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Implications of Telemedicine in Oncology during the COVID-19 Pandemic

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Summary. COVID-19 has had a catastrophic effect on healthcare systems compromising the treatment of cancer patients. It has an increased disease burden in the cancer population. As a result, tele-oncology services have become essential to reduce the risk of cancer patients being exposed to the deadly pathogen. Many governmental establishments have endorsed the use of tele-oncology during COVID-19 era. However, telemedicine in oncology still has certain drawbacks that can be improved upon. Nevertheless, tele-oncology has shown great promise to support cancer care not only during this pandemic but also become a part of normal care in the future. (www.actabiomedica.it)

Key words: COVID-19, Telemedicine, Tele-oncology, Cancer

Introduction

Severe Acute Respiratory Syndrome Virus (SARS-CoV-2) infection resulting in Coronavirus Disease 2019 (COVID-19) has caused a global pandemic leading to a massive burden on healthcare structures across the globe. According to the World Health Organization (WHO), there have been more than 7.1 million confirmed cases and over 400,000 confirmed deaths in 216 countries due to the disease (1). Due to the massive strain on health care structures, patients have been unable to or unwilling to visit hospitals for their regular cancer treatments (2). Hence, telemedicine has started to play a more crucial role in the care of oncology patients during the COVID-19 era.

The WHO and American Telemedicine Association define telemedicine as the use of electronic communications and information technologies in the delivery of clinical services over a distance (3). Telemedicine's application in oncology is referred to as tele-oncology and is used to advance cancer care. The application of telemedicine in various fields of medicine has been examined at length in previous studies (4). Yet, the use of telemedicine in oncology during the COVID-19 era has not received similar interest. This review will focus on the effects that the COVID-19 pandemic has had on cancer patients, how tele-oncology can improve their care, possible risks of tele-oncology and how the future of cancer care looks like with telemedicine.

Effects of COVID-19 on Cancer Patients

The novel coronavirus (COVID-19) pandemic has put the people with chronic illnesses and those who are immunocompromised at the most risk (5, 6). A retrospective study of 1,590 COVID-19 patients took place in 575 Chinese hospitals. Multivariate analysis of the same concluded that a history of cancer was associated with a higher risk of negative events (OR = 5.399, p = 0.003), with a median development time

of 13 vs. 43 days in non-cancer patients (P < 0.0001; hazard ratio = 3.56, 95% confidence interval = 1.65-7.69). Hence proving that a cancer diagnosis is an important comorbidity associated with a higher rate of intensive care admissions (7). A similar retrospective analysis in Italy depicted the case-fatality statistics of 355 patients who died of COVID-19 showing that 20.3% had active cancers (8). Negative outcomes may also be observed in cancer patients due to the distraction effect owing to the intensive care units in hospitals committing to managing COVID-19 patients, failing to provide appropriate care for those affected with cancer (9).

Scientific societies such as European Society of Medical Oncology and National Health Service England, have updated their guidelines with regards to the ongoing pandemic, unanimously recognizing the need for prioritizing patients based on their clinical needs (10,11). The American Cancer Society suggests delaying screening programme during the pandemic (12). A brief summary of the updated guidelines published by the World Health Organization has been summarized in Table 1 (13, 14). This tiered approach focuses on giving a higher priority to patients who are clinically unstable and allows for the continuation of radiation therapy for patients with rapidly proliferating tumours. Guidelines also suggest intravenous treatments to be replaced with subcutaneous or oral routes with longer intervals between immunotherapy regimens, deferring non-urgent supportive therapies (10).

Transition to Tele-oncology

Tele-oncology offers a very innovative and effective solution to the problem of care of cancer patients

Table 1. Updated guidelines for management of cancer in the COVID-19 pandemic, adapted from Al-Shamsi et al. (13,14)

Infectious Pandemic			
Patients with suspected cancer	Patients with established cancer diagnosis	Cancer patients with suspected COVID-19	Cancer patients with confirmed COVID-19
• Staging and diagnosis should not be compromised • Minimize hospital visits and elective admissions • Consider surveillance for early stage cancer with low risk of progression	• Minimize hospital visits and elective admissions • Consider surveillance for early stage cancer with low risk of progression and if active anticancer therapy has not begun • Consider delaying surgical procedure • Consider postponing adjuvant chemotherapy and radiation therapy For all patients on active anticancer therapy remain vigilant for COVID-19 symptoms	• Isolation and infection control as per WHO and CDC recommendations • Hold any active anticancer therapy • Postpone any surgical interventions /procedures • Keep the differential diagnosis broad including possible adverse events from the anticancer therapy and other infectious causes	• Evaluate for admission or discharge, infection control and screen contacts as per WHO and CDC recommendations • Hold any active anticancer therapy • Postpone any surgical interventions / procedures • Follow up as indicated to evaluate for: - Resolution of active infection - Restarting active anticancer therapy

Abbreviations:
WHO- World Health Organisation
CDC- Centre for Disease Control and Prevention

during these uncertain times. There has been an increased inclination for hospitals to utilize tele-health in cancer care with patient appointments being transferred to phone consultations keeping in mind the risk-benefit ratio (10). This has decreased the need for cancer patients to visit hospitals during a time when they have a high risk of death due to the SARS-CoV-2 infection which can be contracted in hospitals (15). Treatment of cancer patients with chemotherapy can often lead to a suppressed immune system that is more vulnerable to severe forms of COVID-19. Thus, tele-oncology has taken on a more prominent role in the care of cancer patients across the world.

Appropriate patient selection is integral to a well-functioning tele-oncology service. Patient selection depends on various factors including the doctor's experience, preferences of the patient and complexity of cases (16). The European Society for Medical Oncology (ESMO) advises that patients on oral therapy be shifted to tele-oncology services for consultation and prescription renewal. ESMO also recommends the use of telephone and web-technology for toxicity evaluation, dose adaptation and supportive care recommendation (11). The tiered approach of ESMO proposes that stable patients (low priority) and non-critical patients (medium priority) have most of their hospital visits converted to telemedicine visits.

Elkaddoum et al., report that the use of tele-oncology helps in reducing the demand for personal protective equipment (PPE). With audio and video consultations, doctors can follow up on patients, their results and monitor response to therapy while assessing if the patient has any signs of infection, particularly COVID-19. This reduces the need for patients to visit hospitals and hence for healthcare workers to utilize PPE resources which are scarce during present times (17).

Patients living in rural, underserved or remote areas would benefit greatly from the incorporation of tele-oncology in hospitals as the need to travel for optimal care would be eliminated. This would also decrease their exposure to the pathogens found in the hospital including SARS-CoV-2. Moreover, patients can report new symptoms and have questions answered more easily by their doctor through the use of tele-oncology (16).

Technological advancements have led to widespread adoption of several technologies in tele-oncology. The advantages and disadvantages of different technologies utilised in oncology are outlined in Table 2 (18).

Guidelines from the National Health Service (NHS) England encourage the application of telephone or video consultation in the care of cancer patients who don't have COVID-19 to decrease the need for hospital visits. Advice for NHS staff includes the use of video conferencing to attend multidisciplinary team meetings in the event of staff having to be in quarantine for any reason (10).

With over 200 patient collaborations via telemedicine every year, Lewis et al., have described immense gratification of patients with the telemedicine services. Their team came to the conclusion that follow up of cancer patients in the long term is complemented by the use of tele-medicine services (19). A scoping review of paediatric tele-oncology services has shown that they can help improve diagnosis accuracy, reduce costs and mortality and enhance care management (20).

Telemedicine has application for triage of cancer patients suspected of COVID-19. Testing of patients for COVID-19 is integral and tele-oncology can help physicians to evaluate whether a patient should be tested for COVID-19. A consultation over video can help a doctor obtain a list of symptoms (like temperature, respiratory rate, cough), risk of exposure and perform an observational assessment (21). Finally, tele-oncology can be helpful in the palliative care of cancer patients. The United States Drug Enforcement Administration allows palliative care professionals to dispense opioid prescriptions to cancer patients using tele-oncology services (22).

Drawbacks of Tele-oncology

Due to the current unprecedented times brought upon by the COVID-19 pandemic, telemedicine is gradually penetrating oncological practice and management. This real-time audiovisual interaction between patient and provider has been widely recognized as a preferable option over in-person consultations.

Table 2. Summary of the advantages and disadvantages of telehealth technologies in oncology adapted from Hazin et al. (18)

Technology	Advantages	Disadvantages
Web conferencing	• Low cost • Wide availability	• Limited resolution of images • Images cannot be manipulated • Participants may not see each other
Videoconferencing	• Good image resolution • Images can be manipulated • Participants can see each other • Readily available • Can present/interview patients • Supports image-intensive clinical case collaborations (diagnosis, radiation/surgery planning, disease monitoring)	• Expensive • Requires maintenance
Tele-synergy	• A multimedia workstation integrates all components for collaborative multidisciplinary tele-oncology • High image resolution • Transmits images from their primary sources • Allows image manipulation • Supports comprehensive multidisciplinary case review and discussion • Supports collaborative planning of radiation and surgery	• Very expensive • Requires ~ 20 ISDN channels • Requires many peripheral components • Difficult to install • Requires intensive maintenance • Requires dedicated storage space
Virtual tele-microscope	• Operator can control microscope without special hardware or software • Good image resolution	• Limited to pathology • Expensive • Performance depends on the user's computer

Despite the clear advantages of tele-oncology, the practice has a few drawbacks that have been discussed below. Amongst others, one of the major limitations of tele-oncology includes jurisdictional boundaries of the physicians' practice that are exacerbated by the limitation of physical exams and insufficient training on telemedicine technology (23).

Besides, telemedicine demands a technologically adept population with experience in internet-based technologies. As a vast majority of cancer patients belong to the older generation and/or live in remote areas, the application of telemedicine becomes as an obstacle due to limited access to telemedicine platforms and improper internet access. The traditional application of tele-oncology is impractical in populations with impaired hearing, vision or cognition. People from different ethnic backgrounds must also be considered when providing tele-oncology services to prevent them from being disproportionately affected during the pandemic (24).

In terms of patient satisfaction, Kitamura et al. saw positive results in their systematic review that analysed the effectiveness of video consultations in oncology. However, some patients reported feelings of

nervousness and anxiety surrounding the use of new technology. They also reported a feeling of difficulty or reluctance to communicate with providers using television-based systems (25).

A survey conducted by Tashkandi et al. reported the views of oncologists on virtual management of patients and the priority of prescribing anti-cancer treatments during the COVID-19 pandemic. Although 86% of oncologists were aware of virtual clinics, the overall consensus proved that most were undecided about virtual management of patients with only 46% preferring to manage cases virtually. A striking 50% of oncologists did not prefer virtual prescription of chemotherapy followed by 48% not preferring virtual novel immunotherapy (26).

In their commentary, Vasiliki et al., highlight the scarcity of guidelines on oncological surveillance over the phone or video in sub-specialties like head and neck cancer. Due to improper guidelines and the inability to physically examine patients, diagnosis and management is merely based on symptomatology and subtleties of symptom change in such specialities (27). Furthermore, Gray et al., in their pilot study reported less than optimal provider satisfaction due to substandard ability to observe non-verbal behaviour of patients and an inability to physically examine them (28).

The rapid adaptation of a fairly new technology during such unprecedented times can bring forth unique challenges to patients and providers alike. one such challenge was highlighted in a survey of population-level interest and telehealth capacity of hospitals in the USA. Results concluded that a positive correlation was observed between the population level interest in telehealth with an increase in COVID-19 cases ($r= 0.95$, $P<0.001$). Additionally, this population-level interest did not correlate with the proportion of hospitals providing telehealth services (29).

Altogether, these results raise questions regarding the preparedness, training, and telecommunication infrastructure of the hospitals extending their telehealth services to oncology patients. In contrast, a chi-squared analysis showed that only the education level of the patient had a statistically significant relationship with the favorability rate of telemedicine utilization (30).

Future Direction

Telemedicine in cancer care has tremendous potential during and after the COVID-19 era. With the widening of collaborations in the field of oncology, researchers are now studying the outcomes of patients that are currently receiving altered schedules for their cancer treatment. This will further help detect cohorts that may benefit from altered treatment protocols (19). In the age of digitalization, virtual linking of electronic health records with diagnostic tools will allow a better exchange of health information to achieve the right care at the right time. This may include, portable cameras equipped with the technology to assess skin changes and rashes associated with radiation and chemotherapy and computer-based interactive tools that analyse cancer related symptoms. Ultimately, advances in technology may allow the linking of these diagnostic tools to relevant patient education materials which modify automatically in accordance with patient literacy based on speech recognition (23).

Tele-oncology has the potential to bring forward improved coordination of cancer care with lower costs, time savings, early detection, increased and individualised access to care, and education. In order to see these changes, appropriate training and education of healthcare professionals must be focused upon. Finally, data collected from the delivery of care to cancer patients during COVID-19 will also help form care models and predictors for high-risk populations in future epidemics (23).

Conclusion

The usage of tele-oncology is not new, however, COVID-19 has forced the widespread adoption of these techniques leading to rapid adaptation to a new way of communication, which is preferred most of the time but can be disruptive as well. The widespread implementation of tele-oncology can prove to be a powerful tool to provide quality care while preserving the safety of patients amid the pandemic. Nevertheless, this pandemic has the potential to evolve tele-oncology into a mainstay practice in the care of cancer patients.

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

References

1. World Health Organisation. WHO Coronavirus Disease (COVID-19) Dashboard. Available: https://covid19.who.int. 7 June 2020.
2. Harky A, Chiu CM, Yau THL, Lai SHD. Cancer Patient Care during COVID-19 [published online ahead of print, 2020 May 14]. Cancer Cell. 2020;10.1016/j.ccell.2020.05.006.
3. American Telemedicine Association. Telemedicine, Telehealth, and Health Information Technology [Internet]. Who.int. 2006 [cited 10 June 2020]. Available from: https://www.who.int/goe/policies/countries/usa_support_tele.pdf?ua=1
4. Flodgren G, Rachas A, Farmer A, Inzitari M, Shepperd S. Interactive telemedicine: effects on professional practice and health care outcomes. Cochrane Database of Systematic Reviews. 2015.
5. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. China Novel Coronavirus Investigating and Research Team. A Novel Coronavirus from Patients with Pneumonia in China, 2019. N Engl J Med. 2020; 382:727–33.
6. Zaim S, Chong JH, Sankaranarayanan V, Harky A. COVID-19 and Multiorgan Response [published online ahead of print, 2020 Apr 28]. Curr Probl Cardiol. 2020;100618.
7. Liang W, Guan W, Chen R, et al. Cancer patients in SARS-CoV-2 infection: A Nationwide Analysis in China. Lancet Oncol. 2020;21(3):335-337.
8. Onder G, Rezza G, Brusaferro S. Case-Fatality Rate and Characteristics of Patients Dying in Relation to COVID-19 in Italy. JAMA - J Am Med Assoc. 2020;2019:2019–20.
9. Cortiula F, Pettke A, Bartoletti M, Puglisi F, Helleday T. Managing COVID-19 in the oncology clinic and avoiding the distraction effect. Ann Oncol 2020. 2020;31(5):553-555.
10. National Health Service England. Clinical guide for the management of noncoronavirus patients requiring acute treatment: cancer. March 23, 2020. https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/specialty-guide-acute-treatment-cancer-23-march-2020.p. Accessed June 8, 2020
11. European Society for Medical Oncology, Cancer Patient Management During the COVID-19 Pandemic. 12 May 2020. Available: https://www.esmo.org/guidelines/cancer-patient-management-during-the-covid-19-pandemic. Accessed June 8, 2020
12. Brunetti O, Derakhshani A, Baradaran B, Galvano A, Russo A, Silvestris N. COVID-19 Infection in Cancer Patients: How Can Oncologists Deal With These Patients? Front Oncol. 2020;10(April):1–3.
13. Al-Shamsi HO, Alhazzani W, Alhuraiji A, Coomes EA, Chemaly RF, Almuhanna M, et al. A Practical Approach to the Management of Cancer Patients During the Novel Coronavirus Disease 2019 (COVID-19) Pandemic: An International Collaborative Group. Oncologist. 2020;2019:1–10.
14. World Health organization. Coronavirus disease (2019-COVID-19) technical guidance: Patient management. Available at https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/patient-management . Accessed May 12, 2020
15. Nelson R. Disruptions in Cancer Care in the Era of COVID-19. Available: https://www.medscape.com/viewarticle/927215 (accessed March 22,2020)
16. Sabesan S, Simcox K, Marr I. Medical oncology clinics through videoconferencing: an acceptable telehealth model for rural patients and health workers. Internal Medicine Journal. 2012;42(7):780-785.
17. Elkaddoum R, Haddad F, Eid R, Kourie H. Telemedicine for cancer patients during COVID-19 pandemic: between threats and opportunities. Future Oncology. 2020.
18. Hazin R, Qaddoumi I. Tele-oncology : current and future applications for improving cancer care globally. The Lancet Oncology. 2010;11(2):204-210.
19. Lewis G, Hatch S, Wiederhold L, Swanson T. Long-term Institutional Experience with Telemedicine Services for Radiation Oncology: A Potential Model for Long-term Utilization. Advances in Radiation Oncology. 2020.
20. Kermani F, Orooji A, Sheikhtaheri A. Tele-oncology for children with cancer: A scoping review on applications and outcomes. International Journal of Medical Informatics. 2020;139:104-118.
21. Portnoy J, Waller M, Elliott T. Telemedicine in the Era of COVID-19. The Journal of Allergy and Clinical Immunology: In Practice. 2020;8(5):1489-1491.
22. Mehta A, Smith T. Palliative Care for Patients with Cancer in the COVID-19 Era. JAMA Oncology. 2020;
23. Sirintrapun SJ, Lopez AM. Telemedicine in cancer care. Am Soc Clin Oncol Educ Book 2018; 38:540–545
24. Abuelgasim E, Saw LJ, Shirke M, Zeinah M, Harky A. COVID-19: Unique public health issues facing Black, Asian and minority ethnic communities. Curr Probl Cardiol. 2020;(August 2020):100621.
25. C. Kitamura HBSc,* L. Zurawel–Balaura HBSc,* and R.K.S. Wong MSc* MBChB How effective is video consultation in clinical oncology? A systematic review
26. Tashkandi E, Zeeneldin A, AlAbdulwahab A, Elemam O, Elsamany S, Jastaniah W, et al. Virtual Management of Cancer Patients in the Era of COVID-19 Pandemic. J Med Internet Res [Internet]. 2020; Available from: http://www.ncbi.nlm.nih.gov/pubmed/32501807
27. Triantafillou V, Rajasekaran K. A Commentary on the Challenges of Telemedicine for Head and Neck Oncologic Patients during COVID-19. Otolaryngol neck Surg Off J Am Acad Otolaryngol Neck Surg. 2020;194599820923622.
28. Gray J, Brain K, Iredale R, Alderman J, France E, Hughes

H. A pilot study of telegenetics. J Telemed Telecare 2000;6:245–7.
29. Hong YR, Lawrence J, Williams D Jr, Mainous III A. Population-Level Interest and Telehealth Capacity of US Hospitals in Response to COVID-19: Cross-Sectional Analysis of Google Search and National Hospital Survey Data. JMIR Public Health Surveill. 2020;6(2):e18961.
30. Raffenaud, Amanda et al. 'Utilizing Telemedicine in Oncology Settings: Patient Favourability Rates and Perceptions of Use Analysis Using Chi-Square and Neural Networks'. 2019:115 – 127.

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