Impact of the COVID-19 Pandemic on Lung Cancer Patients

Zhen Tao

Abstract:

SARS-CoV-2 is a highly infectious respiratory virus that has caused a global pandemic called coronavirus disease 2019 or COVID-19. This virus forced many countries to lock down and has resulted in a very high death toll. Notably, COVID-19 has greatly impacted people with lung cancer. Lung cancer, most often affecting people 65 years of age or older, is the third most common cancer diagnosis in the United States and has the highest cancer-related mortality rate. As COVID-19 has infected more people and developed new variants, many lung cancer patients have faced decreased accessibility to physician consultation, reduced availability of lung cancer screening appointments, and postponement of their treatment plans. Because doctors and nurses have been overrun with treating and monitoring those with COVID-19, lung cancer patients have found fewer physicians available for either consultation or testing. The shortage of doctors and technicians has decreased the number of appointment times available for lung cancer screening, which is critical in the early detection of lung cancer. Furthermore, forced postponement of treatment plans for those with lung cancer has been evident for both COVID-infected and non-COVID-infected lung cancer patients due to a lack of knowledge about the consequences of mixed treatments and a shortage of doctors and supplies. These factors have resulted in detrimental health consequences for lung cancer patients around the world.

Introduction

In the winter of 2019, a viral pneumonia-like disease called COVID-19 was caused by a virus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that was discovered in Wuhan, China (He et al., 2020). In only a month, this outbreak infected 9720 people in China, killing 213 (He et al., 2020). During this month, it also spread globally, infecting over 100 people in 19 other countries (He et al., 2020). As of July 15, 2021, there were over 160 million confirmed cases of COVID-19, which caused over three million deaths (Aiyegbusi et al., 2021). Common symptoms of this virus include fatigue, shortness of breath, headache, cough, muscle, joint and chest pain, and loss of taste and smell (Aiyegbusi et al., 2021). To diagnose this disease, a sample is collected from the patient's upper airways, usually in the form of pharyngeal or nasal swabs (He et al., 2020, Murphy, 2020). Then, per guidance from the Center for Disease Control and Prevention (CDC) in the United States, real-time-polymerase chain reaction (RT-PCR) is used to target several genes of the SARS-CoV-2 genome and lead to a diagnosis (He et al., 2020; Murphy, 2020). Treatment plans for COVID-19 have been constantly evolving to better accommodate the needs of patients. Some treatment options include antiviral therapies, antibody-neutralizing products, immunomodulatory agents, and oxygenation and ventilation management (Cascella et al., 2022). Yet, COVID-19 is only one of the multiple diseases of concern that impacts the lungs.

Another disease that impacts the respiratory tract, yet is not contagious, is lung cancer. Lung cancer is the leading cause of cancer-related mortality in the United States, with smoking being the most prevalent cause. In fact, a smoker is almost 30 times more likely to get lung cancer than a non-smoker (Minna et al., 2002). In the United States today, approximately 541,000 Americans have been diagnosed with lung cancer at some point in their lives (ACS, 2022). There are two main types of lung cancer: small cell lung cancer (SCLC) and non-small cell lung cancer (NSCLC) (Minna et al., 2002). Symptoms of lung cancer include fatigue, chest pain, cough, lack of appetite, insomnia, and anorexia (Cooley, 2000). To determine the patient's stage of cancer, computerized tomography (CT) scans are used to image the chest and abdomen, followed by pulmonary function tests and a flexible fiberoptic bronchoscopy to obtain biopsy material (Minna et al., 2002). For stage I and II lung cancer, stereotactic body radiotherapy (SBRT) with or without chemotherapy is recommended as treatment (Dingemans et al., 2020). However, for stage III lung cancer, concurrent chemotherapy, and radiotherapy, as well as targeted disease control measures are recommended (Dingemans et al., 2020). As for stage IV, the most common treatment plans are chemotherapy and immunotherapy (Dingemans et al., 2020). Care for lung cancer patients is complex and has been made more challenging by the COVID-19 pandemic.

As one may expect, COVID-19 has impacted lung cancer patients tremendously. Because of the restrictions implemented during the pandemic, many lung cancer patients have experienced reduced access to hospitals and clinics. Trials and treatments for lung cancer, including chemotherapy and radiotherapy, are done under physician supervision. As a result of COVID-19 patients flooding the hospital beds, doctors and nurses who administer lung cancer treatments were in short supply. In fact, as of January 2022, more than 153,000 COVID-19 patients were in hospitals in just the United States alone ("Number of COVID-19 Patients in Hospital"). Reduced physician availability also decreased the accessibility to lung cancer screening. While lung cancer screening rates went up in some states because of state-level regulations, screening rates decreased in other states by up to 23% (Fedewa, 2021). Although

the lung cancer screening rates vary from state to state, patients nationwide have been dealing with changes in their lung cancer treatment plans. In a survey at the McGill University Health Center, researchers found that 57% of non-COVID-infected lung cancer patients have experienced at least one change in their lung cancer treatment plan (Elkrief et al., 2020). Because of the challenges caused by COVID-19, lung cancer patients have experienced reduced physician availability, decreased lung cancer screening, and revised treatment plans.

Reduced Physician Availability

With the COVID-19 pandemic spreading worldwide, physician availability and the ease of scheduling appointments for lung cancer patients have been affected. Scheduling within hospitals has gotten more difficult for lung cancer patients because the number of individuals seeking COVID-19 treatment increased (Fujita et al., 2020). Over 9.1% of lung cancer patients in a study at the National Hospital Organization Kyoto Medical Center stated that they experienced delayed scheduling (Fujita et al., 2020). Major surgeries, especially major surgical oncology procedures, have decreased during the pandemic (Moris and Felekouras, 2020). To address these types of cutbacks, hospitals placed limitations on the number of patients seen each day. For example, two large hospitals in Shanghai, China reduced the maximum number of patients that could be seen each day due to limitations necessitated by social distancing, almost decreasing the number of patients seen to half that before the pandemic (Liu et al., 2021). However, fewer appointment time slots are not the only challenge faced by lung cancer patients. The lack of physicians available to take care of these patients is also a problem occurring during the pandemic.

COVID-19 has put much stress on healthcare workers, to the point that more than 29% of physicians describe themselves to be under high amounts of stress and more than 46% reported experiencing burnout (Kannampallil et al., 2020). This has led to more doctor resignations as a result of inadequate resources, reduced numbers of nursing staff, and extended work hours (Lamiani et al., 2021). According to a study conducted by Jacobson Physician Search and Medical Group Management Association (MGMA), 43% of healthcare workers were considering early retirement (LaPointe, 2021). Of note, 67% of administrators in the study reported that their organization does not have a formal plan for physician succession, an important backup if the patient's main physician resigns (LaPointe, 2021). Because of physician and nurse burnout and resignation, lung cancer patients have been faced with the prospect of even greater delayed scheduling and consultation opportunities. This is a problem that also impacts the timing of lung cancer screening protocols.

Decreased Lung Cancer Screening

Lung cancer screening is a fundamental part of a lung cancer patient's journey to recovery. The United States Preventive Services Task Force recommends lung cancer screening for adults ages 55 to 80 years who are smoking or have a smoking history (Tanoue et al., 2014). The most common types of screening include low-dose spiral computed tomography (LDCT) scans, X-rays, and sputum cytology tests (Johns Hopkins Medicine). Studies have shown that lung cancer screening reduced the absolute risk of lung cancer death from 1.66% to 1.33% and decreased the mortality rate of those with lung cancer in the low-dose computed tomography (LDCT) group by 20% (Tanoue et al., 2014). However, COVD-19 restrictions have

made it difficult for this target audience to get screened since limitations caused by social distancing and reduced physician availability have negatively impacted healthcare scheduling. In general, more diagnostic and hospital facilities have been used for patients with COVID-19 during the pandemic, resulting in the reduced availability of lung cancer screening resources (Cafarotti and Patella, 2020). Lung cancer screening at an institutional LDCT program in Ohio was suspended on March 13, 2020, leading to the cancellation of 818 screening visits (Van Haren et al., 2020). The program resumed on May 5, 2020, and fully opened on June 1, 2020 (Van Haren et al., 2020). Because of the paused visits, malignant symptoms in those patients, such as tumors and lung nodules, increased in frequency, resulting in a significant increase in referrals for intervention by thoracic surgery or interventional pulmonology (Van Haren et al., 2020). Because of the COVID-19 pandemic, there has been significant evidence in hospitals that there were delays in lung cancer screening, surveillance imaging, and biopsy procedures contributing to an increased risk of developing lung cancer during this time when compared to pre-COVID times (Mazzone et al., 2020).

Lung Cancer Treatment

For lung cancer patients, treatment opportunities are more difficult to obtain during the pandemic and even more so if they become infected with COVID-19 themselves. Many hospitals have tried to limit exposure of COVID-19 to lung cancer patients, therefore changing their cancer care provisions (Elkrief et al., 2020). At the McGill University Health Center (MUHC), a study demonstrated that 57% of patients experienced at least one change in their lung cancer treatment plans, and 9% of them had their plans changed more than one time as a direct result of the pandemic (Elkrief et al., 2020). Lung cancer surgery scheduling has also been affected due to the pandemic as many surgical departments canceled all elective cases to meet the demand for ventilators and ICU beds caused by the influx of COVID-19 patients (Moris and Felekouras, 2020). Furthermore, a major goal of lung cancer management during this pandemic is to limit face-to-face visits with hospital staff whenever possible because of lung cancer patients' increased mortality risk from COVID-19 (Dingemans et al., 2020). If a hospital visit is necessary, COVID-19 testing must be mandatory beforehand to reduce the risk of transmission in oncologic units (Dingemans et al., 2020).

Although protective measures can be put into place, lung cancer treatment cannot be held off indefinitely. Treatment and clinical trial enrollment must be resumed with appropriate protocols for controlling for COVID-19 (Dingemans et al., 2020). Three major strategies that hospitals have used are to postpone all systemic therapies or elective surgeries for stable cancer, to increase personal protective provisions for patients with cancer, and to intensify symptom surveillance in cancer patients infected with COVID-19 (Addeo et al., 2020). Cancer patients, in general, are more vulnerable to COVID-19 due to their frequent hospital visits for treatment or follow-up appointments. Studies have shown that the fatality rate of cancer patients infected with COVID-19 was 7.6% whereas the total mortality rate of COVID-19 was 3.8% (Wu et al., 2021). COVID-19 can cause an excessive and aberrant non-effective host immune response that can lead to severe lung injury and acute respiratory distress syndrome (Addeo et al., 2020). If a lung cancer patient develops these symptoms concurrent with their current lung cancer anomalies, there is a higher chance of fatality. New therapeutic development must be put in place to treat COVID-19 infections in lung cancer patients to limit the number of deaths

worldwide (Addeo et al., 2020). While the decision to delay cancer lung treatments during the COVID-19 pandemic may bring about some debate, the risks likely outweigh the benefits.

Conclusion

Because of the COVID-19 pandemic, many patients suffering from lung cancer have been negatively impacted by the disease's consequences both directly and indirectly. Lung cancer patients have greater morbidity and mortality associated with COVID-19 infections. Indirectly, physician consultation, lung cancer screening, and treatment regimens have been affected. Reduced physician availability has resulted in many lung cancer patients experiencing delayed scheduling with doctors. Furthermore, lung cancer screening, which is a leading intervention for reducing the risk of death due to lung cancer, has also been decreased in frequency due to the lack of screening resources and doctors to perform screening procedures. Therefore, these actions have resulted in a decrease in the early diagnosis of lung cancer during the pandemic (Mazzone et al., 2020). Because many hospitals aim to limit COVID-19 exposure and are experiencing a decrease in ICU beds and ventilators, many treatment plans for lung cancer patients have been changed or postponed, including major surgeries.

Importantly, this pandemic does not only impact lung cancer patients but all people with cancer. According to a study conducted by the National COVID Cohort Collaborative at 50 United States medical centers, the most common cancer patients that were affected by COVID-19 were skin, breast, prostate, hematologic, and gastrointestinal (GI) cancers (Sharafeldin et al., 2021). Among these patients, many were having active treatments, which included cytotoxic therapies, targeted therapies, and immunotherapies (Sharafeldin et al., 2021). However, these treatments were associated with an increased mortality risk for those with COVID-19 (Sharafeldin et al., 2021). Overall, cancer patients who experience a higher mortality risk are those of age 65 or older, male, have multi-tumor sites, have hematologic malignancies, and had recent chemotherapy treatment (Windsor, 2021). Because of the increased risk of mortality from COVID-19 infections associated with ongoing cancer treatment, many hospitals have advised cancer patients to delay therapy. However, those who go forth with treatment are faced with a problem related to access to care.

High numbers of COVID-19 cases resulted in many infected patients occupying hospital beds and utilizing key resources, such as ventilators, intensive care room space, and surgical equipment. Moreover, since hundreds of thousands of people were hospitalized in such a short time around the world, many clinics were unable to adapt quickly to the new global emergency and lack of materials to address it. Over a couple of months, after the pandemic started, hospitals began to make guidelines for their patients and administrators to suppress the spread of COVID-19. For example, before entering health care facilities, most patients must be tested for COVID-19, and if the patient is infected, he or she is placed in a private room to avoid transmission to other waiting patients (Palmore and Smith, 2022). All people entering the hospital are required to wear a mask and be tested for COVID-19 either on the spot or before visiting (Palmore and Smith, 2022). Furthermore, health care personnel wear additional protective gear including a surgical mask, eye protection, a face shield, and extra gowns to avoid becoming infected by COVID-19 (Palmore and Smith, 2022). Therefore, COVID-19 has led to a better understanding of how hospitals must adapt the way that they care for lung cancer patients and how these changes can be implemented in future pandemics.

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