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approved drugs, there are many novel approaches to making intracellular proteins druggable. They include small peptide inhibitors, small interfering (si)RNAs and miRNAs, which can penetrate the membrane barriers. Moreover, antibodies against intracellular proteins may be internalized into cells by normal and pathological processes, even by direct delivery using various technologies, including nanoparticle carriers. Thus, future perspectives include the development of anti-SPAG5 therapeutic agents and their effective delivery into cancer cells.

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Disclaimer Statement

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Forum

Tele-oncology in the COVID-19 Era: The Way Forward?

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COVID-19 has had a devastating impact on the care of cancer patients. Thus, tele-oncology has become a necessity to improve cancer care. Several organisations have issued guidelines for its use during COVID-19. Despite certain shortcomings, tele-oncology has great potential to help cancer patients during COVID-19 and in the future.

Introduction

The coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome virus (SARS-CoV-2), has resulted in a pandemic that has placed immense pressure on health care systems around the world. This has resulted in hospitals sending patients home if they are not acutely unwell and do not require urgent attention, further leading to an increase in patients from specialties like oncology not being able to attend hospitals for non-urgent care. As a result, tele-oncology has taken a more prominent role in the COVID-19 pandemic.

Tele-oncology is defined as the delivery of clinical oncology services via audio and video communication technologies to patients at a distance. It is effective in providing remote chemotherapy supervision, symptom management, and palliative care to cancer patients [1]. Telemedicine and its applications in different specialties such as cardiology, respiratory medicine, and neurology has been extensively researched and satisfactory outcomes have been reported [2]. However, its use in oncology, and in particular during COVID-19, has not garnered the same attention.

Transition to Tele-oncology

A growing trend of telemedicine in oncology has been observed, with a call for outpatient visits and triage to be shifted to phone consultations, incorporating a risk-benefit balance. This reduces the risk of contagion for the health personnel and patients, especially when the potential benefit of an oncological intervention in terms of cancer recurrence/overall survival is so small that it does not counterbalance the potential risk of death from COVID-19 [3].

It is well established that comorbidities and immunosuppression are common risk factors for severity and mortality. As cancer and cancer treatment frequently

Table 1. Summary of the Advantages and Disadvantages of Telehealth Technologies in Oncology^a

Technology	Advantages	Disadvantages
Web conferencing	<ul style="list-style-type: none"> • Low cost • Wide availability 	<ul style="list-style-type: none"> • Limited resolution of images • Participants may not see each other
Video conferencing	<ul style="list-style-type: none"> • Good image resolution • Participants can see each other • Readily available • Can present/interview patients 	<ul style="list-style-type: none"> • Expensive • Requires maintenance
Tele-synergy	<ul style="list-style-type: none"> • A multimedia workstation integrates all components for collaborative multidisciplinary tele-oncology • Transmits images from their primary sources • Allows image manipulation • Supports comprehensive multidisciplinary case review and discussion • Supports collaborative planning of radiation and surgery 	<ul style="list-style-type: none"> • Very expensive • Requires ~20 ISDN channels • Requires many peripheral components • Difficult to install • Requires intensive maintenance • Requires dedicated storage space
Virtual tele-microscope	<ul style="list-style-type: none"> • Operator can control microscope without special hardware or software 	<ul style="list-style-type: none"> • Limited to pathology • Expensive • Performance depends on the user's computer

^aAdapted from Hazin and Qaddoumi [6].

cause immunosuppression, they increase the susceptibility to contracting the virus. In addition, hyperinflammatory response to the infection may be responsible for organ damage associated with severe COVID-19 in the immunocompromised [4]. Therefore, major shifts in the clinical care of cancer are currently underway, with more light being shed on tele-oncology.

Several organizations have endorsed the use of tele-oncology and issued guidelines for its use during COVID-19. The European Society for Medical Oncology (ESMO) recommends that patients undertaking oral treatments should be transferred to telephonic consultation and web-technology contacts for a prescription renewal. ESMO also endorses the use of telephone and web-technology for toxicity evaluation, dose adaptation, and supportive care recommendation [5]. The tiered approach of ESMO advises that low and medium priority cancer patients be referred to tele-oncology services as much as possible.

The National Health Service in England has issued guidance to support the

use of telephone or video consultation wherever possible to minimise face-to-face appointments [3]. Additionally, if staff have to self-isolate for any reason, they could still continue to provide care and support multidisciplinary teams (MDTs) through video consultations and virtual attendance at MDT meetings [1].

Many different types of technologies have been adopted by tele-oncology to further the health of cancer patients. These include web conferencing, videoconferencing, tele-synergy, and virtual tele-microscope. The advantages and disadvantages of the various technologies are summarised in Table 1 [6].

Analysing 200 patient interactions, Lewis *et al.* proved that great patient satisfaction is associated with the radiation oncology services provided virtually, hence, concluding that tele-oncology is an efficient and cost-effective method of providing high-quality services for the long-term follow-up of cancer patients [7]. Tele-oncology can also be useful to triage for COVID-19. A video-based

consultation would enable clinicians to establish a history of symptoms, exposure risk, and observational assessment. This would aid the clinicians in making the decision to test a particular individual for COVID-19 [8].

Disadvantages of Telemedicine in Oncology

It goes without saying that in the current unprecedented times, tele-oncology is a preferable option over in-person consultations; however, tele-oncology has a few shortcomings. The major drawbacks include jurisdictional limitations of the physicians' practice, the need for training on tele-oncology tools that may be limited in a pandemic setting, and limitation of physical exams. Moreover, robust guidelines on appropriate oncological surveillance over the phone or video in different subspecialties need to be issued [9].

A systematic review analysing the effectiveness of video consultations in oncology concluded that clinical care was not compromised with the use of video conferences. Despite the overall positive results of the study, patients reported feelings of nervousness, difficulty, or reluctance to communicate with providers using television-based systems. A feeling of emotional distance between the patients and providers was also observed [9].

Traditional tele-oncology cannot be extended to patients with impaired hearing, vision, or cognition [9]. Also, linguistic disparities must be taken into consideration to avoid miscommunication and feelings of anxiety when communicating with people belonging to ethnic minority groups. Therefore, the delivery of tele-oncology has to be modified on a case-by-case basis in such circumstances [10].

With regards to the COVID-19 pandemic, implementation of tele-oncology can be

disruptive, especially when it is adopted quickly out of necessity. Moreover, a cross-sectional analysis of population-level interest and telehealth capacity of US hospitals show that the interest in telehealth increased as the number of COVID-19 cases increased ($r = 0.948$, $P < 0.001$). However, the population-level interest failed to correlate with the proportion of hospitals providing telehealth services, further suggesting that increased population demand may not be met with the current telehealth capacity [11].

These results raise questions regarding the preparedness and telecommunication infrastructure of the hospitals extending tele-oncology services to patients [11]. 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.

Concluding Remarks

Tele-oncology has an immense role to play in the care of cancer patients during this pandemic. It has started to be widely

adopted by healthcare systems to reduce the risk of a potentially fatal COVID-19 infection in cancer patients. It is an excellent tool for long-term follow-up of patients, especially those in remote areas [7]. Tele-oncology has also helped widen collaborations across the world, in particular for challenging cancer cases. Studying the outcomes of patients that are currently receiving altered schedules for cancer care will help detect patient cohorts that may benefit from altered treatment protocols. 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 [12].

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