2) |
| Are suspected patients to COVID-19 placed in a separate room from other patients? | 54 (50.0) 54 (50.0) |
| Are all patients' beds placed at least 1 meter apart regardless of whether they are suspected of having COVID-19? | 63 (58.3) 45 (41.7) |
| Has a team of medical staff designated to care exclusively for suspected or confirmed cases of COVID-19? | 55 (50.9) 53 (49.1) |
| Do you use personal protective equipment during giving care to suspected/confirmed cases of COVID-19? Such as mask, goggle, gown, gloves | 106 (98.15) 2 (1.85) |
| Is the screening equipment shared between patients with suspected or confirmed cases of COVID-19? | 61 (56.5) 47 (43.5) |
| If equipment needs to be shared among patients, are they cleaned and disinfected between use for each individual patient? Such as stethoscope. | 66 (61.1) 42 (38.9) |
| Do you avoid touching eyes, nose, or mouth with potentially contaminated gloved or bare hands? | 95 (88.0) 13 (12.0) |
| Do you try to avoid moving and transporting patients out of their room or area unless medically necessary? | 90 (83.3) 18 (16.7) |
| Are medical staff transporting patients to perform hand hygiene and wear appropriate personal protective equipment? | 65 (60.2) 43 (39.8) |
| Does the hospital routinely clean and disinfect surfaces with which the patient is in contact? | 57 (52.8) 51 (47.2) |
| Does the hospital maintain a record of all persons entering a patient's room, including all staff and visitors? | 44 (40.7) 64 (59.3) |
| 3.2 Airborne precautions for aerosol-generating procedures | |
| Does the hospital limit the number of medical staff, family members, and visitors who are in contact with suspected or confirmed COVID-19 patients? | 83 (67.3) 25 (23.1) |
| Are the procedures performed in an adequately ventilated room? | 51 (47.2) 57 (52.8) |

The doctors affirmed that they avoid touching the eyes, nose, or mouth with potentially contaminated gloved or bare hands (88.0%) and avoided moving and transporting patients out of their
published a triage station at the entrance to the facility. If the outbreak
Are the staff who transport specimens
Collecting and handling laboratory specimens from patients with suspected COVID-19
Are the medical staff collect specimens to use appropriate personal protective equipment (ie, eye protection, a medical mask, a long-sleeved gown, and gloves)?
Are the staff who transport specimens trained in safe handling practices and spill decontamination procedures?

room/area unless medically necessary (83.3%). Only 60.2% of the doctors stated that medical staff who transport patients perform hand hygiene and wear appropriate PPE. In addition, 52.8% of doctors reported that their hospitals routinely clean and disinfect the surfaces with which the patient had been in contact. Only 40.7% of the doctors reported that their hospitals maintain a record of all persons entering a patient’s room, including all staff and visitors (Table 3).

The doctors reported that the hospitals limit the number of medical staff, family members, and visitors who are in contact with suspected/confirmed COVID-19 patients (76.9%). However, the procedures were not performed in an adequately ventilated room (52.8%) (Table 3).

Medical staff had not been adequately trained by hospital administration about coronavirus infections (75.9%), and the hospital had not established a surveillance process for acute respiratory infections potentially caused by the COVID-19 virus among medical staff.

5. Using environmental and engineering controls

Are the cleaning and disinfection procedures are followed consistently and correctly?
Collecting and handling laboratory specimens from patients with suspected COVID-19
Are the medical staff collect specimens to use appropriate personal protective equipment (ie, eye protection, a medical mask, a long-sleeved gown, and gloves)?
Are the staff who transport specimens trained in safe handling practices and spill decontamination procedures?

most doctors are following precautionary measures, such as hand washing, but they must be encouraged to ensure that patients

TABLE 5. Comments and Recommendations of Medical Doctors
Categories and comments

Ensuring triage, early recognition, and source control
• We need more triage [stations] with well-trained doctors.
• In my opinion, to protect yourself and your community, you should deal [with] that everybody may have the disease and [every] thing was contaminated and need[s] sterilization.
• As we know PHCs are the first medical services when patient[s] seek medical care so [we] need to have more facility in order to manage suspected cases of COVID-19

Applying standard precautions for all patients
• Sometimes we go around all the hospitals to find a surgical mask. How you expect us to take care of patients when we do not have supplies to protect ourselves!!!!

Implementing additional empiric precautions
Contact and droplet precautions
• There is no adequate PPE for staff in my PHC center.
• Sometimes we use PPE for more than 8 hours because there is a shortage of PPE.
• [We have] a very bad protective system for doctors (doctors are in danger).
• We want more facilities for self-protection and to investigate more patients.
• We do not have the appropriate equipment’s to protect ourselves and our patients.
• Doctors will be infected more than patients.
• Stay at home it the best way to protect people from the corona virus.
• Our hospital has no ability or a special place to keep confirmed COVID-19 cases.

Participants reported that cleaning and disinfecting procedures were not followed consistently and correctly (63.9%) (Table 4).
Just over half the doctors (51.9%) reported that the medical staff who collect specimens use appropriate personal protective equipment (ie, eye protection, medical mask, long-sleeved gown, and gloves) and that staff who transport specimens have been trained in safe handling practices and spill decontamination procedures (49.1%) (Table 4).

Comments and recommendations of the doctors regarding coronavirus infection control are presented in Table 5.

DISCUSSION

Most participants reported that their hospitals had not established a triage station at the entrance to the facility. If the outbreak rapidly spreads across the region, the local coronavirus task force may not be able to afford large-scale diagnostics. Therefore, at the current time, it is critical for the health care system to prioritize triage stations based on clinical case definitions. Establishing a triage and implementation of minimal WHO IPC requirements must be set up as part of COVID-19 preparedness since people with and without COVID-19 present to the health system initially in the same way.

Some routine and elective services have been postponed or suspended in the region, such as those in PHCs. This may help the Ministry of Health mitigate the effect of the threat to health care caused by the competing demands of this outbreak. The government must establish effective patient flow strategies at all levels, including screening and contact tracing, triage, and targeted referral of COVID-19 and non–COVID-19 cases.

Most doctors are following precautionary measures, such as hand washing, but they must be encouraged to ensure that patients

| TABLE 4. Adherence to Implementing Administrative Controls, Environmental Controls, and Collecting and Handling Laboratory Specimens |
|---------------------------------------------------------------|
| Doctors’ Characteristics (n = 108)                              |
| Statistics n(%)                                               |
| 4. Implementing administrative controls                      |
| Has been provided adequate training for medical staff by the hospital administration? |
| 26 (24.1) 82 (75.9)                                           |
| Has the hospital established a surveillance process for acute respiratory infections potentially caused by the COVID-19 virus among medical staff? |
| 30 (27.8) 78 (72.2)                                           |
| 5. Using environmental and engineering controls               |
| Are the cleaning and disinfection procedures are followed consistently and correctly? |
| 39 (36.1) 69 (63.9)                                           |
| Collecting and handling laboratory specimens from patients with suspected COVID-19 |
| Are the medical staff collect specimens to use appropriate personal protective equipment (ie, eye protection, a medical mask, a long-sleeved gown, and gloves)? |
| 56 (51.9) 52 (48.1)                                           |
| Are the staff who transport specimens trained in safe handling practices and spill decontamination procedures? |
| 53 (49.1) 55 (50.9)                                           |
cover their nose and mouth with tissue or flexed elbow when coughing or sneezing. These patients could put HCs at further risk of becoming infected with COVID-19, as the medical staff is at a greater risk of infection.9

In practice, it is not feasible in our region to place all confirmed COVID-19 patients in separate and ventilated rooms; even the government of Lombardy in Italy was unable to allocate every critically ill patient to a private COVID-19 intensive care unit (ICU).10 However, it is important to separate the beds of confirmed cases by at least 1 m from each other. As was applied in Lombardy, the health managers created ICU cohorts for COVID-19 patients. These cohorts were placed in a separate area from other ICU beds. Cohort ICU beds minimize the risk of in-hospital transmission.10 The number of ICU beds must be increased, as we expect the number of confirmed cases will sharply increase within the next weeks.

Home care and mobile clinics could avoid unnecessary transporting and alleviate the pressure on the hospitals.11 Early oxygen therapy, pulse oximeters, and nutrition may be delivered to the homes of patients with mild severity, taking into account the wide surveillance system and the need for sufficient isolation. This technique could limit the rate of hospitalization to a focused target group of patients with severe disease.4 Currently, 2 small temporary hospitals for confirmed cases of COVID-19 are being built in the Duhok governorate. These facilities will help the local health care system mitigate the load flow.

An important point that was implemented during this time is that health authorities applied a quarantine in the initial clusters in several towns and on borders to slow the transmission of the virus. The quarantine was reinforced with precautionary measures, such as self-isolation and social distancing. By April 2, 2020, there were only 176 confirmed cases of COVID-19 in Iraqi Kurdistan—12 in Duhok, 63 in Erbil, 93 in Sulaimaniyah, and 8 in Halabjah.

We need to take into account that hospitals are the principal COVID-19 carriers because they are quickly populated by infected cases, facilitating transmission to previously uninfected patients.4 Many doctors reported that they use PPE against the epidemic, but the protective equipment is not readily available in all health settings. It seems that the health administration collected most of the existing PPE for use in the special coronavirus hospital.

Medical staff must be well equipped because they are asymptomatic carriers and are not followed in a surveillance system. In addition, some of the medical staff may die at the frontline owing to stress.4 The minimum duty of health administration is to provide sufficient disinfectants to clean and decontaminate surfaces that are in regular patient contact.

We recommend that the government present clear guidance for using PPE since panic buying has recently resulted in insufficient facemasks and N95 respirator-class masks in the region. The government must act now to secure supplies and stocks in case outbreaks spread rapidly across the region to prevent the shortage of essential PPE. The health system cannot ask HCs to be on the frontline without suitable protective equipment.12 When doctors work on the respiratory ward with COVID-19 patients, they feel unprotected without sufficient PPE, as reflected in their comments. In addition, these doctors can carry the disease home to their families or pass it to other non–COVID-19 patients in their care if they are not supplied with sufficient protective equipment.

Half of the doctors reported that designating a special medical staff to care exclusively for suspected or confirmed cases of COVID-19 had not been done. Medical doctors and nurses are circulating among medical settings to meet this outbreak. Since the COVID-19 virus is spread through contact, droplets, and fomites, minimizing the risk of infection is vital. The WHO13 recommends optimizing the size of the team to minimize contact with suspected cases of COVID-19, ensuring that the investigation team members are trained in IPC measures for this virus and conducting interviews with suspected cases by phone or at a distance of more than 1 m.

In light of the evidence, WHO maintains their suggestions of performing hand hygiene and regularly cleaning and disinfecting surfaces in medical settings. Medical masks and respirators are used for circumstances and settings where aerosol-generating procedures are performed.14 The evidence has underscored that the COVID-19 virus is transmitted during close contact by respiratory droplets and fomites.15,16 Transmission of the virus is by direct person-to-person contact when a COVID-19 patient talks, coughs, or exhales. These droplets can reach the nose, mouth, or eyes of another person. Because the droplets are too heavy to remain airborne, they land on surfaces and objects around the person. Others can become infected by touching these contaminated surfaces or objects and subsequently touching their eyes, nose, and mouth. The transmission of smaller droplet nuclei (airborne transmission) that travel distances greater than 1 m is limited to aerosol-generating procedures while performing clinical care for confirmed cases of COVID-19. Clearly, HCWs are at greater risk of infection from this virus.12

In light of the available evidence, WHO recommends using surgical masks for regular care of cases of COVID-19 and respirator-class masks (N95, FFP2, or FFP3) for circumstances and settings where aerosols are generated.17 The viable virus is detected in aerosols up to 3 hours after aerosolization, up to 4 hours on copper, up to 24 hours on cardboard, and 2 to 3 days on plastic and stainless steel. The median half-life estimate for the HCoV-19 virus is about 13 hours on steel and about 16 hours on polypropylene.18

Performing surveillance of suspected, probable, and confirmed cases of COVID-19 is required in accordance with the Global Surveillance for Human Infection released by WHO.19 The American health departments reported that 222 of health care personnel were exposed to the infection. The cases were identified by surveillance of 100 cases of the community who were exposed to a patients in medical settings.20

Medical personnel who are involved in the collection and transportation of specimens must be fully trained in proper handling and spill decontamination procedures.21 Carelessness in specimen collection may put the community at a high risk of further infection. Prompt collection and testing of suitable specimens from patients meeting the criteria of suspected cases of COVID-19 must be a priority for clinical management and outbreak control. The WHO states that all laboratory collected specimens must be considered potentially infectious. Therefore, HCWs who collect, handle, or transport clinical specimens must adhere to standard precaution measures and biosafety practices to reduce the possibility of exposure to pathogens.22

CONCLUSIONS
The doctors who participated in this study reported that they adhered to infection prevention and control during health care of suspected/confirmed COVID-19 patients. However, the hospitals administrations did not adhere to infection control guidelines.

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