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Preventing the Spread: A Comprehensive Cancer Center's Journey to Prevent the Spread of Coronavirus Disease (Covid-19) During the 2020 Pandemic

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Abstract

Background: On March 11, 2020, the World Health Organization (WHO) declared Coronavirus Disease (COVID-19) a pandemic. Hospitals around the world began to implement infection prevention and control (IPC) measures to stop further spread and prevent infections within their facilities. Healthcare organizations were challenged to develop response plans, procure personal protective equipment (PPE) that was in limited supply while continuing to provide quality, safe care.

Methods: As a comprehensive cancer center with immunocompromised patients, our efforts began immediately. Preventative measures were established and, as of September 2020, over 14,000 patients have been tested within the facility. From March 2020 through September 2020, only one case of hospital acquired (HA) COVID-19 was identified among our patients. Two cases of suspected community acquired (SCA) cases were also identified. Following the Centers for Disease Control (CDC) guidance, IPC measures were implemented within the facility as information science about the virus developed. This article addresses the IPC measures taken, such as enhancing isolation precautions, implementing screening protocols, disinfecting and reusing N95 respirators, by the center throughout the pandemic as well as the challenges that arouse with a new and emerging infectious disease.

Conclusions: The infection control measures implemented at our comprehensive cancer center during the COVID-19 pandemic allowed our center to continue to provide world class cancer care with minimal COVID-19 infection transmission among patients and team members.

Keywords

infection, oncology, Covid-19, prevention, infection, prevention, comprehensive cancer center

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Introduction

Outbreaks of newly emerging infectious diseases create new challenges for hospitals to navigate. Most hospitals are dependent on the research and data that is collected by the Centers for Disease Control (CDC) when implementing new infection prevention and control measures (IPC). This has been the case with several newly emerging viruses that have become a global concern in past years, which include Ebola virus, severe acute respiratory syndrome (SARS)-, Middle East respiratory syndrome (MERS)-coronavirus, and the avian influenza virus.[1] In December of 2019, a large cluster of patients presented with

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severe respiratory infections with unknown etiology in Wuhan, China. This respiratory illness was later determined to be Coronavirus Disease (COVID-19) and a novel *Betacoronavirus* was subsequently isolated as the causative agent.[2] The virus, which is transmitted via respiratory droplets or small particles, such as those in aerosols, produced when an infected person coughs, sneezes, sings, talks, or breathes, started to spread quickly and was soon declared a pandemic on March 11, 2020, by the World Health Organization (WHO).[3,4] In our local county alone, from March 1, 2020 through September 30, 2020, there were a total of 42,455 COVID-19 cases identified. With more than 40 million people with documented COVID-19 infections and more than one million deaths, the illness continues to spread around the globe.[5]

For new emerging diseases, the recommendations for healthcare providers (HCP) can constantly change as the rapidity of emerging literature and data is established. Our journey at the cancer center is no different. Our comprehensive cancer center is a full-service hospital licensed for 217 beds. Last year alone, we had more than 450,000 outpatient visits, over 425 transplants and are currently the largest Blood and Marrow Transplant and Cellular Immunotherapy program east of Houston and south of Boston. We currently stand with 15 operating rooms on our main campus and 5operating rooms at our outpatient ambulatory surgery center. Our timeline of events will address the IPC measures we implemented along the way (Figure 1), challenges we faced and our incidence of COVID-19 within the cancer center as defined by our case definitions (Table 1).

Infection Prevention and Control Measures

The Infection Prevention and Control program began to review data about COVID-19 long before it was officially declared a pandemic. After reviewing our policy, Influx of Infectious Persons-Pandemic Preparation, we determined our readiness has been suboptimal and there were observed gaps in preparedness seen, not only in our facility, but around the world. As COVID-19 seemed to be unlike the other emerging diseases the center had previously prepared for, we knew we needed to be prepared for the quickly changing and unpredictable circumstances that might present during this time. Beginning on February 5, 2020, the cancer center implemented screening of all patients on arrival to determine if they were displaying any signs and symptoms of COVID-19. Shortly after, the cancer center created an informational letter for patients about COVID-19 and the screening process. With the increased screening protocols, we also implemented Enhanced Airborne Precautions as outlined in our existing pandemic policy. Enhanced Airborne Precautions required staff members to don gloves, gown, eye protection, a N95 respirator, and place the patient in an Airborne Infection Isolation (AII) room in the inpatient setting. With other recent epidemics, the CDC and the WHO usually take the same stance on personal protective equipment (PPE). However, COVID-19 has presented a new set of challenges for Infection Preventionists to navigate. Transmission-Based Precautions are used based on the routes of transmission of the pathogen and according to the clinical syndrome and the likely etiologic agents.[6] Although COVID-19 presented as a virus spread via droplets, the CDC recommended a N95 respirator as the preferred choice of mask protection. The WHO however stated in their *Advice on the use of masks in the context of COVID-19: Interim guidance* that, "in the absence of aerosol generating procedures (AGPs), WHO recommends that health workers providing direct care to COVID-19 patients, should wear a medical mask (in addition to other PPE that are part of droplet and contact precautions); in care settings for COVID-19 patients where AGPs are performed (e.g. COVID-19 intensive and semi-intensive care units), WHO recommends that health workers should wear a respirator (N95 or FFP2 or FFP3 standard, or equivalent)."[7-9] This contradictory guidance left Infection Preventionists unsure of the next steps as word of a global PPE shortage was on the horizon.

By March, the implementation of screening of all patients and visitors upon entering the building was put into place and a COVID-19 Operations manual was created. The Operations manual was created by a multi-disciplinary team and detailed the plan for managing COVID-19 patients in every area of our facility.

In addition, our facility was starting to see the impacts of the PPE shortage. After a comprehensive review of the most current guidelines, our facility made the decision to follow the WHO guidance for mask protection and recommend the use of a standard surgical mask when caring for COVID-19 positive patients or patients under investigation (PUI) and don a N95 respirator for any AGPs. The decision was implemented as our supply of N95 respirators was depleting at a fast pace and the demand for N95s could not keep up with the current supply in the United States. There was also an increase in the number of procedures that were considered AGP. Unlike normal hospital facilities, our cancer center has a very low incidence of Tuberculosis (Tb) and, therefore, the utilization of N95 respirators was rather low. At the time, many team members had not been properly face-fit tested for N95 respirators as many of our outpatient clinics do not have AII rooms and do not see patients with airborne infectious diseases. With the move from a N95 respirator to a surgical mask, our facility created a new transmission-based category to be used for our COVID/PUI patients, Enhanced Droplet/Contact. This category would only require the use of a N95 respirator during AGPs and allowed for placement of patients in non-AII rooms.

As more COVID-19 cases were being identified by the cancer center and more N95 respirators and eye protection were being utilized, our stock was beginning to dwindle. The IPC team implemented the CDC recommended guidance for respirator (N95) reuse and the reuse and extended use guidelines for eye shields in mid-March in order to maintain an adequate supply for frontline healthcare workers.[10,11] Along with the N95 respirator shortage, other supplies of PPE became very hard to obtain. Our supply chain team worked around the clock to ensure our frontline staff were always sufficiently stocked. The lack of PPE supply around the world forced many hospitals into expensive bidding wars. Trying to navigate a PPE shortage in the middle of a pandemic can be very challenging and create unforeseen barriers no one can plan for. Our center's next move would change a routine practice we have

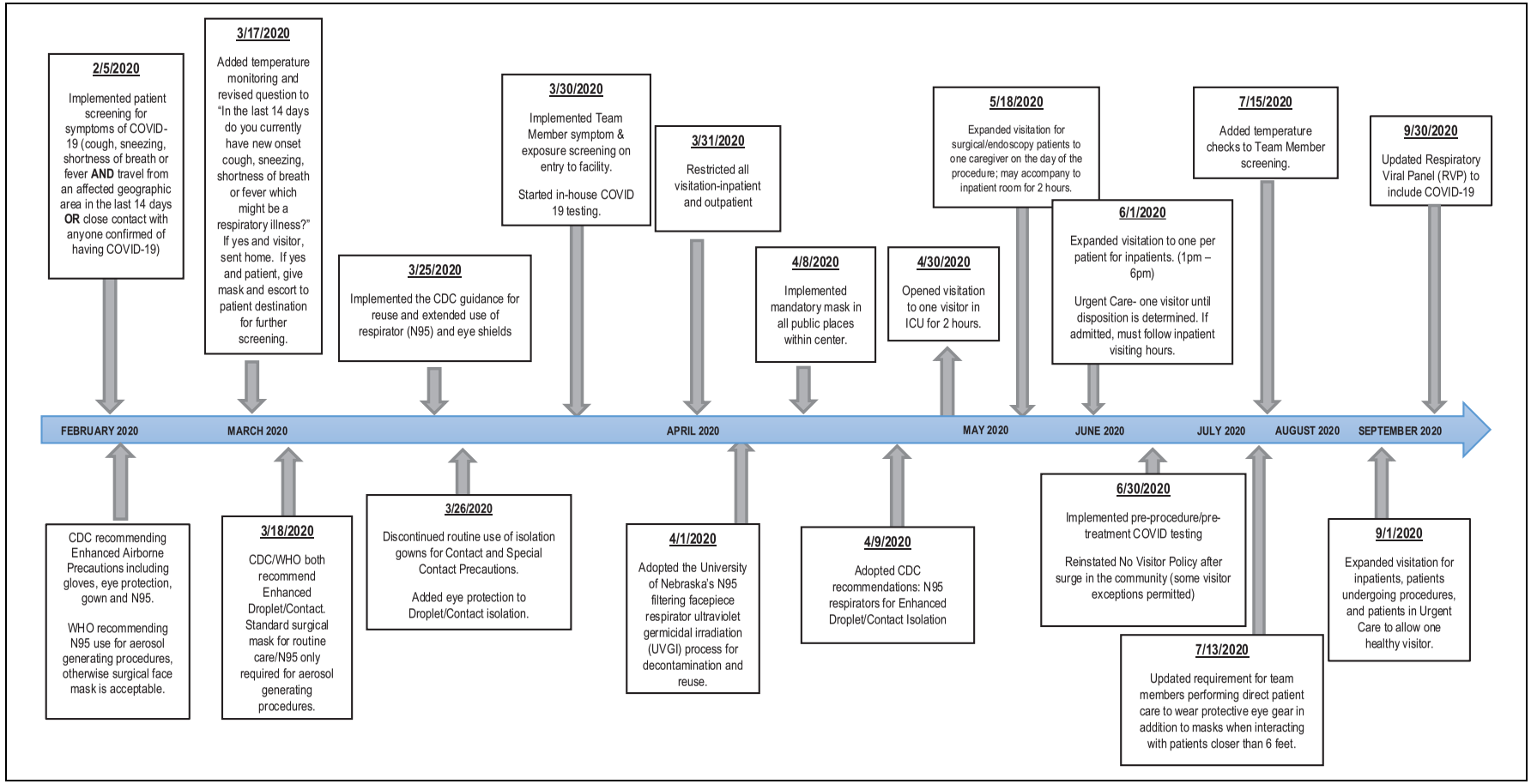

Figure 1. COVID-19 timeline of interventions.

Table 1. Criteria for Classifying COVID-19 Cases.

Classification	Inpatient cases identified	Case definition
Community Acquired (CA)	22	Symptoms and/or COVID-19 positive on admit or within 3 days of admit
Suspected Community Acquired (SCA)	3	Symptom onset and first COVID-19 positive within 14 days of admission with known epidemiological link with COVID-19 case not involved with cancer center
Hospital acquired (HA)	1	Symptom and/or COVID positive test on or after day 4

had in place for many years. The discontinuation of routine use of isolation gowns for entry into a patient's room who was on contact isolation for multi-drug resistant organisms (MDRO) (e.g., Methicillin Resistant Staphylococcus Aureus, Vancomycin Resistant Enterococcus, etc.) or special contact isolation (e.g., Clostridium difficile, norovirus, etc.) was rolled out throughout the center. An extensive literature review was completed prior to making this change and the IPC team would continue to monitor MDRO trends daily to ensure there were no statically significant increases in our rates. As more data about the virus was collected and the rates continued to increase, the implementation of eye protection to our standard Droplet/Contact isolation was initiated. The remainder of March continued to increase the IPC team's workload as their shifts were expanded to take on the new normal of COVID-19. Our center began team member screening at all entrances to the building, implemented a strict no visitor policy for both inpatient and outpatient visits, and in-house COVID-19 testing had been validated and started hospital-wide.

April began another busy month for the cancer center. With the increase demand of N95 respirators around the world and at our center, we adopted the University of Nebraska's N95 filtering facepiece respirator ultraviolet germicidal irradiation (UVGI) process for decontamination and reuse.[12] In addition to following the UVGI process outlined by the University of Nebraska, we verified the ultraviolet (UV) cycles at the beginning of each day with a UV dose verify card to ensure sufficient UV-C dose levels had reached the targeted surfaces (masks). Community spread in our area was also beginning to rise, and following guidance from the CDC, we implemented a mandatory mask policy for anyone entering the building. The implementation of mandatory masks increased team members perception of safety as more evidence about the virus supported the possibility of reducing transmission of asymptomatic and minimally symptomatic spread to other providers and patients when wearing a mask.[13]

As we know, with any new emerging infectious disease, the recommendations and supporting evidence will continue to change as more studies are completed. With new supplemental studies to support airborne spread of the virus during activities such as coughing and sneezing, on April 9, we reverted to requiring N95 respirators for all staff caring for patients who were COVID-19 positive/PUI patients. By mid-March, our center validated and implemented our first set of automated molecular test for the qualitative detection of SARS-CoV-2, the virus that causes COVID-19. As the test was in such high demand, the supplies were once again limited and, until May, we restricted the capacity of tests being run. The test provided rapid detection and allowed results in as soon as 30 minutes.

At the end of April, our center began to reevaluate the emotional well-being of our patients along with the COVID-19 trends in the community. The leadership began to allow one visitor to our Intensive Care Unit (ICU) for 2 hours daily. This trend continued into May as our hospital maintained a low COVID-19 positive census. By mid-May, surgical and endoscopy patients could have one caregiver with them on the day of their procedure. Caregivers could accompany the patient to their inpatient room if needed and could stay for 2 hours. On June 1st, our center moved toward allowing one healthy adult visitor per patient for inpatients and our Urgent Care unit allowed one healthy visitor to remain with the patient until a disposition has been determined and if the patient is admitted. These changes were all made as trends were being observed in the community. We did note that, during the time frame that visitors were permitted, one patient contracted COVID-19 following a visit from his adult children who tested positive the day after their visit. The children were the likely source as the visit occurred during the 14-day incubation period. Per our case definition, this patient was considered a suspected community acquired case (SCA). June was also the only month we had identified a hospital acquired (HA) COVID-19 case within the cancer center.

When our community experienced a second wave of COVID-19 cases, on June 30th, our center reinstated the no visitor policy with limited exceptions. These exceptions included end of life, patients with significant neurocognitive impairment and/or who cannot consent for themselves, patients younger than 18 years of age, and Bone Marrow Transplant (BMT) patients with designated caregivers who were to remain for the patient's entire hospitalization. We also implemented COVID-19 testing protocols to include all patients prior to chemotherapy, radiation therapy and surgery.

As a new month began, new protocols ensued. Following additional recommendations from the CDC, our center added temperature checks to our team member screening and banned masks with external valves for source control. As cases continued to rise within the community, in July, our center encouraged patients to wear a mask or face covering, when possible, whenever someone entered their room and when they left their room. We also implemented the use of eye protection for any team member performing direct patient care within 6 feet of a patient. The IPC team continued to round in all patient care areas to provide education about the new changes and ensure staff were wearing the appropriate PPE.

Even though the center only experienced one HA COVID-19 infection in our patient population, 5 staff members tested positive following COVID-19 positive patient exposures, one caregiver tested positive and 2 additional cases of SCA was identified among our patient population. Three of these staff exposures

occurred prior to the implementation of eye protection for all direct patient care staff and prior to patients wearing a mask when a team member entered their room. We also noted that 2 of these exposures were most likely influenced by a delayed diagnosis of COVID-19 and, therefore, delayed implementation of isolation. The caregiver who contracted COVID-19 was an outlier as no source was ever identified. He had roomed with the patient for the previous 4 weeks and maintained that he never left the facility. He did leave the patient floor to visit the cafeteria and walk the halls. The patient remained COVID-19 negative.

Conclusion

Our comprehensive cancer center strives to keep our patients, visitors and team members safe. A total of 14,689 COVID-19 tests completed on our patients from March 2020 to September 2020, only 76 of these patients were identified as positive, 26 of which were inpatients and only one was considered HA. In addition, 795 team members were tested in-house and, of those team members, only 5 potentially acquired COVID-19 following positive patient exposures. From the start of our journey, there have been many lessons learned that will help improve the future knowledge of emerging infectious disease protocols. During our continued efforts in fighting this pandemic, our IP team will continue to be flexible and reinforce constant education and reassurance to staff. We have learned that every action has an equal reaction. For example, once we stopped allowing visitors, our team members needed to increase communication with family members to ensure they were still receiving information and contributing to their family members care. Similar to the large academic medical[14] center mentioned in the September JAMA article which implemented rigorous infection control measures, we believe the IPC measures implemented at our comprehensive cancer center during the COVID-19 pandemic allowed our center to continue to provide world class cancer care with minimal COVID-19 transmission.

Authors' Note

There are no human subjects in this article and informed consent is not applicable.

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