Dissertation at IIHMR, DELHI

A Report By:

PRIYANKA RUTH CHATTREE (PG/19/066)

Under the Guidance of
PROF. DIVYA AGGARWAL
(Associate Professor)

Post-graduate Diploma in Hospital and Health Management
2019-2021

Internship Training

at

Karkinos

Study of Telehealth in Oncology Care: A COVID-19 Response

by

Priyanka Ruth Chattree

PG/19/066

Under the guidance of

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PGDM (Hospital & Health Management)

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KARKINOS

Date: 19-June-2021

Internship Completion Certificate

To Whom It May Concern

This is to certify that **Priyanka Ruth, '**Business Analyst Intern**'** with Karkinos Healthcare Private Limited, has successfully completed the internship, that started on 15-February-2021 and ended on 05-May-2021.

During the tenure, the intern worked on the **'**Study of Telehealth in Oncology Care: A COVID-19 response**'** under the guidance of Sripriya Rao, Chief Digital Officer- Karkinos.

We wish all the best for future endeavors.

Karkinos Heathcare Pvt. Ltd.

Pooja Sharma
Vice President-HR

TO WHOMSOEVER IT MAY CONCERN

This is to certify that Priyanka Ruth Chattree student of PGDM (Hospital & Health Management) from International Institute of Health Management Research, New Delhi has undergone internship training at Karkinos from 15.02.2021 to 5.05.2021.

The Candidate has successfully carried out the study designated to him during internship training and his/her approach to the study has been sincere, scientific and analytical.

The Internship is in fulfilment of the course requirements.

I wish him all success in all his/her future endeavors.

Ms. Divya Aggarwal
Associate Dean, Academic and Student Affairs
IIHMR, New Delhi

Mentor
IIHMR, New Delhi

Certificate from Dissertation Advisory Committee

This is to certify that **Ms Priyanka Chattree,** a graduate student of the **PGDM (Hospital & Health Management)** has worked under our guidance and supervision. She is submitting this dissertation titled 'Study of Telehealth in Oncology Care: A Covid 19 response' at Karkinos Healthcare in partial fulfilment of the requirements for the award of the **PGDM (Hospital & Health Management).**

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

Prof. Divya Agarwal,

Associate Dean, Academic and Student Affairs

IIHMR, New Delhi

Bharat Kumar Sarvepalli

Transformation Manager

Karkinos Healthcare PvtLtd

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled "**Study of Telehealth in Oncology Care: A COVID-19 Response"** and submitted by Priyanka Ruth Chattree Enrolment No.PG/19/066 under the supervision of Prof. Divya Aggarwal, Associate Professor, IIHMR, Delhi for award of PGDM (Hospital & Health Management) of the Institute carried out during the period from 15.02.2021 to 5.05.2021 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Signature: 

FEEDBACK FORM

Name of the Student: Ms Priyanka Ruth Chattree

Dissertation Organization: Karkinos Healthcare

Area of Dissertation: “Study of Telehealth in Oncology Care: A Covid 19 Response”

Attendance: 98%

Objectives achieved:

1. Supporting cancer care guideline automation through tools

2. Working on Lung Cancer Pathways in reference to NCG and NCCN guidelines

3.Working with industry leaders and clinicians and a part of the digital health care transformation journey

4. Involved in Research and analysis of oncology health care.

5. Collaborating with external teams to gather input on process requirement.

Deliverables:

Dissertation report
Presentation

Strengths:

Research acumen and Relevance of topic

Suggestions for Improvement:

Study of Industry trends, initiatives and opportunities for academic- industry collaboration

Suggestions for Institute (course curriculum, industry interaction, placement, alumni):

Review with industry expert during the initial stages of the dissertation.

Signature of the Officer-in-Charge/ Organization Mentor (Dissertation)

Bharat Kumar Sarvepalli

Date:19/06/2021

Place: Hyderabad

ABSTRACT

Introduction

The first half of 2020 saw the rise of COVID-19 as a pandemic, which had an immediate and drastic effect on cancer treatment. COVID-19-related disruptions have impacted almost every area of cancer control and prevention infrastructure, including cancelled cancer screening programmes, postponed elective procedures, dismantled therapeutic regimens, and furloughed health care providers. The pandemic has sparked a rapid shift toward virtual consultations in oncology. This is due to the need to decrease physical contact inside hospitals and cancer centers in order to minimize the risk of infection. The use of telehealth in routine cancer treatment during the pandemic has benefitted for patients and clinicians due to social distancing and reduced patient footfall. This study therefore focusses on the various interventions in tele-oncology and its impact on the virtualization of the practice in oncology during and post pandemic.

Objective**:** To address the impact of digital technology in cancer care during COVID 19

METHODOLOGY: The secondary study is based on the secondary data available from various government agencies and in the cancer care. Amongst the important sources of data are from National Cancer Registry, National Cancer Guidelines, National Comprehensive Cancer Network. A deep literature review is also carried out from various databases like Medline, Google Scholar, ProQuest, JSTOR and Science Direct.

RESULT: The decline in patients was due to the delay in four major causes which was delay in surgeries, delay in chemotherapy, conduct of fewer diagnosis and change in treatment protocols. Besides these, there were several other problems that resulted in the loss of life such as failure to follow up on routine cancer treatment, inability in operating emergency surgeries, and unable to

return home after chemotherapy center. Despite the fact that millions of cancer patients around the world are experiencing delays in diagnosis and care as a result of the pandemic's resource diversion, there is an increasing hope that telemedicine will play a key role in alleviating the backlog cancer cases. A process model of oncology care is presented to highlight the bottlenecks and the use of tele-oncology at specific pathways to reduce those bottlenecks. Some bottlenecks will continue to exist, such as imaging and pathology processes, where technology currently does not provide assistance. Many in-person visits can be transferred to virtual platform after a patient enters active treatment. Follow-up visits throughout therapy, specialist visits, are all examples of this. Education about specific chemotherapy and other cancer related training materials can be quickly converted to video and posted online, with telehealth counselling available for any extra problems.

Conclusion: Continued use of telemedicine for postoperative visits and systemic therapy surveillance will reduce patient travel burden and infection risk. Prior efforts to advance the digital patient experience have also been sluggish to deploy, but the pandemic revealed that it was possible to do so rapidly and successfully.

ACKNOWLEDGEMENT

It brings me great pleasure to work and submit my dissertation report on "**Study of Telehealth in Oncology Care: A COVID-19 Response"** in Karkinos. For this I deeply am thankful to Mr. S. Bharath for his help and invaluable guidance throughout the duration of the project.

Also, I am thankful to my mentor, Prof. Divya Aggarwal, Associate Professor, IIHMR, Delhi for her advice which was a constant source of inspiration.

I am also thankful to the colleagues and friends for guiding me to achieve the project.

Finally, I am deeply thankful to my parents who helped and inspired me in completing this project

Priyanka Ruth Chattree

PG/19/066

ABBREVIATION

COVID 19	Corona virus disease 2019
IARC	International Agency for Research on Cancer
ESMO	European Society of Medical Oncology
ASCO	American Society of Clinical Oncology
NHS	National Health Service
MRI	Magnetic Resonance Imaging
PET-CT	Positron Emission Tomography- Computed Tomography
NCCN	National Comprehensive Cancer Network
NCG	National Cancer Grid
RADS	Remote, Avoid, Defer, Shorten
VROC	Virtual Radiation Oncology Clinic

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

STUDY OF TELEHEALTH IN ONCOLOGY CARE: A COVID-19 RESPONSE

Introduction

The outbreak of COVID-19, was confirmed in Wuhan, China, in late January 2020. COVID-19 became a global pandemic in just two months. The implementation of social distancing measures with respect to people's interactions with the environment have changed. To prevent the spread of disease, states have issued directives restricting personal travel, closing non-essential movements, and people confined to home. The first half of 2020 saw the rise of COVID-19 as a pandemic, which had an immediate and drastic effect on cancer treatment. COVID-19 has disrupted health-care delivery around the world, putting strain on healthcare system. Many cancer patients, who need regular visits and intensive use of the health-care system to handle illness and treatment related issues, have had their health-care delivery disrupted by the crisis. This vulnerable population is at maximum risk of serious COVID-19 exposure and mortality, as well as an elevated cancer burden due to tumour growth, delayed cancer diagnosis or treatment as well as the pause or disruption of their routine medical treatment. Despite the fact that cancer prevention and screening are critical for individual and population health, the cancer industry is undergoing significant changes as a result of the outbreak of the pandemic. COVID-19-related disruptions have impacted almost every area of cancer control and prevention infrastructure, including cancelled cancer screening programmes, postponed elective procedures, dismantled therapeutic regimens, and furloughed health care providers. Remote working technologies has taken a major shift both for the patients and the providers to avoid the exposure of the virus. In this situation, digital solutions have proven to be able to strengthen the healthcare system in emergency situations. Technology is playing a critical role during the pandemic. These technologies may have a long-term effect in addition to COVID-19. The virtual care also was an emergency

strategy during the onset of the pandemic for treating the cancer patients. The pandemic has sparked a rapid shift toward virtual consultations in oncology. This is due to the need to decrease physical contact inside hospitals and cancer centres in order to minimize the risk of infection. The virtual experience in consultation has proved both positive and negative simultaneously for the patients and the doctors. Tele-oncology has also proved to increase both accessibility and affordability in providing cancer services. Cancer tele-genetics, telepathology, remote chemotherapy monitoring, symptom management, survivorship treatment, palliative care, and ways to improve access to cancer clinical trials, some of which could utilise mobile technology, are all examples of effective tele-oncology strategies. Telehealth has made this possible despite social constraints and can be used for all types of care, including outpatient, surgical planning, chemotherapy delivery (tele-chemotherapy), and clinical trials also called as tele-trials. The use of telehealth in routine cancer treatment during the pandemic has benefitted for patients and clinicians due to social distancing and reduced patient footfall. This study therefore focusses on the various interventions in tele-oncology and its impact on the virtualization of the practice in oncology during and post pandemic.

Objective

To address the impact of digital technology in cancer care during COVID 19

Specific Objective

a) To conduct a detailed analysis of cancer cases worldwide and its effect of COVID 19 on cancer care (US, UK and India)

b) To put forward some of the digital solutions in the care pathway of lung cancer, bottlenecks associated and tele-palliative care plan for cancer patients.

c) To review the digital technologies used in the oncology care and the advancements during the pandemic

Methodology

The present study is based on the secondary data available from various government agencies and in the cancer care. Amongst the important sources of data are from National Cancer Registry, National Cancer Guidelines, National Comprehensive Cancer Network.

A deep literature review is also carried out from various databases like Medline, Google Scholar, ProQuest, JSTOR and Science Direct. The data of the outcomes of the study has also been collected from white papers of consulting firms and oncology journals including ASCO, National Cancer Institute.

Inclusion Criteria	Exclusion Criteria
Articles taken from the start of the COVID (2020-2021)	Articles pre- COVID
Full text articles	Peer- reviewed and abstracts
Original research, Meta-analysis, Systematic review, Scoping review	Newspaper articles, conference presentations, blogs
English language articles	Articles related to only oncology
Technology related articles related to oncology	Other language articles
	Questionnaire studies

Review of Literature

COVID-19 has affected the oncology, forcing patients to seek care online. COVID-19 has made a way for rapid shift toward virtual consultations in oncology. This is due to the need to limit physical contact inside hospitals and cancer centers in order to reduce the risk of infection.

Telehealth must improve patient access and results, clinician efficiency, or both in order to survive. There is still a lot to learn about how to use telehealth effectively in radiation oncology in order to achieve these aims. Because of the intricacy of cancer care and the intricacies involved with radiation therapy, poor telehealth adoption and execution offer possible dangers to patients. We must acknowledge that rapid acceptance of this technology in radiation oncology during COVID-19 was based on limited data, and we must be cautious of unforeseen implications. (*Goenka A et al, 2020*)

Oncology is a multidisciplinary field, and multidisciplinary tumor boards play an important role in developing evidence-based treatment decisions. If a physical meeting cannot be held, a remote meeting via video calls or teleconferencing may be considered. (*Jayakrishan T, 2020*)

COVID-19 has accelerated the "pivot" toward virtual consultations in oncology along with the multidiscipline. During the epidemic, the implementation of this virtual framework was both quick and successful. As a result, virtual consultations and other forms of virtual connection are likely to remain in the future. Moving to the virtual cloud, on the other hand, has a number of implications on doctor–patient interaction, some of which are potentially favorable but some quite negative. (*Broom A et al, 2020*)

Patients from rural areas would get benefit from the tele-oncology in hospitals because for reduced travel for appropriate care. This would also reduce their exposure to infections such as SARS-CoV-2 present in hospitals. Furthermore, with the use of tele-oncology, patients can report new symptoms and the queries can be addressed by the doctor. (*Shirke, M et al, 2020*)

Telehealth is not a substitute for in-person patient visits because it is not a replacement and is based on the purpose of the consultation and the patient's preferences. However, there is a chance for a virtual patient "room" where interdisciplinary care from all specialties can be provided. As a result, tumor boards and multidisciplinary cancer centres have become important components of oncologic therapy. (*Sim J Austin et al, 2020*)

The multidisciplinary tumor board (MTB) meeting, where a team of experienced doctors examine complex cases to decide the best feasible treatment plan for a patient, is a critical point in a cancer patient's journey. MTBs are a well-established element of cancer care, and such gatherings were both useful to patients and educational. (*Hammer D R et al, 2020*)

Telemedicine was quickly revitalized as one of the remedies to the COVID-19. Telemedicine has emerged as a significant oncology pillar. Patients with breast cancer, lung cancer, and head and neck cancer account for maximum proportion requiring care and hospital visits. Apart from triage, counselling, and follow-up, there is a plethora of other services that can be employed for radical and palliative therapy. (*Pareek P et al, 2020*)

Telemedicine has numerous potential applications in oncology care. Due to the pandemic, telemedicine consultations have rapidly expanded to cover maximum services starting from clinical examination to treatment/palliative care/end of life care. (*Jazieh A R et al, 2020*)

Telehealth services, monitoring of health conditions using wearables and other smart devices are among the technologies that have been proved useful for breast cancer patients. (*Kalser K F, 2021*)

Tele-oncology is a novel technique of remote communication that is especially relevant during COVID-19. This technique will be more appropriate for patients who are under surveillance following the completion of oncology therapy, and further they will be considered for follow-up visits in addition to in-person sessions. (*Hasson P S et al, 2021*)

Results

Global Cancer Scenario

According to the International Agency for Research on Cancer (IARC), out of five people one will develop cancer during their lifetime, and one in eight men and one in eleven women will lead to death. According to the above figures, more than 50 million people will be alive within five years of a cancer diagnosis. Globally, ageing demographics and socioeconomic risk factors remain the key drivers of this rise.

Breast cancer affects one out of every four women worldwide. Women are more likely to develop colorectal, lung, cervical, and thyroid cancers.

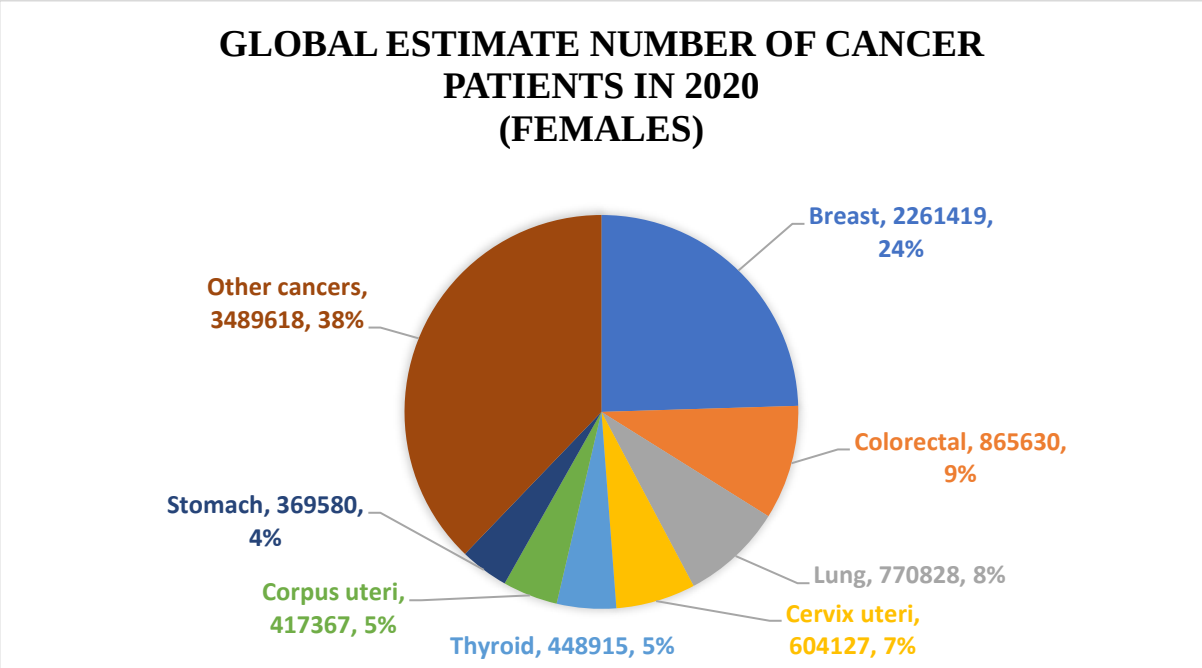

Fig 1: Global estimate number of cancer patients in 2020

The common cancer cases in men are lung cancer and prostate cancer, which together account for approximately one-third of all male cancers.

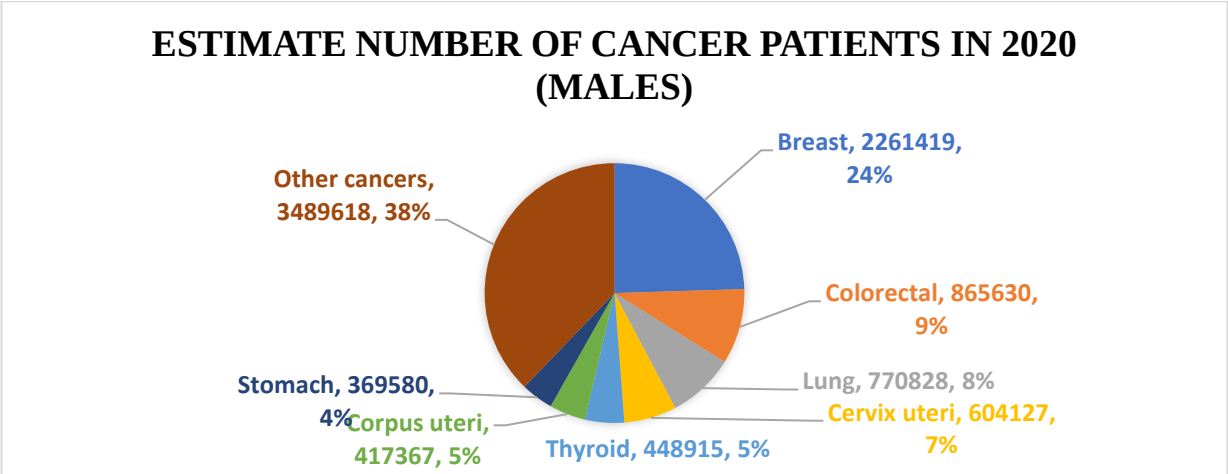

Fig 2: Estimate number of cancer patients in 2020

India Cancer Scenario

For the year 2020, the measure of incidence of cancer patients in India is 646,030 (94.1 per 100,000) for males and 678,383 (103.6 per 100,000) for females. Cancer affects one in every 68 men (lung cancer), one in every 29 women (breast cancer), and one in every nine Indians.

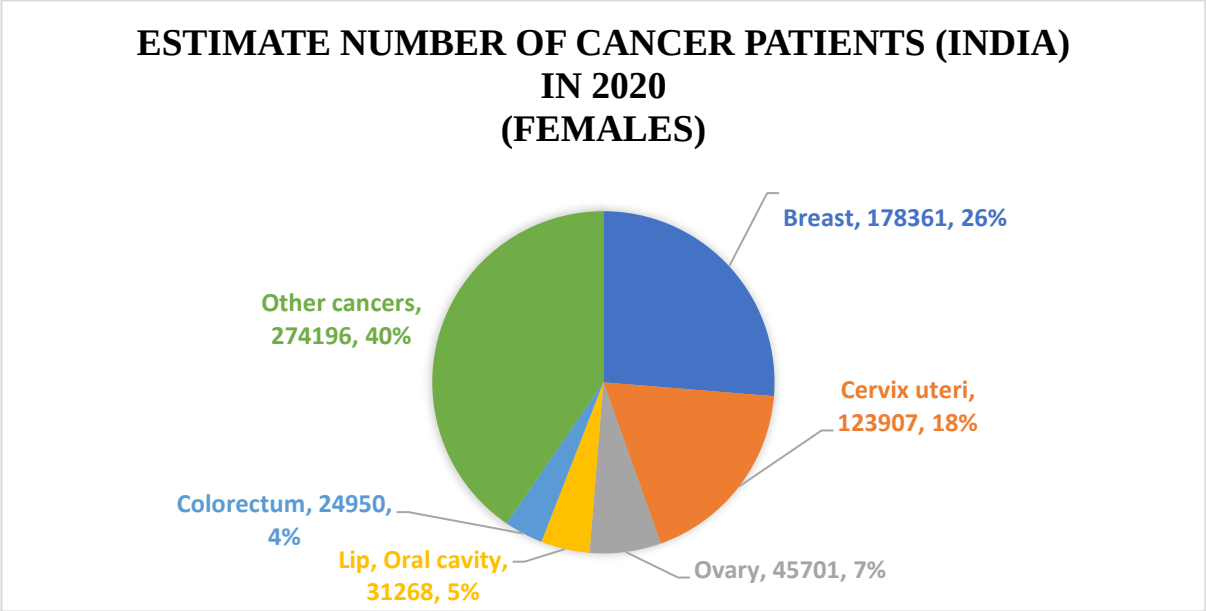

Fig 3: Estimate number of female cancer patients in India (2020)

In 2020, the five most common cancers for males (lung, throat, prostate, tongue, and stomach) will account for 36 percent of all cancers, while the five most common cancers

for females (breast, cervix uteri, ovary, corpus uteri, and lung) will account for 36 percent of all cancers.

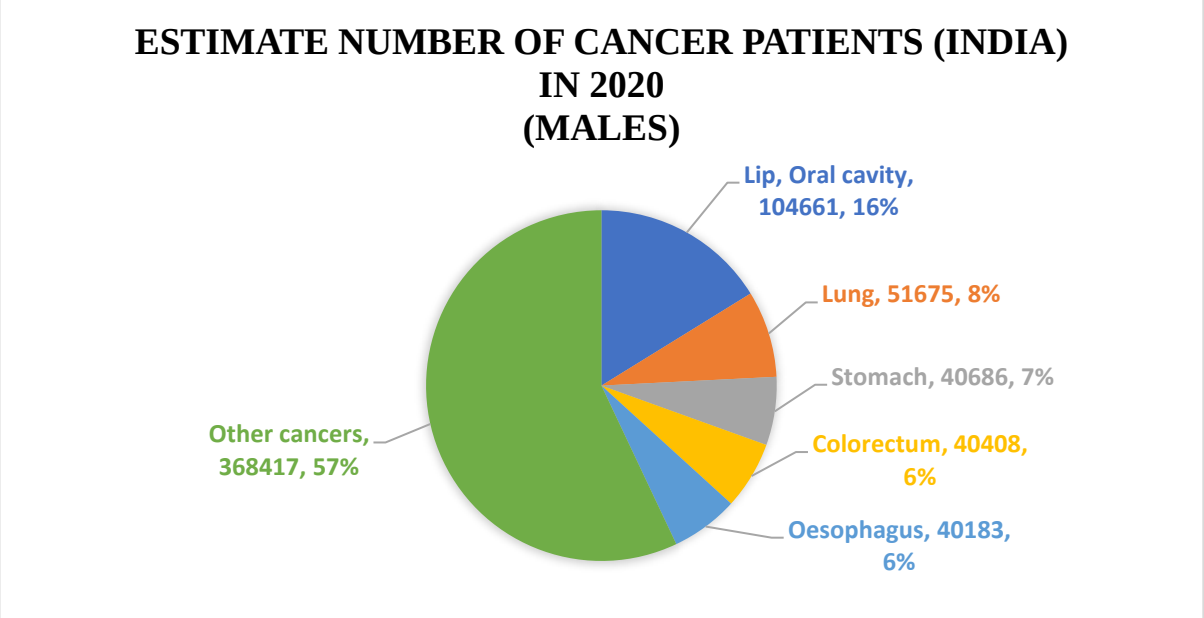

Fig 4: Estimate number of female cancer patients in India (2020)

Effect of COVID on cancer care in UK

The COVID 19 pandemic and attempts to stop it from spreading had an effect on routine cancer treatment. Treatment delays and a decrease in the number of patients receiving cancer-directed care were exacerbated by the nationwide lockdown, travel restrictions, and fear of contracting COVID.

In a recent survey conducted by IQVIA by 100 physicians, the impact of COVID 19 has affected the cancer care amongst the people of UK.

During a survey conducted, during pre-COVID and different waves of the pandemic, it was found that 62 patients visited per week to the oncologists. During the lockdown process, the number of patients reduced to 24 patients. And during the subsequent waves, the number slightly increased to 38, 37 and 33 patients respectively. But the number was less as it was pre-COVID.

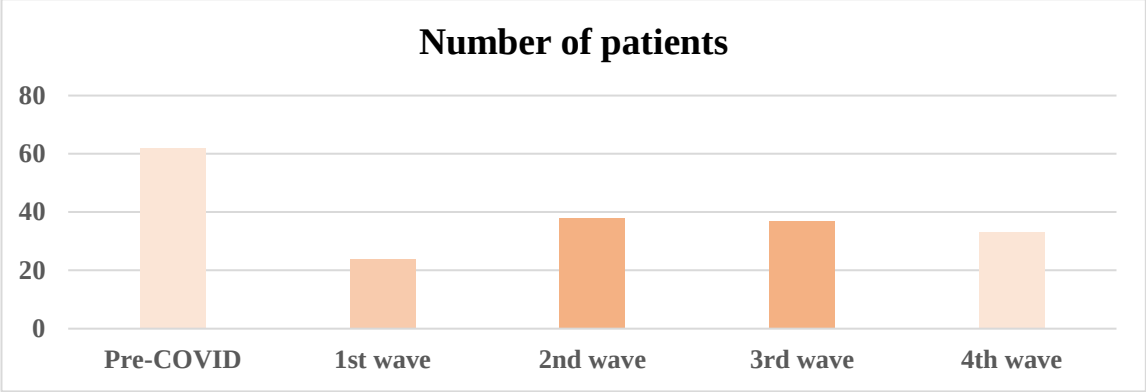

Fig 5: Number of patients visits in various waves of pandemic in UK

(Source: IQVIA)

The decline in patients was due to the delay in four major causes which was delay in surgeries, delay in chemotherapy, conduct of fewer diagnosis and change in treatment protocols.

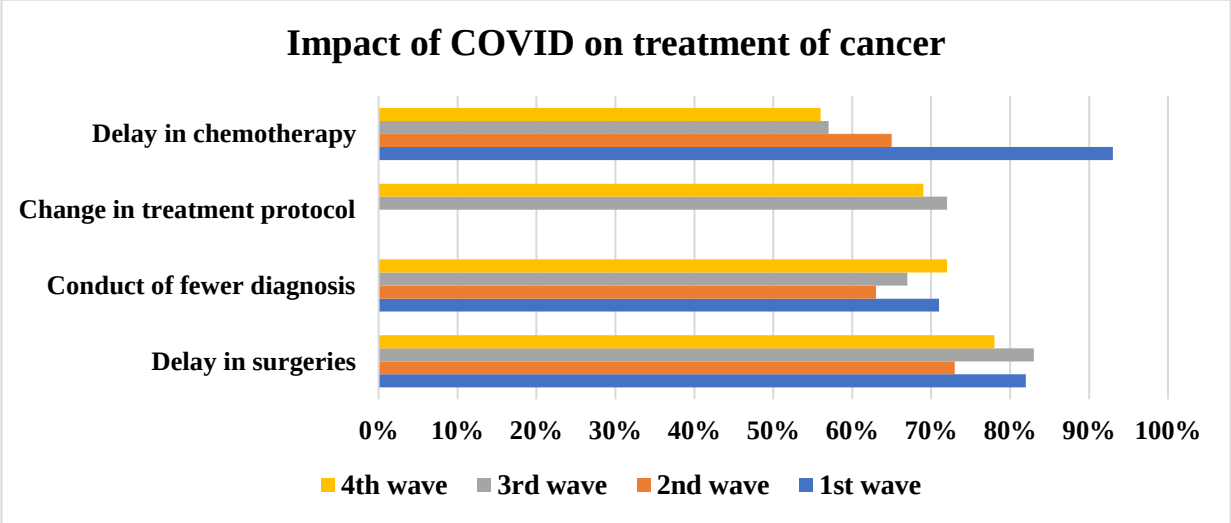

Fig 6: Impact of COVID-19 crisis on cancer treatment practice in UK

(Source: IQVIA)

The impact was overall affected but deep diving into the types of cancers which has affected are the lung cancer (55%), breast cancer (38%) and colorectal cancer (34%). Delay in early screening and postponing of biopsies are impacting diagnosis with lung, breast and colorectal cancer.

Effect of COVID on cancer care in US

During a survey conducted prior to COVID and during various waves of the pandemic, it was discovered that 94 patients visited oncologists once a week. The number of patients was reduced to 46 during the lockdown procedure. The number of patients increased marginally in subsequent waves, to 62, 72, and 70 patients, respectively. However, compared to pre-COVID, the number was lower.

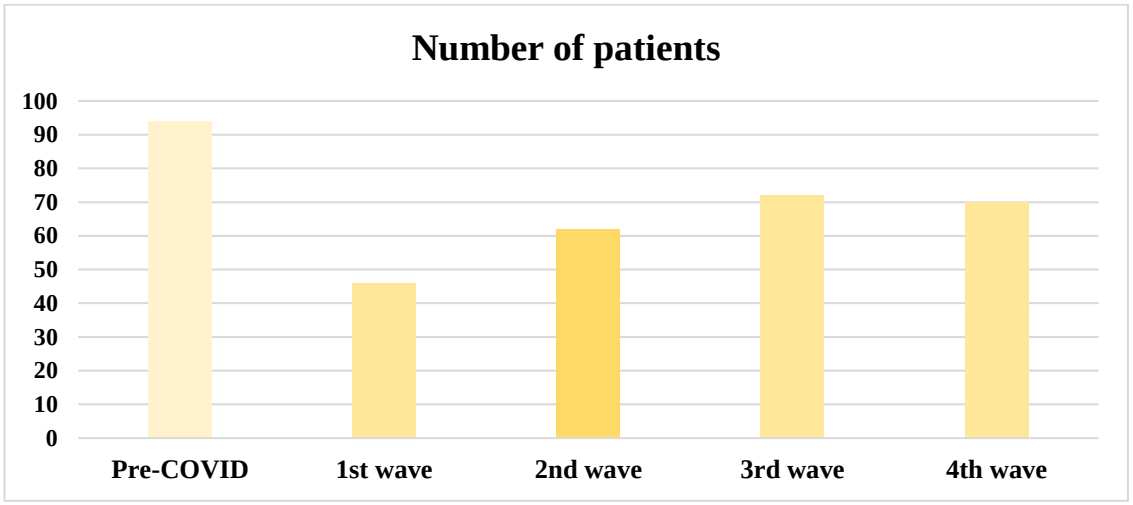

Fig 7: Number of patients visits in various waves of pandemic in US

(Source: IQVIA)

The decrease in patients was attributed to four main causes: delays in operations, chemotherapy, fewer diagnoses, and treatment protocol changes.

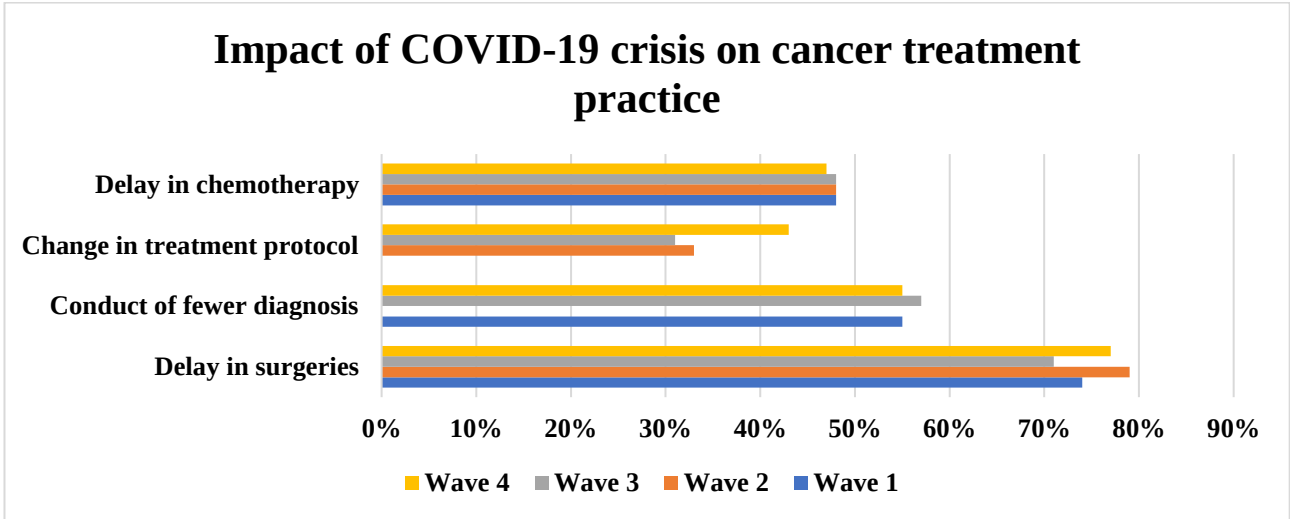

Fig 8: Impact of COVID-19 crisis on cancer treatment practice in US

(Source: IQVIA)

The effect was felt throughout the board, but the types of cancers that were most affected were breast cancer (80%), colorectal cancer (64%) and lung cancer (58%). Lung, breast, and colorectal cancer diagnoses are being hampered by delays in early screening and postponement of biopsies.

Effect of COVID - Cancer care in India

A lot of unprecedented events occurred in India after the declaration of a full nationwide lockdown to prevent the spread of the virus. But there were various healthcare utilizations which was seen at a decline rate such as drop in immunization in children, reduction in institutional deliveries. Cancer was also not left behind. There were many unprecedented events seen in decline of cancer patient footfalls.

Table 1: Impact of COVID on cancer care in India (2020)

Impact Indicator	Percentage/Number
Inaccessibility of life saving surgeries and treatment	70%
Postponement of chemotherapy treatment and follow-ups	
Decrease in patient footfall for cancer care in private clinics	50%
Postponement of cancer surgeries	59.7%
Cancellation of life-saving cancer surgeries	51,100

(Source: The Lancet)

Besides these, there were several other problems that resulted in the loss of life such as failure to follow up on routine cancer treatment, inability in operating emergency surgeries, and unable to return home after chemotherapy centre.

Despite the fact that millions of cancer patients around the world are experiencing delays in diagnosis and care as a result of the pandemic's resource diversion, there is an increasing hope that telemedicine will play a key role in alleviating the backlog cancer cases.

Transformation into Tele- Oncology- A Silver Lining

According to the estimates supplied by Cancer Research UK, COVID-19 has resulted in a backlog of 24 million people requiring cancer care in early June.

Therefore, the use of telemedicine has increased dramatically from about 10% before COVID-19 to around 75% since the peak of the pandemic. The unintended result of telemedicine is that a general practitioner handling cases on a regular basis has risen dramatically. This shift was made possible by the rapid adoption of digital technologies. As health-care systems move forward in minimizing the backlog in treatment of cancer, use of telemedicine will be crucial.

Recent guidelines and standard operating procedures from European Society of Medical Oncology and National Health Service England have bolstered the adoption of telemedicine practice in cancer care. Total triage is proposed in this guidance, in which an in-person appointment is given only after completion of electronic consultation. To reduce the need for hospital visits, the National Health Service (NHS) England recommends using mobile or video consultation in the treatment of cancer patients who do not have COVID-19. In the event that NHS employees must be quarantined for whatever occasion, video conferencing may be used to attend multidisciplinary team meetings.

In order to successfully incorporate and integrate telehealth into cancer care, it must first be determined which in-person services can be delivered safely and effectively using this technology. According to ASCO paper, COVID-19–positive infections, nonurgent high-risk patient populations, and symptom management are all appropriate telemedicine visit types.

Transformation of tele-oncology is surely helping in solving the cancer backlogs but the process of deployment and the implementation is a major concern in the ongoing pandemic.

Mapping of Digital Health Applications in Oncology Care Pathway-Effect of COVID-19 on lung cancer treatment

Cancer treatment is one example of where deferring medical care could be crucial, as the danger of metastasis increases without treatment. However, surgeries and laboratory examinations are frequently postponed. Also, post-operative care and follow up tests were halted, putting cancer treatments at risk. However, this may result in an increase in readmission rates. COVID-19 also hampered cancer diagnosis, as physician consultations and diagnostic examinations were frequently postponed due to resource constraints.

To address the above process-oriented approach during the pandemic, a process model of oncology care is presented to highlight the bottlenecks and the use of tele-oncology at specific pathways to reduce those bottlenecks.

A lung cancer care model will be presented in the following sections. The example was chosen because COVID 19 has had a major impact on oncology patient treatment procedures. The high vulnerability to the virus is caused by cancer and subsequent cancer treatment that relies on immune suppressing drugs.

In the below figure, processes 1a, 1b and 1c describes the diagnostic phase while 2a,2b, 2c and 2d (upward process) describe the treatment phase where palliative care must be chosen and 2a, 2b, 2c and 2d (downward process) describes curative therapy for small cell and non-small cell lung cancer. And process 3 represents the process of post therapy care.

The diagnosis is the first step in lung cancer treatment. Clinicians examine the patient's health and confirms about the risk factors. The confirmation of a lung cancer diagnosis necessitates an assessment of the disease's stage, treatment selection, and follow-up tests

such as imaging (ultrasound, MRI and PET-CT) and a biopsy. If the cancer can be treated, surgery options include surgery (lobectomy) and lung resection. Adjuvant therapies, such as chemotherapy, are examples of systemic therapies. However, if the cancer cannot be treated, palliative care for the patient is chosen.

The bottlenecks in cancer care provision (**red marked**), including surgeries, lab evaluations, diagnostic processes, and postoperative care. These major bottlenecks (processes) are highlighted in red in the lung cancer treatment process model.

Optimal Care Pathway for Lung Cancer

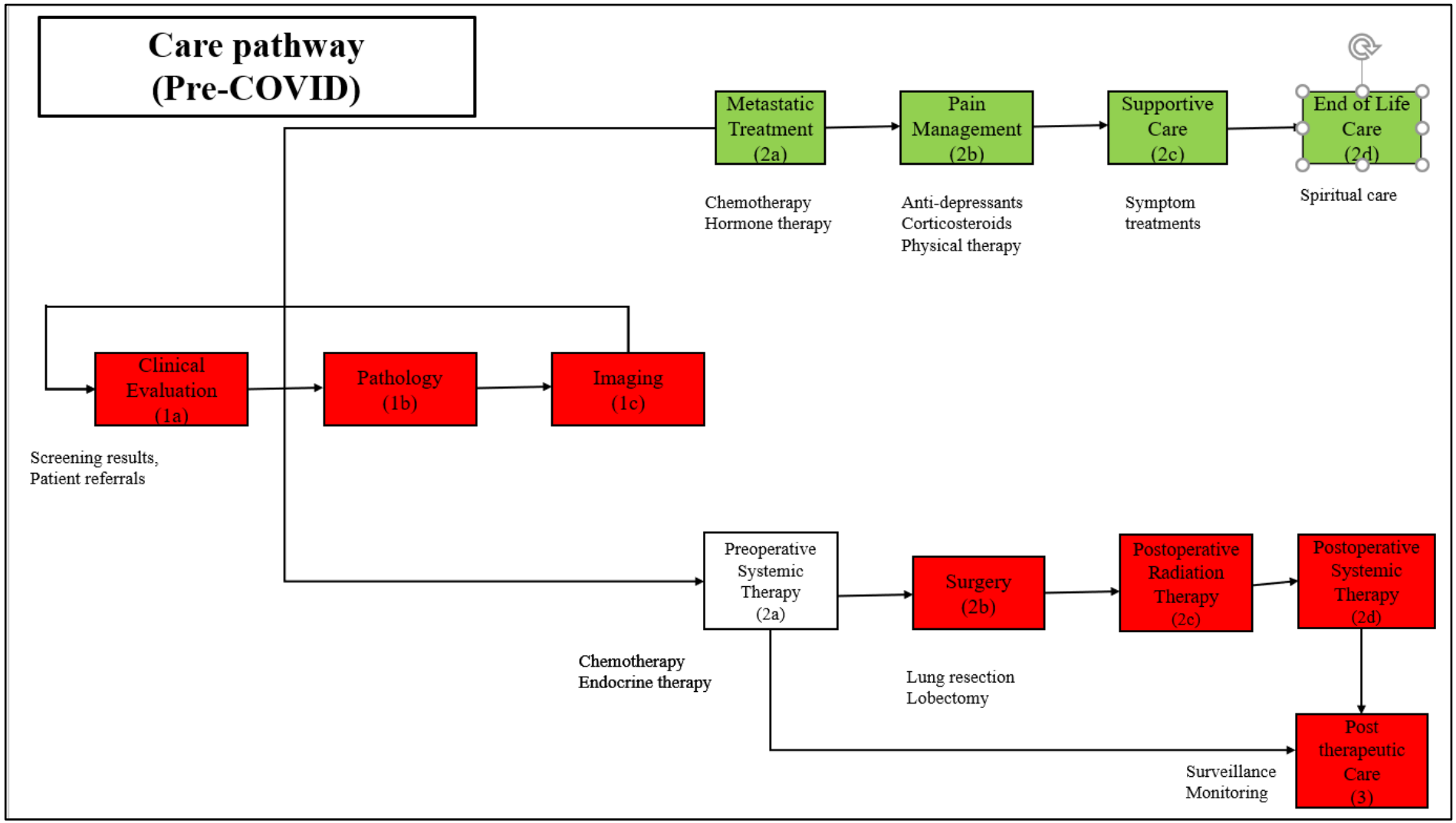

Fig 9: Care pathway of lung cancer (Drafted from NCCN and NCG guidelines)

Clinical evaluation as bottleneck

The exposure of virus and crowded patients can make the normal asymptomatic patient vulnerable to COVID. So, the backlogs of screening and clinical examination is also reduced during the pandemic making it worse to develop the symptoms more.

Diagnosis as bottleneck

Many patients have been afraid of being exposed to the virus or of burden of healthcare services, until seeking cancer screening and diagnosis. Most types of endoscopy procedures generate aerosol, increasing the risk of COVID transmission.

Surgery as bottleneck

Surgery has also been reduced as theatre space and ventilators have been requisitioned to provide additional critical care capacity for COVID-19 patients.

Also, reports of patients developing COVID-19 after being admitted to the hospital have made patients more hesitant to have surgery. As a result, many cancer centres have turned to various treatment modalities and ultimately surgeries are postponed.

Radiotherapy as bottleneck

Radiotherapy has always played an important role in cancer treatment, both as palliative and curative treatment. As the pandemic unfolded, radiation therapy is frequently used to replace or postpone with a higher infection risk.

Systemic treatment as bottleneck

Systemic treatments may put the patients at greater risk of infection and worsen their outcomes if they develop COVID-19.

Digital health solutions to close some bottlenecks

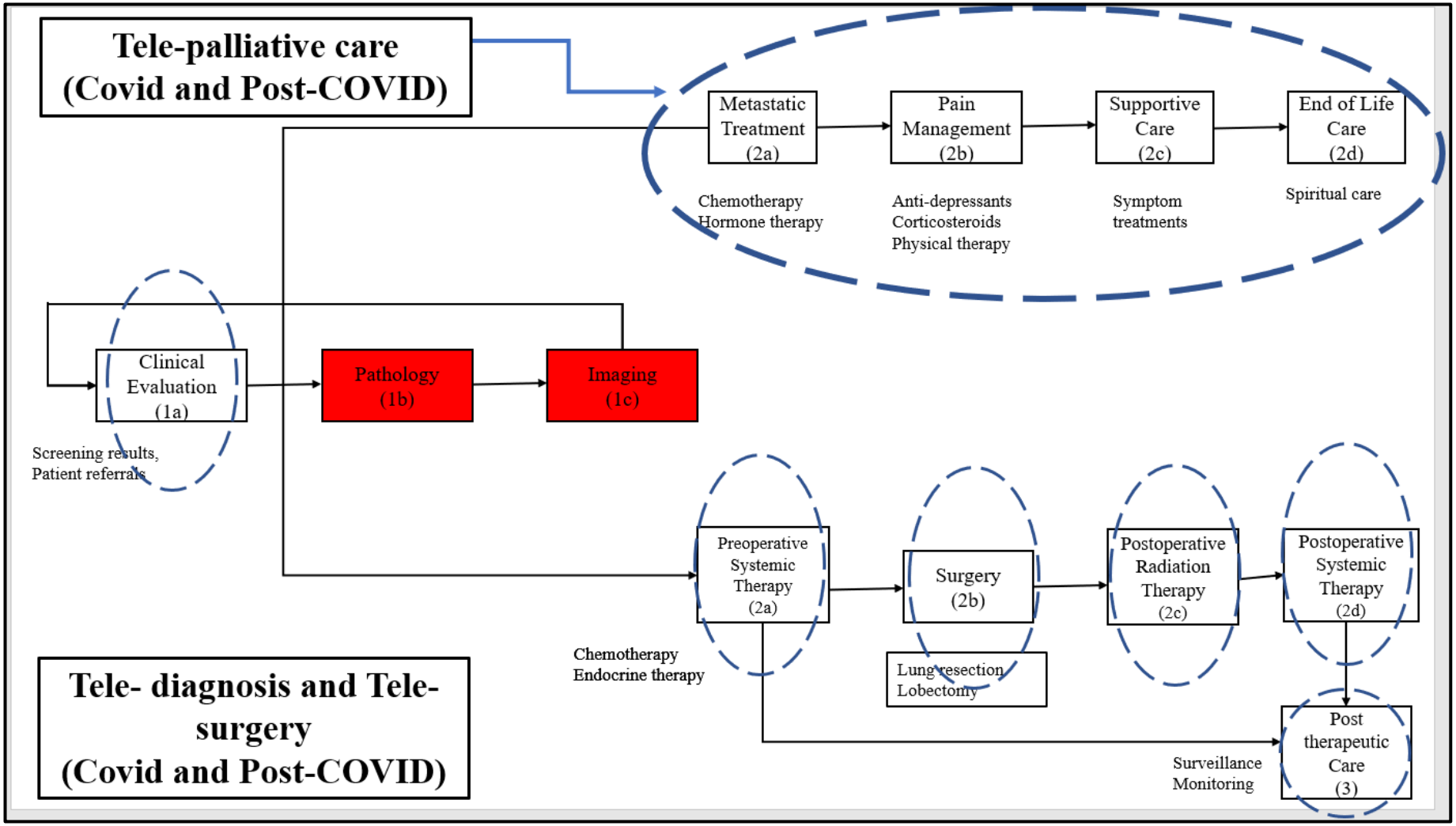

Fig 10: Tele care pathway of lung cancer (Drafted from NCCN and NCG guidelines)

Clinical evaluations

Through telediagnosis and tele-oncology procedures, the exposure of virus transmission can be reduced which will ultimately save the patient from developing symptoms. Usage of artificial intelligence and mapping the care pathway to the electronic health record will reduce the transmission of virus more.

Treatment and tele-palliative care

Some forms of systemic therapy and palliative care can be conducted through digital technologies such as pain management, spiritual care and end of life care which does not require in-person visit during the pandemic and this will be the new normal.

Curative Therapy

Curative therapies such as chemotherapy are now being conducted through technology using a virtual consultation through a nurse in the home-based care or any injectibles that the patient can administer themselves in the home itself getting instructions from the tele-physician at the other side.

Pathology and imaging to remain as bottlenecks

However, some bottlenecks will continue to exist, such as imaging and pathology processes, where technology currently does not provide assistance. Smartphone cameras may be used for medical imaging, but in the case of lung cancer, these technologies are unable to capture medically useful images. As a result, these technologies cannot be used for imaging procedures.

Tele-palliative Care Plan amid COVID- 19

Palliative medicine is an important part of cancer treatment that can be delivered in a variety of settings, including outpatient clinics, inpatient consultations, dedicated palliative medicine units, long-term care facilities, and home care. Because of the growing complications in cancer patients, there is a concern that these patients will be receiving delayed necessary care and medical services, such as palliative care and supportive care.

Due to the ongoing COVID-19 pandemic, palliative care and oncology providers face unique challenges. Telepalliative care is the use of telehealth services to provide palliative care to patients. During the ongoing pandemic, it holds a lot of promise for meeting the needs of patients with advanced cancer.

According to several studies, telehealth is both cost-effective and has high levels of patient satisfaction. Telehealth have proven to be a cost-effective way to overcome travel-related barriers.

Palliative Care via tele-route

Palliative care physicians can interact with patients, demand for medical history, and check for any symptoms using audio-visual platforms for videoconferencing. To supplement their clinical assessment, physicians can use a virtual physical exam combined with patient self-examination. These measurements can be used to estimate the patient's current functional status and evaluate certain physical characteristics such as vital signs, general physical appearance, cardiorespiratory status, skin and extremity changes, and changes in performance status.

- Initial assessment

  Palliative care physicians can interact with patients, demand for medical history, and check for any symptom by using audio-visual platforms for

videoconferencing. Physicians can supplement their clinical evaluation with a virtual physical exam supplemented by patient self-examination. Telemonitoring or home-based telehealth services can be used for ongoing patient monitoring and palliative care delivery. These also allow for remote monitoring of symptoms after the patient begins systemic chemotherapy.

- Special Virtual visits

  Virtual visits can also be used to detect signs of psychological distress and emotional stress. Telehealth services like videoconferencing help maintain a connected relationship by allowing doctors to interact with and respond to their patients' cues. Before beginning a consultation, the clinician should make comfortable the patients before starting with the virtual visit.

- Remote monitoring of symptoms

  Telemonitoring can be used for ongoing patient monitoring and palliative care delivery. These also enable remote symptom monitoring once the patient begins chemotherapy.

- Follow-up virtual visits can be conducted via videoconferencing

  During these visits, any supportive care that may be required can be discussed. When patients and their families are dealing with a lot of uncertainty, having access to a tumor board or multidisciplinary board of doctors can help with their emotional well-being.

Case Study and Flow chart for Telepalliative Care plan for Cancer

Ms X is a old woman with metastatic pancreatic cancer and aggravating pain in her back. She considered initiating chemotherapy of the second line and was referred to as the palliative treatment programme. Ms. Smith lives alone, and on days of chemotherapy her neighbour drives her to and from the clinic. The reduction in clinical staff associated with

COVID-19 has reduced the range of palliative clinical service. In 14 days, the next clinical meeting will be available.

So, a clinical pathway is shown for palliative care about the steps followed and where in digital health/telehealth/telepalliative care can be opted so that Ms X will not visit the clinic and can be treated in her home itself.

The clinical pathway is drafted from the National Comprehensive Cancer Network (NCCN guidelines) and a flowchart is shown in the below figure.

Telehealth Plan

- The palliative care provider can address the pain of the patient during an initial virtual visit, which is a common symptom for cancer patients. Uncontrolled pain may result in hospitalisation that can increase your risk of exposure to COVID-19.
- The location and nature of the pain are known to help the oncology team to determine the etiology of the pain and inform their subsequent management, aggravating and related factors and relationships of pain and posture.
- Then the initiation of chemotherapy is started which can be a virtual visit for administering of injectibles which a nurse can be available for Ms X in the home.
- After the chemotherapy, reassessment is done by the doctor to see any alarming changes through remote monitoring.
- If any alarming changes and depending on the pain and severity, Ms X can be continued with remote palliative care or need hospitalization.

PALLIATIVE CARE PLAN FOR CANCER PATIENT-

Drafted from National Comprehensive Cancer Network (NCCN guidelines)

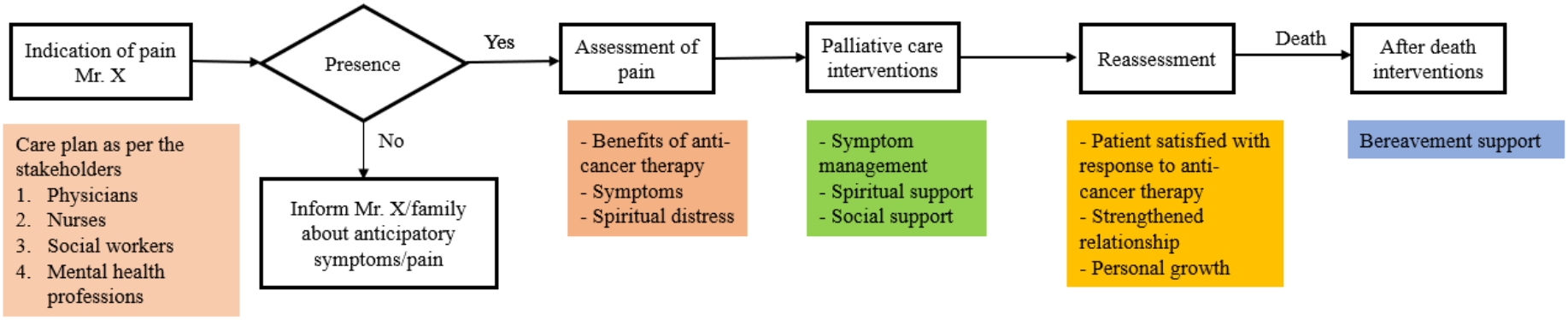

Fig 12: Palliative Care plan for cancer patient (NCCN guidelines)

TELE- PALLIATIVE CARE PLAN FOR CANCER PATIENT- Telehealth as a solution in COVID-19 (Drafted from Palliative Care as per NCCN guidelines)

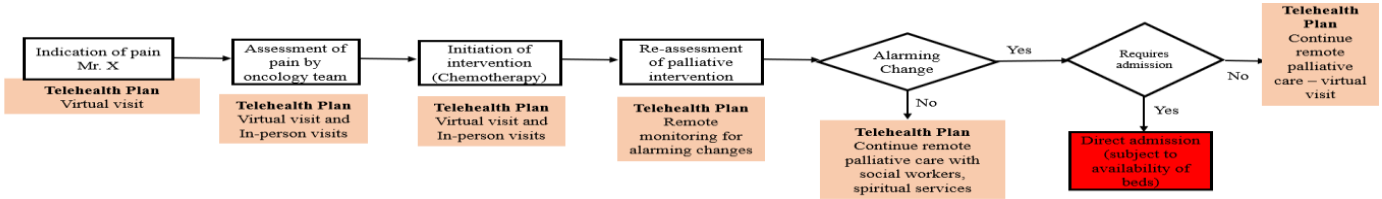

Fig 13: Tele-palliative care plan for metastatic pancreatic cancer

Telehealth implementation in oncology into routine care during COVID 19

Providing good quality cancer care to the patients is a top priority. Access and quality differences are created by local architectural (infrastructure, resources, and staff) as well as social and geographical constraints. Especially among the most vulnerable, such as those from rural and regional locations, as well as those from culturally, socially, and linguistically diverse backgrounds. Digital tools offer ways for overcoming logistical difficulties that contribute to inequality.

Telehealth implementation strategies occur at two phases: Interaction between patients and providers, and communication between providers.

Patient-Provider Telehealth Along the Oncology Care Continuum

Two components of the cancer care journey of the patient can be evaluated while preparing to quickly deploy or expand oncology telehealth: (1) which all services can be converted to virtual setting (2) which services can be given virtually.

The synchronisation of tests, imaging and virtual follow up visits for patients is more crucial than ever in this pandemic, as social alienation may cause further suffering and loss of control for patients. Virtual navigators serve this job, but other clinicians can execute similar tasks on behalf of patients in other institutions where patient navigators are not accessible.

In a breast cancer clinic, for example, physical visits are now limited to patients who require a physical breast examination, while other symptoms and services were provided through telehealth options which was a multidisciplinary visit.

The implementation and deployment begin with transitioning of the clinical services into telehealth services.

Table 2: Oncology services that can be converted to virtual platform

Clinical Service Category	Services converted to virtual setting
Doctor visits and consultation	Initial consultation, which includes discussions about the diagnosis, prognosis, and treatment care
	Visits of clinical trials (as referred by tumor board)
	Follow-up visits for survivorship
Evaluations	Examination of surgical wounds (better for video availability)
	Evaluation of side effects and symptoms
Supportive care	Support from social work
	Tobacco and smoking counselling sessions
	Consultation of specific diet
	Physical and occupational therapy
Palliative care	Symptom and pain management
Self-management and patient education	Patient reported outcomes self-assessment
	Chemotherapy/cancer education

Many in-person visits can be transferred to virtual platform after a patient enters active treatment. Follow-up visits throughout therapy, specialist visits, are all examples of this. Education about specific chemotherapy and other cancer related training materials can be quickly converted to video and posted online, with telehealth counselling available for any extra problems. Palliative consultations can also be virtual when symptom management guidance is needed.

Additional telehealth services

- To keep cancer patients out of emergency departments, telehealth-based triage of medical emergencies is critical.
- Since cancer survivors may be at increased risk for COVID-19, it is fair to move asymptomatic patients' survival appointments to virtual treatment. This is especially important when formal assessments, such as scans, laboratory data, and/or patient reported outcomes (PROs), show that the patient is still in remission.
- Basic education and timely technical support are required for populations who are unfamiliar with telehealth.
- Telephone visits should be offered to patients who have restricted access to the internet and video capabilities. During a phone call visit, the healthcare providers should encourage the patients to note down key points for any major instructions.

Provider -Level Telehealth Capacity

At the provider level, there are various steps to implement oncology-based telehealth interventions during this pandemic.

The below table represents the telehealth strategies that has been adopted to minimize the co-morbidities and choose telehealth options for the cancer patients.

Table 3: Steps in implementing or expanding telehealth

Deployment Steps	Oncology based steps
Identify the telehealth phone and video methods for the clinicians and health workers	Oncology Telehealth platform (depending on the technical infrastructure)
Determine which patient meetings are possible for the patients and practise via telehealth	Follow up visits, cancer survivorships and chemotherapy infusion (to minimize the hospital admissions due to COVID 19)
Determine the telehealth visit type Who will conduct telehealth?	General Physician/Nurse/Oncologist/Pathologist/Radiologist (Depending on the cancer case)

How documentation need to be done in medical records?	
Provide training about the use of telehealth	
Discuss how to schedule telehealth appointments with the scheduling department	Depending on the consent and type of the cancer patient and the technical know-hows
Inform patient about how to make appointments, and visits through telehealth option	
Moving to teleconsultation through calls, web or tumor board	Case dependent (rare cancers/ treatment recommendation/ clinical trials)

A systems-based approach to protect the healthcare proffesionals is also required to mount a pandemic response. Flexible working hours and home-based work protect the health of the oncology workforce. Because older adults infected with COVID-19 have a higher mortality rate, this is especially important given the ageing oncology workforce. Closures of schools and the need to care for one's own family also affect younger workers.

Specific considerations by tumor

Based on tumor sites, specific considerations are taken care in having a telehealth visit or not.

For treating some anti-cancer related therapies and post therapy follow up visits can be a well chose option for opting telehealth in order to minimize the spread of COVID-19 and if geriatric patient is approaching for a post therapy follow up then the attending oncologist should advise for telehealth approach.

Table 4: Tumor specific and therapy related telehealth considerations

Oncology parameters	Telehealth related approach
Therapies of anti-cancer	For any toxicity related to therapy, telehealth can facilitate reviews in the duration of treatment through a nurse with a virtual consultant at the other side
	Pre-treatment visits can be checked via telehealth the day before to avoid unnecessary trips to healthcare centre

Long term follow-up post therapy and surveillance	Patient distance from centre, patient suitability, capability, and acceptability must all be determined for all TH
Specific areas	
Small cell lung cancer Stage 0, 1	Telehealth cannot be advised as physical examination is required
Non-small cell lung cancer Advanced stage	If chemotherapy used, telehealth may not be suitable

But there are some specific areas for tumor sites where telehealth approach may not be an option. For example, in advanced stage of non-small cell lung cancer, if the patient is on chemotherapy, then the effectiveness of the treatment option may not be known by a virtual visit rather than in-person visit to the oncologist.

Telehealth in multidisciplinary field of oncology during COVID-19

Use of telehealth for hematologic malignancies during pandemic

The patients with hematologic malignancy often interact with the doctors present in the hospitals making vulnerable to infection. Governments have established mitigation strategies such as triage facilities and social distancing rules. These regulations have pushed cancer centres to devise solutions for continuing to deliver proper care while reducing the risk of infection for both patients and healthcare personnel. Now it's the time for decentralized care where the care comes to the patient rather than patient going to the healthcare facility. This is enhanced with the telecommunications technology.

For the hematologic malignant patients, telehealth consults, home-care treatment, and remote patient monitoring are examples of decentralised care tools which has helped these patients during the pandemic.

Telehealth visits

- Synchronous and asynchronous approaches allow clinicians to communicate information without having to physically interact. It also helps to cut down on patient-physician interactions.
- The usage of asynchronous haematological e-consultative services in the outpatient context at lowered the frequency of in-person visits.
- Initial visits for hematologic malignancy can be completed through telehealth and those who require specific procedures such as bone marrow biopsy need to be addressed through in-person visits.

Home based treatment

- There is a new model of telehealth infusion for cancer patients in which a nurse who is well versed with chemotherapy treatment provides education for self-administration via telehealth in some injectable medications.
- In the United States, home-based blood transfusion programmes are unusual, but they are more extensively used in Europe and are considered safe and effective, and are accepted by the patients. Blood cancer patients would benefit tremendously from ongoing programmes that can administer these therapies at home if they were more widely implemented. The present COVID-19 pandemic could be the trigger for the necessary changes to make these services standard of care.

Radiation Oncology technology advancement- Pre COVID

The advantage of radiation oncology is that it is intimately related to technology, which is advancing at a rapid pace. Because of the constant advancement of technology, the area of radiation oncology has had to evolve and adapt to changing technologies such as developments in radiological imaging, engineering, and computerization.

Importance of manual clinical practice in radiation oncology- No replacement for technical advancement

Despite the importance of technology in radiation oncology, it cannot replace real people in clinical practise. Close collaboration and an established process are required in the clinical setting, which begins with the initial consultation and continues with computed tomography simulation, dosimetry and planning, therapy delivery, potential toxicity follow-up, and post-therapy consultations.

The Pandemic Effect on Radiation Oncology- Digital Technology

Radiotherapy is used to treat around 50% of cancer patients. Due to delays in chemotherapy and surgery during the COVID-19 outbreak, the importance of radiotherapy in the management of oncological patients has become even more vital. To reduce treatment interruptions, radiation oncology departments have used a variety of methods, including treatment prioritising based on urgency, increased use of ICT, and shorter treatment schemes (hypo fractionated or ultrahypofractionated).

The acronym RADS (Remote, Avoid, Defer, Shorten) summarises recommendations to optimise radiotherapy during the epidemic which encourages in virtual visits reducing and deferring the radiotherapy treatment at the centre.

Teleradiotherapy

Due to the increased use of ICT, the radiation oncology profession is undergoing a paradigm shift, transforming radiation oncology into a tele-discipline called tele radiotherapy, enabling professionals to consult, determine contours, and plan treatment remotely.

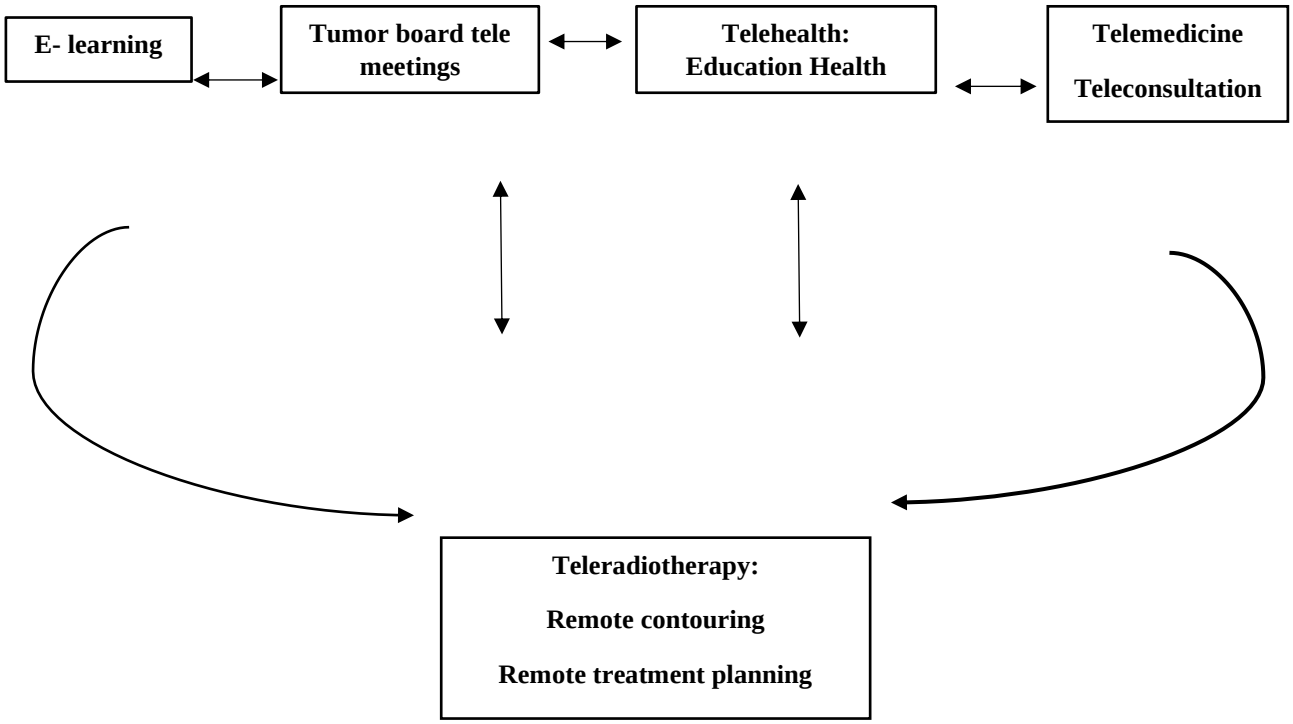

Fig 11: Combination of teleradiotherapy and oncology education

The teleradiotherapy model can minimize the number of in-patient visits that require physical presence. Furthermore, patients requiring follow-up visits can be referred via telehealth.

Radiation oncologists have learned to build telematics networks and communications (i.e., online and mobile), receive training through webinars and social media, and access new research through open access publications.

Implications of the "Virtual Radiation Oncology Clinic (VROC)" Model

Telemedicine has the potential to change the way radiation oncology is practised. The legal framework, patient and provider tolerance, and technological improvements required to support the strategy will determine the impact of broad Virtual Radiation Oncology Clinic (VROC) adoption.

A virtual evaluation might be augmented by a "joint visit" and full physical examination performed by a qualified practitioner located close to the patient. Even if only 20% of processes could be moved online, telemedicine models might have major operational ramifications for traditional cancer offices.

Digital technology helping the radiation oncology workforce

The VROC paradigm, in conjunction with modifications in supervision requirements, has the potential to overhaul the radiation oncology workforce. Regardless of the fact that existing tactics demanding coordinated monitoring are likely to urge the VROC show on the workforce.

Telehealth in Medical Oncology during pandemic

A medical oncologist conducts the initial video visit and obtains a complete history, covering significant aspects such as degree of weight loss, nutrition level, and performance level. A virtual examination may also involve an assessment of the face, skin, hydration, oxygen usage, visible neck nodes, the usage of accessory muscles to breathe. With the use of support systems, a brief exam and affect evaluation are done (presence of family).

Challenges for Telehealth in Oncology in COVID 19

One of the issues with tele oncology is its lack of accessibility. Geriatric cancer patients may lack the knowledge in virtual visits, while patients from low-income families could be financially incapable to do so. The second fear is that online information sharing may threaten patients' privacy, particularly during COVID-19, when more health data is shared online, increasing hackers' interest in physicians' accounts. One of the primary limitations of tele-oncology is the jurisdictional borders of physicians' practise, which are exacerbated by physical exam constraints and inadequate training in telemedicine technology. Because of limited access to telemedicine platforms and inadequate internet connections, the use of telemedicine becomes an obstruction for the majority of cancer patients, who are old and/or live at remote locations. The usage of contemporary technologies made some patients feel uneasy and apprehensive. They also claimed that engaging with providers through television-based solutions was difficult or difficult for them. There is a lack of recommendations for oncological surveillance over the phone or video in subspecialties such as head and neck cancer.

Recommendation

It is improbable that oncology will return to pre-pandemic conditions. To ensure fairness of access to healthcare for patients and their families, adaptation to a "new normal" in cancer care would necessitate ongoing reconsideration of various interactive, economic, and physiological components of cancer care. The interpersonal and technological repercussions of the telehealth shift will need to be addressed based on patient situations and capacities, as well as the growing financial systems of oncologists across the country. Virtual clinic visits and phone call evaluation for routine visits that do not require physical examination or activities related to oncological concerns can aid in the reduction of hospital visits for clinical encounters (cancer survivorship, palliative care, chemotherapy,

online education). Before returning to normal hospital operations, communication and care coordination must be addressed. Organizations must invest in proper infrastructure, such as adequate technology and Internet speed, as well as provider training on how to use telehealth effectively.

In the digital era, virtual connecting of electronic health records with diagnostic tools will allow for a better sharing of health information in order to provide the right care at the right time. Portable cameras equipped with technology to detect skin changes and rashes connected with radiation and chemotherapy, as well as computer-based interactive tools that analyse cancer-related symptoms, may be included. Data gathered from the delivery of care to cancer patients during COVID-19 will also be used to develop care models and policies.

Conclusion

As the COVID-19 pandemic unfolds, it is evident that cancer-care recommendations must adjust to the shifting COVID-19 scenario. Continued use of telemedicine for postoperative visits and systemic therapy surveillance will reduce patient travel burden and infection risk. Prior efforts to advance the digital patient experience have also been sluggish to deploy, but the pandemic revealed that it was possible to do so rapidly and successfully. Nonetheless, this pandemic has the potential to make tele-oncology a standard practise in the treatment of cancer patients. The difficulties of managing cancer patients during a viral pandemic highlight the crucial need for more research on the role of telemedicine during crisis.

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