A Case Report of the Hospital-Acquired Coronavirus Disease 2019 Pneumonia

Recognition of the Potential Exposure, Atypical Presentation, and Timeline on the Course of the Illness

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Abstract: This study presented a case of coronavirus disease 2019 pneumonia in a patient in isolation for 103 days. Severe acute respiratory syndrome coronavirus 2 was positive in her last 4 days. Despite policies of temperature checks for employees and visitors, and employees facing patients wearing a mask, the transmission of severe acute respiratory syndrome coronavirus 2 from an asymptomatic carrier was inevitable.

Key Words: COVID-19 pneumonia, asymptomatic transmission, hospital acquired

CASE REPORT

This is a case of a 28-year-old woman with a prolonged hospital stay, 103 days, for sustained 54% total body surface area burn injury from the resultant flame after lighting garbage.

The emergency medical service staff intubated the patient for airway protection, and the patient was airlifted to the emergency department of the Louisiana State University Health Sciences Center via helicopter. Initial vital signs and investigations showed heart rate of 142 beats per minute, blood pressure of 148/101 mm Hg, respiratory rate of 16 breaths per minute, and oxygen saturation (SpO2) of 95%. Laboratory results (white blood cell [WBC] count, 39.59 K/μL; hemoglobin level, 16.1 g/dL; platelet count, 562 K/μL; and albumin, 2.1 g/dL) and chest x-ray (CXR) showed prominent interstitial markings and endotracheal tube present.

The patient was admitted to a private room at the burn intensive care unit for further care, ventilation, and wound care and volume resuscitation. The patient's hospital course was characterized by multiple operation room visits, intermittent clinical decompensation with cyclical fevers of temperature ranging from 101°F to 104°F, episodes of tachycardia, hypotension, and desaturation. The patient, however, became stable, normotensive, and had a temperature range of 99°F to 100°F for approximately 2 weeks (March 10, 2020, to March 22, 2020).

The patient deteriorated with sepsis again, with decreased oxygen saturation, hypotension, and hypothermia (temperature, 95.7°F), and was put back on a ventilator on March 24, 2020. On March 26, 2020, the clinical condition rapidly worsened with marked tachypnea on the ventilator, increasing oxygen requirements, metabolic acidosis, and characteristic CXR findings as shown. The patient tested positive for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) on March 27, 2020, and was isolated in a negative pressure room and given hydroxychloroquine, but she continued to deteriorate, requiring 100% FiO2 to keep her oxygen saturation at 94%. The patient expired on March 30, 2020.

Epidemiological Exposure and Timeline of the Course of the Illness

The mystery of transmission here may be solved with an evaluation of who may have had direct or indirect contact with the patient, and if they had coronavirus disease 2019 (COVID-19). There was no caregiver symptomatic or sufferer from COVID-19 who took care of the patient throughout. The source of infection from within the hospital is not clear. It shows the many possible exposures that might have transmitted the infection. In all, 4 of the nurses tested positive for SARS-CoV-2, a week after patient's demise. A respiratory therapist whose husband was SARS-CoV-2 positive before the patient tested positive also took care of the patient. However, she was SARS-CoV-2 negative. Only if she was an asymptomatic carrier of SARS-CoV-2 from exposure to her husband and tested positive could she be a possible source in this case. The patient's mom who visited daily until March 17, 2020, when zero visitor policy was implemented was not tested. The patient was nursed from March 21, 2020, to March 23, 2020 (4 days before clinical deterioration and 7 days before diagnosis), by a nurse who became ill and tested positive for SARS-CoV-2, 1 week after the patient had died (Table 1). The nurse had complied fully with the hospital policy and use of personal protective equipment. She might have been an asymptomatic source of transmission, given the average incubation period of 4 to 7 days for COVID-19.

The patient tested positive for SARS-CoV-2 (March 27, 2020), although unable to exhibit “travel history” or express recognizable “who she met while she was there.” Also, no early symptoms of sore throat, cough, aches, shortness of breath, and anosmia, indeed COVID-19 pneumonia, may correctly be described as a confounding virus, COVID-19.

The interval between acquisition and decompensation/expiration was only 7 days (March 24 to 30, 2020), which fit into the average incubation period of 4 to 7 days, estimating the mode of acquisition and transmission risk in this patient who had aero-solizing procedures, including suctioning points to airborne/droplet spread through the asymptomatic or presymptomatic caregiver. A timeline of epidemiological exposure, clinical features, silent hypoxemia, shock, and acute respiratory distress syndrome (ARDS) with the matching radiological imaging and diagnostic reverse transcription polymerase chain reaction is a likely guide to the surveillance of the health care–acquired SARS-CoV-2
infections. A compounding factor is the potential for atypical presentation of COVID-19.

**DISCUSSION**

This is the first case report and description of a chronically ill, prolonged hospitalized patient who, despite prior protective isolation, was infected with SARS-CoV-2 in the United States. The timeline fits and is verifiable as shown in table 1. Fourteen days before the patient’s positive test, the nurses and respiratory caregivers who documented the care given showed the asymptomatic respiratory therapist whose husband was SARS-CoV-2 positive before the patient and the registered nurses who became symptomatic and tested positive after taking care of the patient. Similar to published data, she developed ARDS and rapid deterioration leading to death. It should show insight into the risks of hospital-acquired SARS-CoV-2, which may not be prevented by mere social distancing as obtainable in community-acquired prevention. In the face of changing guidelines, given the novelty of COVID-19, more needs to be done in hospitals than zero visitor policy, temperature checks for employees and visitors, and use of surgical masks.

Those caring for these patients who are vulnerable by their premorbid state should undergo extra strict hygiene and extensive pretesting and tracing and, if asymptomatic but infected, should be home quarantined and not continue to work.

The radiological imaging findings (Fig. 1) in this patient are typical and, as commonly found in CXR with confirmed COVID-19 pneumonia, its characteristic haziness and bilateral reticular opacities, especially after 72 hours of onset. Similarly, the

| Date | March 21 | March 22 | March 23 | March 24 | March 25 | March 26 | March 27 | March 28 | March 29 | March 30 |
|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| SARS-CoV-2 | RIP | RIP | RIP | RIP | RIP | RIP | RIP | RIP | RIP | RIP |
| WBC count, K/μL | 6.9 | 5.12 | 8.16 | 13.07 | 13.46 | 11.06 | 11.48 | 13.7 | 13.44 | 13.02 |
| Lymphocyte % | 28 | 12 | 6 | 9 | 5.5 | 4.0 | 5.0 | 7.6 | 8.0 | 12 |
| SpO2, % | 99.8 | 99.2 | 96.3 | 93.6 | 91.1 | 91.6 | 93.9 | 90.6 | 90.6 | 90.6 |
| Fio2 (%) | 40 | 30 | 65 | 60 | 60 | 60 | 100 | 100 | 100 | 100 |
| Temperature | 100°F | 98.4°F | 97.2°F | 99.7°F | 98.8°F | 100.2°F | 102.6°F | 101°F | 100.6°F | 99.0°F |
| Nurse/respiratory therapist | Nurse 11 caregiver tested positive after the patient. Nurse 13 and 14 caregiver tested positive after the patient. Respiratory therapist’s husband tested positive before the patient. |

**FIGURE 1.** Showing progression of deterioration and worsening of chest X-ray from A to B to C.
patient had a normal WBC count with lymphopenia, an occurrence in approximately 67% of cases. As it is found in all intubated patients, ARDS was present with profound hypoxemia; despite $FiO_2$ of 100%, the patient was barely able to keep up an oxygen saturation of 94%. The extent to which the transmission of SARS-CoV-2 from either asymptomatic or presymptomatic has occurred may not be known; however, this is the only plausible explanation of the hospital-acquired COVID-19 in a patient who has been hospitalized for over 100 days and kept in a protective isolation room. It would seem that the patient's exposure occurred between 1 and 3 days (from March 21 to 24, 2020) before symptoms of hypoxia development. This clinical characteristics of asymptomatic infection with SARS-CoV-2 highlights the importance of longitudinal surveillance of contacts in this case, via virus nucleic acid tests. Screening among close contacts will be beneficial in the future for protection of at-risk patients in a vulnerable environment, in addition to a strict and robust system of infection control placed.

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