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NATIONAL CENTRE FOR DISEASE INFORMATICS AND RESEARCH

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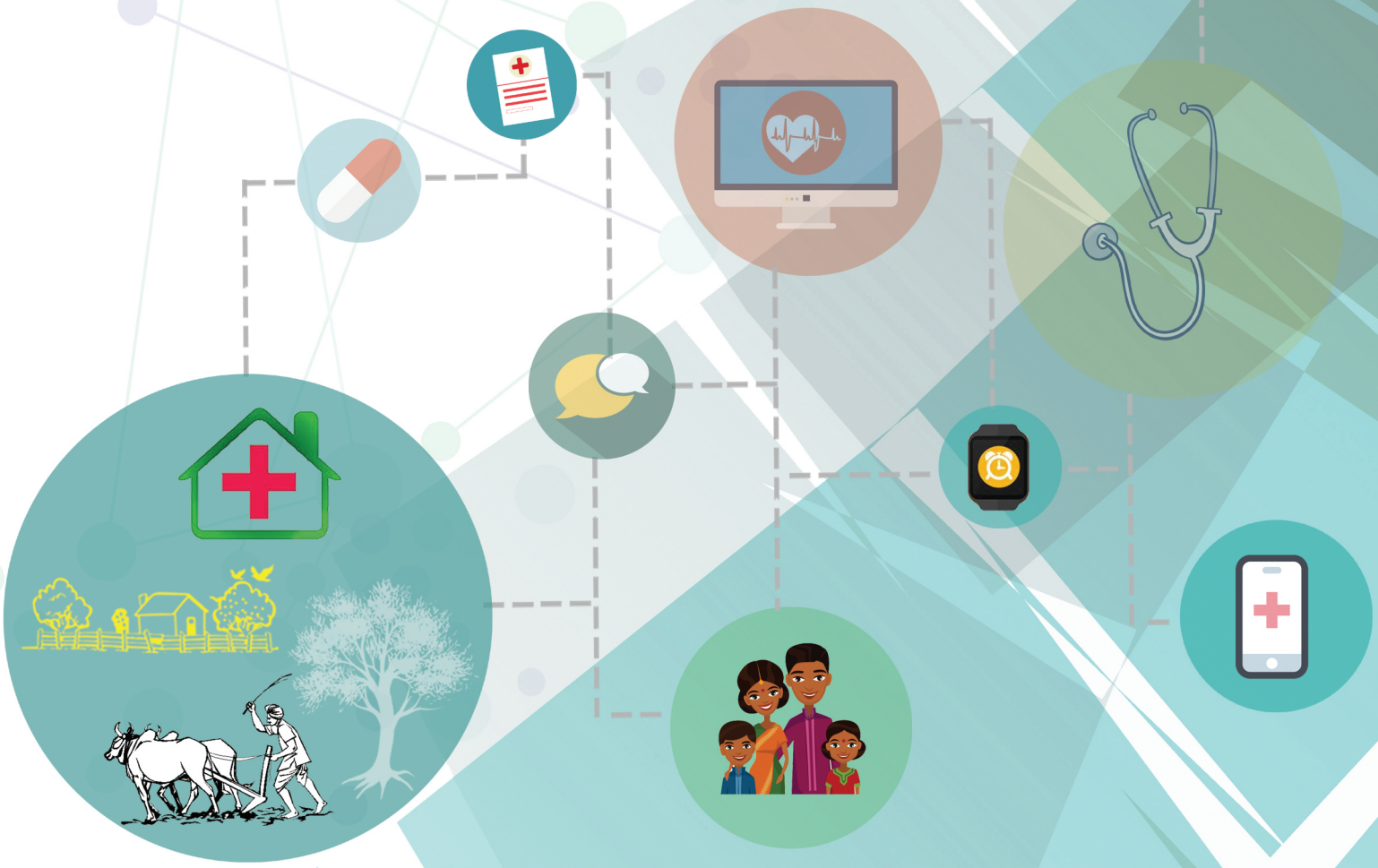
Collaborate Innovate Inspire

Framework for Telemedicine use in Management of Cancer, Diabetes, Cardiovascular Disease and Stroke in India



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Framework for Telemedicine use in Management of Cancer, Diabetes, Cardiovascular Disease and Stroke in India

ICMR – National Centre for Disease Informatics and Research, Bengaluru

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Foreword

Non-communicable Diseases (NCDs) have become the leading cause of morbidity and mortality in the country. These patients require lifelong medical care to manage the conditions, prevent complications and premature death. Accessibility, availability and affordability of care is critical in management of NCDs. Continuous provision of care to the patients with NCDs is pivotal to manage the conditions and avoid complications. The Government of India's (GoI) response in improving access to health care has been strengthened by the release of the Telemedicine Guidelines in March 2020 by the Ministry of Health and Family Welfare. The e-Sanjeevani portal has enabled lakhs of consultations and is implemented across 28 states in India. This is an encouraging response as the nation is accepting and embracing technology for achieving health of their families and communities.

It is very crucial to provide the necessary capacity and skills to the health care providers to embrace telemedicine for health education, promotion, service provision and public health management of diseases. I am pleased that ICMR-National Centre for Disease Informatics and Research (NCDIR), Bengaluru has steered the development of such a guidance book **'Framework for telemedicine use in management of cancer, diabetes, cardiovascular disease and stroke in India'**, that can provide clear guidelines of adopting telemedicine across the different levels of care to manage the major non-communicable diseases.

This book has highlighted the importance of strengthening referral systems, clinical expertise, clinical tools and the flow of knowledge and skills to primary care providers. It is appreciable that the best clinical expertise of our country has been involved so that its adaption across public and private health systems, primary care providers to tertiary care physicians, and for health promotion, preventive, curative and rehabilitative services is feasible.

I see this as an important step towards strengthening our country's response to tackle NCDs and achieving Health for All. I look forward to widespread use of this framework to develop more detailed guidance for healthcare providers, patients and their care givers.

Balram Bhargava

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Message

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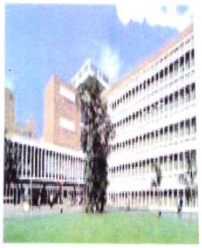

15th January, 2021

MESSAGE

Prevention, early detection and management of NCDs require efficient healthcare system which is affordable and accessible to all. Telemedicine can fill the gaps in provision of care where distance is a hurdle or patients cannot easily reach specialist centres. The Telemedicine Practice guidelines released by the Ministry of Health and Family Welfare in March 2020, aims to mainstream telemedicine in healthcare. In support, the guidelines on application of telemedicine in cancer, diabetes, cardiovascular diseases and stroke shall support the use of telemedicine for continued care of NCDs. The guidelines would attain special importance in the present pandemic times and continued application in all situations where the health care system needs to be strengthened for ensuring early detection, timely referral and management of the major NCDs.

The book **"Framework for Telemedicine use in Management of Cancer, Diabetes, Cardiovascular disease and Stroke in India"** by ICMR-NCDIR, Bengaluru is very timely and commendable. Specific guidelines on the major non communicable diseases so as to integrate telemedicine in healthcare practice for cancer, diabetes, cardiovascular diseases and stroke is explained.

The chapter on cancer shall enable practitioners to understand the use of basic telemedicine tools and exercising critical judgement when assessing cancers of different anatomical sites of cancer in various stages of disease. The framework is specific to the different modalities of cancer management and evaluation, and describes the role of telemedicine in surgical, medical, radiation oncology, palliative care, radiology and pathology. This could support the practitioners in diagnosis and management of cancer, taking treatment decisions, counselling, palliative care, and taking timely actions to prevent complications through telemedicine.

The guidelines provide an easy understanding of the basic concepts and methods through the use of illustrative flowcharts. I congratulate all the experts and ICMR-NCDIR for taking initiative to develop this document and wish for its successful dissemination across the NCDIR registry network of hospitals.

GK Rath

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Message

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MESSAGE

It gives me immense pleasure that ICMR-NCDIR, Bengaluru has brought out the "**Framework for Telemedicine use in Management of Cancer, Diabetes, Cardiovascular disease and Stroke in India"** in conjunction with the Telemedicine Practice Guidelines for Registered Medical Practitioners (RMPs). This guideline covers more general aspects on utilization of telemedicine in health care system, and in reference, the specific guidelines for NCDs shall further strengthen the health care system.

The chapter on application of telemedicine in management of diabetes mellitus includes the various aspects of diabetes management {screening/diagnosis, treatment, health education, complication screening and management). Clear demarcation on indication for face to face consultation in diabetes management and conditions that can be managed through telemedicine has been explained. This would enable health care workers to decide the mode of management depending on the nature and severity of the illness.

These comprehensive guidelines have been developed and reviewed by the team of experts in diabetes mellitus and their efforts in shaping the guidelines is highly appreciated. I am confident that the guidelines would help all endocrinologists, physicians, family practitioners and general medical practitioners in rural and urban areas in providing diabetes care. I congratulate ICMR-NCDIR for steering the development of NCD specific telemedicine guidelines, adding another feather to its achievements. I wish success for the release and dissemination of the book, and wish that the guidelines are used and applied appropriately by the medical fraternity.

Ashok Kumar Das

Message

ST. JOHN'S NATIONAL ACADEMY OF HEALTH SCIENCES
Division of Clinical Research and Training
St. John's Research Institute

MESSAGE

I am glad that ICMR-NCDIR, Bengaluru has brought out the chapter on application of telemedicine in management of cardiovascular diseases (CVD) in the document titled **'Framework for Telemedicine use in Management of Cancer, Diabetes, Cardiovascular disease and Stroke in India'.**

The specific guidelines on CVD shall enable the Registered Medical Practitioners to use technology in an efficient way to bridge the gaps in CVD care particularly for at-risk & vulnerable patients. CVDs are conditions requiring both acute and chronic care from medical practitioners. Telemedicine serves as an important tool to ensure accessibility for medical care, and enables health provider & patient education. The chapter on CVDs provides an overview on screening, evaluation, risk stratification, treatment, monitoring of complications and the guidelines on timely referral of the patient to tertiary care hospitals. It also has scope for further expansion on specific CVDs.

I extend my appreciation to ICMR-NCDIR for taking the initiative in developing the Framework on use of telemedicine specifically for CVDs. This shall guide general practitioners to understand the potential of telemedicine for prevention and management of CVDs.

Prem Pais
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18th January, 2021

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Message

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MESSAGE

I am delighted that "**Framework for Telemedicine use in Management of Cancer, Diabetes, Cardiovascular disease and Stroke in India**" has been developed by ICMR-NCDIR. This would definitely aid the healthcare professionals in development of efficient and sustainable NCD care services across India through effective use of telemedicine.

Early detection and management of stroke is important not only reduce mortality but also to prevent disability, and reduce the burden on caregivers. The Covid 19 pandemic has necessitated medical professionals to innovate different ways of consultations both for acute stroke care and continuum of stroke care. The chapter on stroke explains about 'Tele-stroke' -application of telemedicine in diagnosis, assessment of severity and management of acute stroke and also plan for future rehabilitation. It also apprises the usage of telemedicine in educating community about recognising the symptoms of stroke and training doctors at all levels in organising stroke services using the framework of Tele-stroke.

These guidelines are very comprehensive and detailed, and can be used by health care providers at all levels to implement telemedicine in stroke care efficiently and improve service delivery and management. The efforts put in by staff of ICMR-NCDIR in this regard is laudable, and I sincerely appreciate the experts who have contributed and critically reviewed this document. I look forward to see its application in improving service delivery for stroke in the days to come in our country.

DR. P. Satishchandra

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Preface

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Preface

The rising burden of NCDs linked to the health transition of rural and urban India, calls for concerted efforts in health promotion, early detection, timely management and continued care for NCDs so as to reduce disability and premature death. India has leveraged many activities and interventions under the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS), Ayushman Bharat Health and Wellness centres linked to the National Medical College Network (NMCN), and the Ayushman Bharat scheme to synergize the health system response to NCDs.

The recent release of Telemedicine Guidelines in March 2020 has provided the technical and regulatory framework for Registered Medical Practitioners to practice medicine using digital solutions and communication networks. The goal of telemedicine is to improve accessibility of care among communities in remote areas, and for people with limitations in mobility, transportation and time. There are technical, ethical and financial challenges in implementing telemedicine in India. If implemented properly, telemedicine can improve access to care by eliminating barriers like time constraints, travelling long distances and prolonged waiting time in hospitals. It is a powerful tool to build referral systems and link primary and secondary levels of healthcare system both in government and private sectors to tertiary care, through standard workflows and protocols.

Experts on Cancer, Diabetes, Cardiovascular diseases (CVDs), and Stroke through four working groups, developed specific guidelines on telemedicine use in management of major NCDs respectively, which was further reviewed and finalized by subject experts. The guidance book is organized as Chapters 1 and 2 that provide an overview of telemedicine and its application in management of NCDs. Chapters 3 to 6 elaborate guidelines specific to Cancer, Diabetes, CVDs and Stroke, respectively. Each chapter describes guidelines on consultation, referral, prescription of medicines, monitoring of biochemical parameters and health education through telemedicine. They also explain its utility in improving emergency care for respective diseases. Overall, it aims to strengthen the continuum of care for the major NCDs.

At the outset, this guidance book shall benefit the nation-wide network of hospitals that are part of the ICMR-NCDIR registry network in developing databases on cancer, diabetes, CVDs and stroke in India. It shall further support training of RMPs in telemedicine use in management of NCDs. There is further scope for development of comprehensive disease specific guidelines and ICMR-NCDIR shall ably support such processes.

I look forward to its dissemination and adoption to strengthen management and control of NCDs.

Prashant Mathur

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Acknowledgement

NCDs are among the top five leading causes of disease burden in India. Patients with NCDs need both acute care and long-term management and monitoring. Telemedicine can be used to sustain the interventions in health promotion, prevention and control of NCDs in India. In the context of Telemedicine Practice Guidelines released from MoHFW, ICMR-NCDIR has worked with experts in the fields of Cancer, Diabetes, Cardiovascular Diseases and Stroke, to develop a detailed guideline for the management of the major NCDs.

We express our sincere gratitude to the Conveners of the Working Groups Dr. SVS Deo, Dr. Anoop Misra, Dr. P C Negi, Dr. MV Padma Srivastava who have translated evidence and experience to develop the framework guidelines of use of telemedicine in management of Cancer, Diabetes, Cardiovascular diseases and Stroke. The extensive discussions and inputs provided by all the members of the Working Groups, has shaped the development of the chapters, and their motivation to complete the work is greatly acknowledged.

We sincerely thank each one of the reviewers - all senior faculty and subject experts who carefully reviewed the content and provided valuable suggestions for its finalization.

The encouragement of Prof Rath, Chairperson, SAC, ICMR-NCDIR has helped us to take up this enterprise to its completion, and we are thankful for his support and advice. We duly acknowledge the suggestions and support from Dr. Satishchandra, Chairperson, Research Area Panel-Stroke, Dr. Ashok Kumar Das, Research Area Panel-Diabetes, and Dr Prem Pais-Research Area Panel-Cardiovascular diseases. We are extremely thankful for the critical inputs from the Research Area Panels and Scientific Advisory Committee, ICMR-NCDIR for completing this exercise.

We are deeply inspired by Prof Balram Bhargava, DG, ICMR who has supported and motivated NCDIR in all endeavours in research and capacity building in NCDs, and we duly acknowledge his support in facilitating this work.

We are deeply grateful to Dr. Prashant Mathur, Director, National Centre for Disease Informatics and Research Bangalore for leading and guiding the scientists team, his valuable insights on the framework of telemedicine use, and his unstinted support in the development of the book and its release.

We acknowledge the active involvement and efforts from scientific, technical, administrative staff of ICMR-NCDIR for completion and release of the book. The motivation and sustained interest and team work has helped to see the light of the day in the release of the book.

We hope that this book shall provide the much-needed guidance to health providers and systems to organize and implement telemedicine for the management of the major Non-communicable diseases in India. We sincerely believe that the book shall support the clinical practices of the hospitals of NCDIR registry network. We are thankful for the opportunity to be part of the process of developing and publication of this book.

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Anita Nath
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1 Telemedicine in India

1.1 Introduction

Telemedicine includes the use of communication networks and digital solutions in providing health services. It allows collaboration between providers and patients across spatial boundaries, for activities linked to health promotion, prevention, diagnosis, timely referral, management and follow-up of patients.

Evolution of telemedicine in India

E-health solutions, which include telemedicine, are recognized as cost-effective tools to increase access to health care and to improve patient outcomes(1). Telemedicine in India was started with the support of the Indian Space Research Organisation (ISRO) in 2001 (2). Multiple telemedicine projects have been initiated in different states of the country in collaboration with Ministry of Electronics and Information Technology (MEITY) and Ministry of Health and Family Welfare (MoHFW) (3,4).

The National Health Policy-2017 advocated extensive deployment of digital tools for improving the outreach of the healthcare system (5). Online consultation networks for telemedicine, including the National Medical College Network (NMCN) and State telemedicine networks, were established(1). In 2019, the telemedicine guidelines for Health and Wellness Centres (HWC) of the Ayushman Bharat Scheme were released to leverage Information Communication Technologies (ICT) to connect the HCW with the Medical colleges.

Telemedicine guidelines by the Ministry of Health and Family Welfare

MoHFW, Government of India released the 'Telemedicine Practice Guidelines' in March 2020 to give practical inputs to the doctors in realizing the full potential of the telemedicine for better healthcare delivery in the aftermath of the COVID-19 pandemic (6). The guidelines are focussed on the Registered Medical Practitioner (RMP) defined as a person who is enrolled in the State Medical Register or the Indian Medical Register under the Indian Medical Council (IMC) Act 1956.

The following sections are covered in detail in telemedicine guidelines that is a component of the Indian Medical Council (Professional conduct, Etiquette and Ethics Regulations 2002) (IMC Act 2002)

- Definition of telemedicine
- Scope of telemedicine
- Types of telemedicine
- Telemedicine technologies
- Duties & responsibilities of Medical Practitioner
- Patient information, confidentiality and consent
- Drug prescription rules
- Documentation & medical records

These guidelines shall support increased utilization of telemedicine and will increase the availability, access and affordability of health care in the long run. Telemedicine is an important tool to ensure universal health care coverage in India.

1.2 Definitions

Telehealth

The delivery and facilitation of health and health-related services, including medical care, provider and patient education, health information services, and self-care via telecommunications and digital communication technologies(6).

Telemedicine

Telemedicine is defined as "the delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for the diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities" (7)(8).

Telemedicine encompasses all systems, modalities and applications involved in the delivery of health services to substitute for any exchange of information and communication employing an electronic format. Hence, telemedicine aids in the electronic exchange of information and communication through -

- **Teleconsultation**

  Teleconsultation is defined as synchronous or asynchronous consultation using information and communication technology to overcome geographical and functional distance (9).

- **Telemonitoring**

  Telemonitoring is described as the use of information and communication technology to track and communicate patient health problems among geographically distant people (10).

- **Teletriage**

  The method of identifying individuals into different categories based on their need for emergency medical attention as opposed to their chance of benefiting from such care using information and communication technology.

1.3 Types of interventions and modes of communication

There are multiple technologies for the implementation of telemedicine today. The technology used and the mode of communication used in telemedicine should be customized to the objectives of the interaction. Commonly, the types of interventions are differentiated based on the time of communication between the stakeholders.

Synchronous

In synchronous interaction, the stakeholders or the participants of the telemedicine are interacting with each other dynamically in real-time. The communication is quick, and it provides an opportunity for the participants to solve queries (if any) in real-time. For example, video consultation is a synchronous teleconsultation.

Asynchronous

It is also called the "store and forward" way of communication. Here the participants can interact or reply in their own time frame. There is no real-time interaction between the stakeholders. It is suitable when the consultation or communication is not urgent. It is mainly used for forwarding the investigation reports, or for routine follow-up. Examples include e-mail, text messages, fax.

Remote monitoring

This is also called the remote patient monitoring and refers to the method of health care delivery that uses the advances in information and technology to monitor

patients outside the healthcare settings. The patient data is electronically transmitted to the healthcare provider, who monitors the patient for the maintenance of health and development of any new disease states.

Mode of communication

The mode of communication chosen should be based on the purpose of the communication.

- **Video**

  Video consultations are closest to the in-person consultations. The communication is two ways, interactive and real-time. Patient identification is straightforward. This mode allows inspecting and getting visual cues from the patient. It also provides an opportunity to examine patient and demonstrate certain activities to the patients.

- **Audio**

  Audio consultation is more convenient and readily available compared to the video consultation. The interaction is dynamic and real-time. The information provided can be exchanged iteratively between the provider and the receiver. Audio consultation provides verbal cues but misses non-verbal cues and is not suitable for conditions that require visual inspection.

- **Text-Based**

  Text-based consultations are convenient and quick. These may be either real-time when the interaction is simultaneous or delayed, like in 'store and forward' systems. These are best for follow-ups and second opinions. The text-based platforms also help in better transmission of documents, including the test reports and previous medical records. However, text-based platforms lack both visual and verbal cues.

1.4 Medical Ethics

Health-related data of patients should be recorded and handled as per Telemedicine guidelines released as Appendix 5 of the Indian Medical Council (Professional Conduct, Etiquette and Ethics) Regulation, 2002 (6), that outlines the duties and responsibilities of a doctor, misconduct rules and ethical aspects of consent, data privacy and confidentiality.

1.4.1 Consent

Consent of patient/caregiver holds a vital role in the telemedicine consultation. Consent needs to ensure that the patient understands the nature and scope of telemedicine and also the nature and scope of the disease under consideration.

informed consent should also include aspects of teleconsultation. It should explain

- Scope of the consultation
- Expected benefits
- Nature of consultation
- Medical information and records
- Confidentiality
- Risk and limitations of the consultation

The standards of informed consent as is applicable for the in-person consultation are applicable for the teleconsultation also.

Implied versus Explicit consent

Implied consent is a presumption of approval to do something that is deduced from the acts of a person, rather than expressly stated. When the patient/ person initiates a teleconsultation, it is considered to be implied consent. At the same time, explicit consent is an expressly stated statement of approval. When a teleconsultation is physician/ doctor initiated, there is a need to take explicit consent.

Consent can be obtained through any one or more of the following modes depending on the type of consultation, and this should be recorded in the patient's records.

- Audio Consent- Verbal
- Video Consent- Through video conferencing
- Digital Consent- As text

1.4.2 Data privacy and confidentiality

- Professional standards for data privacy and confidentiality under IMC Act 1956 and IMC (Professional Conduct, Etiquette and Ethics) Regulations 2002 should be adhered to while providing telemedicine consultation.
- The teleconsultation is also bound by similar data protection and privacy laws as applies to an in-person consultation.

- A system should be developed for documentation, storage and retrieval of the medical records. All the documents as applicable for in-person consultation should also be maintained for teleconsultation.

1.4.3 Standards of care

- The doctors providing telemedicine services shall abide by the same standard of care as followed in-person consultation.
- The doctors shall ensure that the patients/ family members will receive correct and timely information on the nature and severity of their illness.

1.5 Preparation

Any organization planning to provide care through telemedicine should assess the preparedness for the same.

Organizational Readiness

Assessing organizational readiness is a comprehensive task and necessary as many stakeholders are involved in running an organization.

- Leaders should be proactive and provide direction in adapting to telehealth services
- The leaders can act as change agents and promote behavioural change of others in the organization for telemedicine.
- Motivation to learn new skills and explore new ways of care provision will help in easy implementation of telemedicine.
- The existing operation and administrative protocols of the organization may need assessment to accommodate telemedicine services.
- While multiple staff of an organization may be involved in care provision, a nodal person or a group of people from different departments should be identified who will be accountable for the smooth functioning of telemedicine services.

Provider Readiness

- Readiness in terms of availability of professionals and ancillary staff, affordability and operational feasibility of delivering services through telemedicine should be assessed and strengthened.

- Capacity building of both professionals and support staff is necessary based on the levels of motivation, and challenges identified.

Patient Readiness

- The readiness should be assessed in terms of availability of technology, affordability, acceptability, user penetration and friendliness of the telemedicine technologies through in-person interviews, exit services or web-based patient surveys as may be appropriate.
- Behavioural change for using telemedicine services can be promoted through counselling, posters, pamphlets and professional guidance.
- Modes of teleconsultation should be customized to the patient's needs and comfort.
- Patients might need handholding in terms of understanding the advice and maintaining electronic health records.

2 Application of Telemedicine in the Management of Noncommunicable Diseases

2.1 Burden of NCDs in India

Noncommunicable diseases (NCDs) are a major cause of disease, disability and death in India. The demographic and epidemiological transition has resulted in a shift in the morbidity burden from infectious diseases to NCDs. Ischaemic Heart Diseases and Chronic Obstructive Pulmonary Diseases are the top two leading causes of disease burden, stroke is the fifth cause. NCDs contributed to 55% of the Disability Adjusted Life Years (DALYs) and 61.8% of deaths in India in 2016 (12). NCDs are estimated to account for 55 million deaths by 2030 (13). Management and prevention of NCDs and reduction in deaths due to NCDs is an essential component of achieving the health goals of Sustainable Development Goals (SDGs)(14). Managing NCDs is a challenge when the resources are limited, and when there are other competing priorities.

2.2 Rationale of use of telemedicine

Patients suffering from NCDs need long term care and support. Shortage of health workers and inadequate access to hospitals and medicines are essential barriers for optimizing care (15). Leveraging technologies for NCD care can have a positive impact on NCD control strategies. Telemedicine has a role in the whole spectrum of NCD care. It has a role in promoting healthy behaviours, prevention of risk factors, early detection of diseases, timely initiation of treatment, monitoring and follow-up support, rehabilitation and palliation. Telemedicine can increase access to healthcare and help in maintaining the continuum of care (16).

2.3 Scope of guidelines

2.3.1 Scope

- These guidelines are expected to encourage and assist primary health care providers in adopting and using telemedicine effectively for NCD care.
- The guidelines will act as a directory for preventive, promotive, curative and rehabilitative care.

- The guidelines will cover the best practices to be followed while providing care through telemedicine.
- The guidelines will be dynamic and will adopt the changes in the accepted standard of practice as and when they are updated.

However, the guidelines will exclude the technical aspects of the telemedicine platforms and communication channels of data management systems. The guidelines do not provide prescriptions for treatment of specific NCDs but explain the framework of application of telemedicine in management of NCDs.

2.3.2 Aim

To strengthen the preventive and continuity of care for NCDs using telemedicine

2.3.3 Objectives

Primary

To improve use of telemedicine for preventing and managing major NCDs by public and private healthcare providers at all levels of care.

Secondary

- To improve the continuum of care from the community to the tertiary health care level (community- primary - secondary - tertiary healthcare level).
- To empower patients and their healthcare providers in primary and secondary healthcare settings towards preventing and managing NCDs optimally through the use of telemedicine.

2.4 Broad areas for the use of Telemedicine in NCD Management

2.4.1 Primary prevention

- Primary prevention refers to the actions taken before the onset of disease, which removes the possibility that a disease will ever occur. In the case of NCDs, it refers to the actions that target the risk factors.
- Major risk factors for NCDs are- tobacco use, use of alcohol, unhealthy diet, physical inactivity, elevated blood pressure, elevated blood sugar, obesity and dyslipidaemia.
- Primary prevention can be achieved through;
    - Health promotion: healthy lifestyle, healthy eating habits, low salt diet, physical activity, yoga and self-care.

- Health education: knowledge about NCDs, preventive measures, myths and misconceptions.
- Counselling: tobacco cessation, alcohol cessation, medication adherence.
- Imparting skills: self-testing for blood glucose, monitoring of blood pressure.

2.4.2 Teleconsultation for treatment

Types of teleconsultation

a. First consultation

The consultation is provided for the first time through telemedicine.

The following aspects should be considered during the first consultation

- Chief complaints
- Family history
- Previous medical history
- Comorbidities
- Drug & other allergies

Patients can be advised for

- Screening/diagnostic tests
- Other investigations
- Non -pharmacologic interventions
- Prescription of medicines
- Transmission of previous medical records/ Investigation reports

Prescription of medicines

Medication can be prescribed during teleconsultation based on the professional discretion of the provider. The prescription should be based on the diagnosis/provisional diagnosis.

The medications are divided into four broad groups depending on the restrictions on their prescription.

- List O: Safe and can be prescribed through any mode of teleconsultation.

- List A: Can be prescribed during the first consultation and can be reviewed during follow-up
- List B: Which can be prescribed only in-person for the first consultation and can be refilled in the teleconsultation during follow-up.
- Prohibited list: Medication that cannot be prescribed through tele-consultation

Medications for most NCDs such as diabetes, hypertension and chronic lung diseases belong to the categories of:

1. 'List A': Follow-up medications for chronic illnesses for 'refill' (on any mode of consultation) such as medications for

- Hypertension: Enalapril, Atenolol etc
- Diabetes: Metformin, Glibenclamide etc
- Asthma: Salmeterol inhaler etc

2.'List B': On follow-up, medications prescribed as 'Add-on' to ongoing chronic medications to optimize management such as for hypertension: Eg, add-on of Thiazide diuretic with Atenolol, for Diabetes: Addition of Sitagliptin to Metformin

b. Follow-up consultation

The following aspects should be considered during the follow-up consultation

- Fresh complaints (if any)
- Review of past records/investigations & treatment
- Disease status/ progress
- Transmission of recent investigation reports
- Treatment modification (if any)

c. Regular monitoring

Regular monitoring can be done for

- Healthy individuals
- Individuals with risk factors
- Patients with NCDs

Monitoring of physiologic and biochemical parameters such as

- Blood glucose
- Blood pressure
- Height, Weight
- Oxygen saturation

d. Patient education

Teleconsultation can be used for patient education for -

- Self-monitoring of physiologic and biochemical parameters
- Medication adherence
- Administration and supervision of medicines like insulin
- Wound / ulcer care
- Diet regulation, Physical activity, Blood pressure monitoring

e. Emergency consultation

Emergency consultation can provide

- Advice /measures for immediate relief of pain/discomfort
- First aid: Life-saving care of the patient until the patient reaches the hospital
- Referral of the patients to appropriate facilities
- Specialist consultation by the primary care provider/ other health care providers
- Counselling: If the presenting complaint/s is/are not deemed to be an emergency, counselling and reassurance may be provided

2.4.3 Specialized consultation

The consultation can be between

- Patient and the Registered Medical Practitioner (RMP)
- Patient and the front-line healthcare worker
- Front-line healthcare worker / Primary care provider (RMP) and the Specialist
- RMP/ Front-line healthcare worker with a caregiver

Patient and the RMP

- The patients can interact with the doctor either from their home setting or from a dedicated teleconsultation setting facilitated by a technician.
- Consultation of the patients directly with the doctor would require the patients to have some technical knowledge.
- The ubiquitous availability of text/ voice/ video channels of communication is conducive for the teleconsultation between the patients and the doctor.

Patient and the front-line healthcare worker

In remote areas or difficult to access areas where the availability and accessibility to the health care facilities are limited, the front-line healthcare workers like ASHA/ ANM/ AWW along with a technician appointed for the telemedicine can provide telemedicine consultation.

Front line healthcare workers can

- Identify the conditions requiring emergency consultation/ referral
- Provide first aid
- Empower patients to access telemedicine tools
- Explain the doctor's advice to the patients in the local language
- Facilitate health care providers by taking preliminary history/ collecting records
- Follow-up the patient for treatment adherence

Front line healthcare worker / Primary care provider (RMP) and the specialist

Telecommunication between the primary care provider and the specialist can help in the devolution of duties.

- The primary care providers can expand their care provision under expert guidelines.
- This would also decrease the load on tertiary health care centres and would help in triaging the patients.

RMP/ Front line healthcare worker with a caregiver

When the patient is not in a state that he/she can attend the teleconsultation, the patient's caregiver can be provided advice on -

- The tests or routine refill of the drugs
- Patient care at home
- Changing the family environment / care provision

2.4.4 Process of consultation

The process of teleconsultation can be standardized so that all the elements of consultation are covered. The telemedicine consultation must always assess need for physical/in-person evaluations and inform patients accordingly.

The consultation can include the following broad steps-

Preparation

- The patients can share the history/ relevant investigations/medical records if present
- The doctors/ care providers can share the identity/ qualification and also provide a checklist of items that might be required during teleconsultation
- The time and date of the consultation can also be fixed during this step

Introduction and Identification

- The healthcare provider and the patient should identify themselves at the beginning of the consultation
- The participant should provide consent for teleconsultation
- The scope and limitations of the teleconsultation should be explained during the introduction

History taking

- This step involves collecting the information on the patient's condition and other relevant histories
- As in the in-person consultation, all the relevant information that would facilitate treatment of the patient should be collected

Examination

- This is the most limiting aspect of teleconsultation when compared to an in-person consultation.
- While some aspects of examination (palpation/ auscultation) cannot be performed through teleconsultation, an inspection of the patient for general (pallor/ clubbing/ Icterus etc.) and disease-specific signs can be undertaken through telemedicine (eg: healing of diabetic foot ulcers, balance in walking, deviation of mouth in stroke).

Advice

This can be accomplished by

- Advising for Investigations
- Prescribing the medicines
- Prescribing lifestyle changes
- Health Monitoring activities
- Patient/ Health education

Fixing next date and time of the follow-up

- A session of consultation should always end with a mutually understood and agreed time and place for the next consultation.
- The same information can also be reiterated with the patients by sending a copy of the consultation with a note on advice and the follow-up schedule.

2.4.5 Skill-building for the providers

All the health care providers/ doctors should be sensitized about delivering care through telemedicine and should be trained to use telemedicine tools.

Telemedicine Practice guidelines published by the MoHFW, GoI prescribes a mandatory one-month online course on telemedicine for the RMPs before providing telemedicine services.

Following skills can be imparted to the healthcare providers

- Different modes of telecommunication
- Tools available for telemedicine
- Communication skills for telemedicine
- Maintaining Health Records
- Training in operational guidelines of National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS)
- Training in standard treatment guidelines/workflows on NCDs

2.4.6 Empowering the patients

One of the key challenges in the practice of telemedicine is the need to sensitise patients and their care givers on the scope of telemedicine. A patient charter may be developed to explain the patient's right to receive reasonable care/consultation within the limitations of telemedicine. The information could include

- Scope of telemedicine consultation
- Way to access care using telemedicine
- Right to confidentiality and dignity
- Provide general information on the right to receive complete information on the medical conditions, treatment, prescription and procedure details and choice of care or treatment
- Documented procedure for obtaining the informed consent

Patient's responsibilities	Doctor's responsibilities

- Honesty in disclosure
- Treatment compliance
- The intent for health promotion and maintenance
- Transparency and honesty
- Patient-friendly
- Patient education

2.5 Communication

- Effective communication is a core component of telemedicine and teleconsultation. Clear and detailed communication will compensate for the lack of in-person consultation.
- Communication should be clear and in a language that the patients can easily understand.
- All the parties involved in the consultation (doctor/ front line healthcare worker/ patient/ care provider/ family members) should be aware of the identity of each other.
- A mechanism should be built in the telemedicine consultation to verify the identity of the participants routinely.
- Whenever applicable, written instructions/ advice should always accompany the oral instructions.

2.6 Challenges

Numerous factors act as challenges for the widespread adoption of the telemedicine.

- Resistance to change may be seen in both the providers and the patients. Adoption of telemedicine and change management is an important factor
- Technical illiteracy, lack of access to hardware and poor internet facilities
- Lack of integration between different platforms like EHRs with the telehealth platforms, which may lead to duplication of work and difficulties during coordination
- Lack of availability of clinical tools required at primary health care setup for making diagnosis and treatment decisions
- The process of ensuring privacy and confidentiality of health data of patients is in the process of evolution
- High cost of setting up the telemedicine platform

2.7 Limitations

- Delays in healthcare provision due to failure of the electronic equipment, communication network and technological problems
- Inability to provide emergency care or change the course of care easily
- Inability to examine patients using clinical methods
- Protection of data is always a concern
- Doctors/ Providers who do not have experience using telemedicine may be unable to provide optimal care

2.8 Advantages

- Patients can connect to their physician at the comfort of their home: Telemedicine provides easy access to a specialist.
- The problems and cost of travelling from other towns or states are eliminated: People living in rural areas or with no direct access to tertiary care facilities in urban areas can overcome their limitation of travelling.
- Eliminates the fear of contracting infections while waiting for doctor's appointment: During the pandemic, the fear of contracting any infectious disease while going to doctor's office/hospital can be a hindrance in the continuum of care. This problem can be solved by consultation through telemedicine.
- Frequent consultations with the physician are possible without travelling: Patients do not require travelling for their routine and follow-up visits, and they can save expenses and time.
- Easy maintenance of medical records: Telemedicine can be an easy, safe and legally approved way to maintain and retrieve records.

2.9 Disadvantages

- Physical examination is not possible. This is a major issue in new cases or in an emergency.
- The absence of the personalized approach and 'healing touch' is another drawback of telemedicine.
- Emergency and serious cases cannot be managed, making it a serious disadvantage of using telemedicine. The physician can only guide the patient to the nearest hospital.

3 Application of Telemedicine in the Management of Cancer

3.1 Introduction

The burden and spectrum of disease in India has witnessed a major transition from predominantly infectious diseases and malnutrition to Non-Communicable Diseases (NCD), during the last two decades. Among the NCDs, cancer is emerging as a significant public health problem in India due to life style and environmental factors. As per the recent National Cancer Registry Programme (NCRP) report 2020, cancer burden in India was 1.26 million cases in 2016, 1.39 million in 2020 and expected to increase to 1.57 million cases by 2025 (17). Despite significant progress made in the field of health care a number of challenges related to cancer management still need to be addressed. Major areas of concern are limited health care infrastructure, resource constraints and shortage of oncology workforce. Access and affordability to health care is a major issue of concern for a significant proportion of Indian cancer patients. Recently many major health care policy initiatives were implemented by the Government of India for capacity building, increasing access and affordability through government sponsored health insurance schemes. There is a need to explore innovative methods, including leveraging technology to further strengthen cancer care services in India. Telemedicine is one of the promising options with great potential in the field of oncology.

3.2 Aims & Objectives

- To prepare cancer specific, scientifically acceptable, logistically feasible, ethically and legally tenable, patient centric and user-friendly guidelines for practicing telemedicine in cancer care.
- To facilitate mainstreaming of telemedicine in consonance with Govt of India digital health initiative and telemedicine guidelines issued by MCI, MOHFW
- To prepare a generic framework for telemedicine suitable for any cancer and subsequently expand to a tailored guideline for specific cancers.
- To develop guidelines for telemedicine feasible for implementation by majority of the cancer centres including private and government hospitals from rural and urban areas with currently available technologies and resources.
- To protect and safeguard the interests of patients as well as doctors.

3.3 Challenges of Telemedicine in Cancer

- Unlike other NCDs cancer comprises a diverse group of diseases involving different organ systems.
- The clinical presentation and trajectory of the disease course varies widely depending on stage of presentation and organ system involved.
- Most of the cancers in the current era are treated with a multidisciplinary treatment approach involving surgical, medical, radiation and palliative care specialities.
- Due to lack of structured referral system, cancer patients can present to diverse types of healthcare setups for diagnosis and treatment.
- Majority of the cancer treatments take few months to complete and there is a need for life long follow-up and surveillance (18).

3.4 Benefits of Telemedicine in Cancer Care

- Telemedicine has the potential to improve access and affordability (mainly reducing costs involved in follow-up visits and surveillance) of cancer care in India.
- One of the main goals of telemedicine is to reduce unnecessary hospital visits of patients to decrease patient burden and avoid overcrowding of hospital premises. This will result in better utilization infrastructure and human resources for productive activities.
- Strengthening primary and secondary level healthcare setups for early detection, referral and post treatment follow-up of cancer patients at local level.
- Less financial burden for the patient and family members due to decreased number of hospital visits (19).
- **Facilitate multidisciplinary tumor board consultations and seeking expert opinion for management of difficult and rare cases.**

3.5 Scope of Telemedicine consultations in Oncology

Telemedicine can be utilized across cancer care continuum starting from prevention, screening, diagnosis, treatment and rehabilitation to palliative and end of life care.

There are certain hospital visits where physical presence of the patient is mandatory and a good proportion of hospital visits related to awareness, education, counselling and follow-up can be shifted to a telemedicine platform.

Based on need for Tele Consultation

a) Prevention & Screening
    i. Screening (Review of reports eg. Mammogram)
    ii. Health Education
    iii. Health Awareness
    iv. Genetic Counselling
b) Diagnosis
    i. Ordering investigation
    ii. Review of reports
c) Treatment
    i. Virtual tumour board for treatment planning
    ii. Pre-treatment counselling (after first physical visit)
        1. Surgery
        2. Systemic therapy
        3. Radiation therapy
        4. Palliative care
d) Follow-up & Rehabilitation
    i. Post treatment surveillance for long term effects of treatment & relapse of disease
    ii. Physical & psychological rehabilitation of cancer patients

e) Referral
    i. Primary or secondary care setup to tertiary care centre for treatment.
    ii. Tertiary care centre to secondary or primary care setup for follow-up
f) Second opinion
    i. Diagnosis – pathology & radiology review
    ii. Treatment related consultations for expert opinion
g) Palliative Care & End of Life Care

3.6 Specialty wise Telemedicine Guidelines for Cancer

This section deals with specific issues related to various specialities dealing with cancer. A general framework for managing any type of cancer is presented with description of clinical scenarios where telemedicine can be used and where it should not be used. Section related to follow-up, referral and second opinion of cancer patients is common to all specialities and has been presented at the end of specialty wise sections.

3.7 Surgical Oncology

Surgery plays a major role in the diagnosis and management of cancer patients and significant number of cancer patients require some kind of surgical intervention during the course of treatment. **Physical presence is needed for any surgical intervention** but there is an immense potential of telemedicine especially in fields related to surgical education, treatment planning, perioperative surgical consultations, counselling, post - surgery follow-up and rehabilitation.

3.7.1 Clinical Scenarios Where Telemedicine can be used

First consultation

- A patient may contact a surgeon on a telemedicine platform for his complaints and share his investigations and treatment records. Based on the complaints of the patient and available investigations, surgeons may decide to recommend further investigations and / or fix a hospital visit appointment for clinical evaluation on a telemedicine platform.
- Once the diagnosis and staging are confirmed the surgeon may discuss the case through a virtual tumor board to decide the appropriate management plan in the best interest of the patient.

Follow-up consultations

For cancer patients planned for surgery, the following interactions can be managed through telemedicine platform to reduce hospital visits by the patient-

Preoperative counselling

- The patients and the primary caregivers must be explained in detail regarding the type and extent of surgery, expected outcomes including the possibility of complications using images and videos.

- Discussion regarding the expenses involved for surgery and various financial aid and insurance options that are available can also be discussed over teleconsultation.

Anaesthesia review and assessment

- The patient who is scheduled for surgery can have an online consult with the anaesthetist for advice regarding the investigations, review of investigations and pre-habilitation protocols. One physical visit is mandatory for assessment of fitness.

Preoperative optimization

- Telemedicine consultations are especially useful for preoperative optimization of the patients planned for a surgical procedure.
- A multimodal intervention, consisting of a standardized fitness program, nutrition supplementation, smoking cessation can be given through the telemedicine portal to optimize the condition of the patients.
- Online interaction with the physician can be facilitated to address any co-morbid conditions like diabetes mellitus, hypertension, etc.

Appointment for surgery and admission

- The patient may be given an appointment for the surgery using a telemedicine platform and information regarding admission procedure can also be provided through telemedicine platform.

Post-operative care

- Post-operative wound monitoring, care of drains and tubes and physiotherapy can be managed through a telemedicine portal and patients can be called for managing major wound complications and suture removal etc. The active and passive movements of physiotherapy can be demonstrated once in the ward and subsequent teleconsultations can be carried out.
- Video links depicting some minor procedures like - suctioning, tracheostomy tube care, colostomy bag change, feeding tube care and dietary advise etc. can be shared with the patient and their primary care providers for effective management at home.

Review of Histopathology reports for Adjuvant therapy planning & Referral

- A surgeon may discuss the postoperative histopathology report in a virtual tumor board to decide the adjuvant treatments.
- Adjuvant treatment if decided can be communicated to the patient and appointments can be fixed with radiation or medical oncology specialists through telemedicine.
- If the patient needs to be referred to higher centre, telemedicine can be used for referral. A complete clinical summary must also be sent along with the referral.

Genetic counselling for patients with hereditary or familial cancers

- Patients and relatives who have a strong family history of cancer who are at a higher risk of developing cancers can be counselled through telemedicine portal for education, pre-test counselling, advise genetic testing, post-test counselling and to discuss various interventions including pros and cons of risk-reducing surgery.

3.7.2 Clinical Scenarios Where Telemedicine should not be used

- Telemedicine consultations have no role in the management of patients with surgical emergencies and prompt hospital care for further management must be emphasized upon.
- Tele surgery from remote location is not under the purview of these guidelines.
- Though a patient can be informed about the nature of the surgery and possible benefits/outcomes, a formal informed *written* consent is mandatory before undertaking any surgical procedure for documentation purposes after the hospital admission.
- No surgical decision must be made based on the interaction with the patient on a telemedicine platform. An in-person visit by the patient for a diligent clinical examination is essential for any surgical decision.

3.8 Medical Oncology

Majority of cancer patients need medical oncology consultations for systemic therapy planning and treatment. Medical oncology deals with a wide spectrum of chemotherapy, hormonal and biologic therapy agents in adjuvant, neoadjuvant or

palliative settings. Most of the medical oncology interventions are prolonged in nature and assessment of patient fitness and tumour response are critical for prescribing medications in a cyclical manner.

3.8.1 Clinical Scenarios Where Telemedicine can be used

First Consultation

- The first visit of a cancer patient for triage or navigation can be done via telemedicine. The clinical problems, reports, expectations and treatment plans can be broadly discussed and the patient may be directed to register at the appropriate specialty clinic. This will cut down the waiting list, streamline patient management at reception.
- Once the patient is connected to the concerned physician, preliminary assessment, review of available reports and recommendation of further investigations can be done through telemedicine platform and appointment for physical assessment can be given through same platform.
- **Physical presence of the patient is a must for establishing the diagnosis, assessing the performance status and planning treatment. Any discussion on prognosis, chance of recovery, or treatment plans needs the physical presence of the patient.**
- When the patient has been physically examined, multidisciplinary tumour boards can be organised on telemedicine portals to plan the management.
- Telemedicine is not recommended for managing oncological medical emergencies and treating sick patients

Follow-up Consultation

1. Solid Tumours

For patients on Neoadjuvant / adjuvant treatment

- Chemotherapy counselling for anticipated benefits, toxicity, and general precautions can be reinforced through teleconsultation.
- Patients on chemotherapy who are tolerating previous cycles well without toxicity may be tele consulted for mid cycle assessment, thus sparing them of OPD visits. Video-consults may be done for toxicity assessments like mucositis.
- Telemedicine is also useful for patients who have recently started a treatment and are concerned about how well their tolerating the drug at

home. A teleconsultation can be used to clarify whether they need to come for more in - hospital support.

On palliative systemic therapy

- Most of these patients will need physical visits for continuation of treatment, as assessment of toxicity and a continuously evolving disease status and the performance status needs evaluation.
- Patients on hormonal therapies who have been stable without toxicities, may be followed using telemedicine and physical consultation alternatively.

2. Hematological malignancies

Patients on Intensive chemotherapy

These patients are not suitable for teleconsultation as they need intensive close observation for toxicities and supportive therapy.

Patients on less intensive therapies

- CML: Stable patients in molecular remissions, on Tyrosine Kinase Inhibitors (TKIs) (Imatinib, Dasatinib, Nilotinib), who need monitoring of Complete Blood Count (CBC), Realtime Quantitative Polymerase Chain Reaction (RT-PCR) reports can be effectively followed by teleconsultation. Tele and physical visits may be alternately done and judiciously combined.
- Stable patients on maintenance chemotherapy e.g. low-grade lymphomas, Acute lymphoblastic leukemia on maintenance protocols may be checked via telemedicine before subsequent cycles. Teleconsultation may alternate with OPD visits.
- Patients with hematological malignancies who are under active surveillance or observation like CLL, low-grade lymphomas can be followed up using telemedicine or teleconsultation may alternate with physical visits, thus sparing them from hospital visits.

What can be done

1. Assessment of symptoms and side-effects of medications
2. Advising new investigations & evaluation of investigation and interpretation of results
3. Prescription of supportive medications allowed in MCI guidelines of Telemedicine
4. Stoppage of medications in case of toxicity
5. Referral appointment or consultation with a specialist or a genetic counsellor

6. Education sessions about a health problem, diagnosis, managing medications and nutrition
7. Help making lifestyle changes like diet and exercise, or help quitting smoking

3.8.2 Clinical Scenarios Where Telemedicine should not be used

1. Prescription of anticancer drugs
2. Dose modification of anti-cancer drugs
3. Managing Oncological medical emergencies.

3.9 Radiation Oncology

A significant proportion of cancer patients receive radiation therapy during the course of illness alone or in combination with surgery and or systemic therapy. Radiation therapy involves tumor board planning, counselling, in - hospital treatment planning followed by delivering radiation therapy over few weeks. Physical presence is needed for radiation therapy. Telemedicine can be utilized for managing certain phases of radiation therapy.

3.9.1 Clinical scenarios where Telemedicine can be used

First Consultation

Patient can consult a radiation oncologist through teleconsultation for preliminary assessment and review of reports. Subsequent appointment for a clinical assessment and advising further investigations can be done through a telemedicine platform. Telemedicine can also be used for tumor board discussion and treatment planning.

Follow-up Consultation

Pre-treatment Counselling

When radiation therapy is planned for a patient telemedicine can be utilized for pre-treatment counselling to explain basics of radiation therapy, various types of radiation therapy, pros and cons of each modality, and cost factors. Anticipated benefits and probable acute and late complications can be discussed in detail through a teleconsultation.

Optimization of Patient

Telemedicine can be utilized for patient optimization prior to radiation therapy including nutritional support, medical consultations and dental review prior to head & neck radiation etc.

Radiation therapy Planning

Imaging, simulation, and pre-treatment planning can be fixed on telemedicine platform and process can be explained with clear instructions.

Anaesthesia assessment for patients planned for Brachytherapy or External Beam Radiation Therapy (EBRT) under anaesthesia

Patients planned for brachytherapy or radiotherapy under aesthesia can be assessed through telemedicine for pre-anaesthesia evaluation and review of investigations to minimize hospital visit. One hospital visit is mandatory for physical assessment for assessment of fitness for anaesthesia.

Post Treatment assessment

Telemedicine can play a major role for assessment and management of mild radiation induced toxicities like mucositis and dermatitis etc. The treating doctor can take decisions on when to call the patient for a hospital visit based on severity of symptoms. Prescription of supportive medications (as per MCI guidelines) for management of toxicities can be done through telemedicine portal.

3.9.2 Clinical Scenarios Where Telemedicine should not be used

1. Managing Oncological Emergencies
2. Managing moderate to severe radiation induced reactions
3. Prescription of anticancer drugs

3.10 Palliative Care

A significant proportion of advanced cancer patients and their families require palliative and end of life care expertise and interventions. Telemedicine services can improve access and can play a critical role in delivering palliative care services to terminal cancer patients especially residing in remote locations (20). Through teleconsultation and counselling, majority of patients with advanced and incurable cancers can be managed at home with the help of family members or local care givers. Telemedicine can significantly reduce the hospital patient burden and help families to care for advanced cancer patients at home.

3.10.1 Scope of Telemedicine in Palliative Care

1. Consultation, referral, second opinion and treatment planning in palliative care
2. Pain management though first-time physical presence is required to assess pain.
3. Counselling/Psychosocial Support
4. End of life care

3.10.2 Advantages of Telemedicine in Palliative Care

- Tele-palliative care can facilitate symptom assessment and management for pain, depression, anxiety and fatigue. It can enable better reporting of psychological symptoms, improve psychological distress and avoid catastrophizing pain responses.
- Telemedicine in a palliative care setting can be a great source of support to the families caring for patients with terminal illnesses. It can foster communication between health care providers, patients and families and facilitate advance care planning (21).
- Telemedicine can also facilitate end of life care and dying at home.
- It can enable multiple family members situated at different geographic locations to participate in a family meeting using a single platform.
- Video consults are better appreciated than audio consults as they improve perception of the genuineness of the therapeutic relationship. It can foster the trust between families and palliative care team (22).
- Optimum utilization of tele-palliative care facilities can reduce emergency room visits and reduced unnecessary hospital admissions, and can have an overall cost-saving benefit for the families.
- From a health care provider perspective, telemedicine enabled palliative care providers to work effectively despite reduced staffing, and facilitate multidisciplinary participation and cooperation among various professionals providing palliative care (22).

3.10.3 Clinical scenarios where Telemedicine should not be used

- Avoid tele-palliative consultations in oncological emergencies
- **Don't prescribe opioids and anti-cancer drugs**

- Don't advise interventional pain management protocols
- If there is lack of consensus among family members regarding end of life care insist for a hospital visit and clearly explain and obtain consent for the management plan

Annexures describing Algorithmic approach for telepalliative medicine are in page nos. 34 - 36.

3.11 Oncoradiology

Imaging plays an important role in the overall management of cancer patients. A wide variety of imaging modalities including ultrasound, CT scan, MRI, PET scan and other nuclear medicine imaging modalities are frequently used in oncology practice. There is a significant potential for utilizing teleradiology services for cancer care. Most of the current imaging technology works on digital platforms and robust teleradiology platforms including PACS are widely available.

3.11.1 Teleradiology

- Electronic transmission of radiologic images like CT, MRI, X-ray, Mammogram, PET CT etc. can play a major role across remote locations for the purpose of interpretation and/or consultation.

3.11.2 Teleradiology can play a major role in the following cancer care clinical scenarios

1. Cancer screening
2. Cancer diagnosis
3. Cancer staging
4. Treatment Planning
5. Surveillance & Follow-up
6. Second opinion
7. Referral

3.11.3 Basic prerequisites for Teleradiology consultation

- Patient demographic data and clinical details, provisional diagnosis and biopsy report if available, previous imaging details and type of anti-cancer therapy received should be provided.
- Contact information (mobile/email) of requesting oncologist and radiologist should be available.
- Access to Picture Archiving and Communication System (PACS), Digital Imaging and Communication in Medicine (DICOM images) at treating

hospital/imaging centre conducting the study by remote log-in access to be preferred.

- High quality images or soft copy of the imaging study can be transmitted for obtaining expert opinions.

3.11.4 Clinical scenarios where Telemedicine should not be used

- Avoid giving conclusive teleradiology opinions in the absence of necessary clinical inputs.
- Don't recommend interventional radiology procedures without assessing the patient's condition.
- When there is a discrepancy in opinions, insist for a physical visit for a review of all available images and advise repeat imaging if necessary.

3.12 Oncopathology

Oncopathology services are one of the critical components of modern cancer care. Histopathology confirmation is mandatory for diagnosing cancer and treatment decisions are mostly based on organ system involvement, stage and histopathology of tumor. Recently molecular biology and genetics also play a major role in cancer diagnosis and management decisions. Modern oncopathology setups are resource intensive and availability of expertise is limited. Telemedicine can play a vital role in improving access to advanced oncopathology services to patients from rural and remote parts of the country.

3.12.1 Telemedicine can be utilized for providing following Oncopathology services

- Providing Pathology services within the hospital
- Tumor Board Discussions (reports can be discussed through telemedicine portal).
- Second opinion
- Referral
- Providing advanced & specialty pathology expertise

3.12.2 In cancer care the following samples can be used for obtaining telepathology services

- Pre-operative biopsy/cytology sample
- Post-operative surgical specimens

- Pre- operative biopsy/ Post-operative specimen and/or slides/blocks of tissue biopsied or patients who are operated in other hospitals.

3.12.3 Prerequisites for telepathology services

Complete clinical details, reports of radiological investigations should be provided to the referring pathologist. The requisition forms should provide details of the specimen and should be sent along with the labelled specimen/slides/blocks. The digital version of form may also be sent via the hospital information system if available. In institutes without Health Information System (HIS) facility and Lab information system (LIS), the exchange of clinical details and pathology reports may be done using shared google sheets (equivalent of MS excel) or google docs (equivalent of MS word) which are free to use.

3.12.4 Technologies available for Telepathology

Various technologies can be utilized for telepathology services.

- **Static image-based systems**: Images are captured from a digital camera connected to a microscope. An image area can be selected and transmitted for telepathology opinion.
- **Virtual slide systems**: In this technology, pathology specimen slides are scanned /video graphed, and high-resolution digital images are created for transmission.
- **Real-time systems**: The operator remotely guides a robotically controlled motorized microscope. The consultant pathologist has complete control and can adjust the slide position, zoom, etc. so that the area of interest is brought under view and transmitted.
- **Whole slide imaging (WSI)**: Digitization and scanning of a glass slide to generate a large sized digital image that can be viewed in parts in a manner that simulates microscopy.

In case adequate static images of the slides or whole slide imaging are available with the referring laboratory or centre then the same may be acceptable for consultation with following caveats-

a) The images/scans must be taken from all areas of section and be representative of the lesion. All special stains and relevant

immunohistochemical stains if done at referral lab must also be photographed or scanned.

b) The static pictures of slides must be at a resolution of 200-300 DPI resolution with white balance adjustments.
c) The referring lab must take an undertaking that the images sent belong to the patient and the digital images or scanned files must be named and annotated.
d) The contact details of referring lab must be provided for clarification on grossing of specimen, slides, and blocks and for any further details required for evaluation of the case.

The diagnosis on static digital images would be provisional and may be conveyed to referring clinician for purpose of triaging and further plan of action. Final diagnosis would be only possible once actual slides and blocks are received. The same may be transmitted via HIS or digitally shared files over internet.

3.12.5 Clinical scenarios where Telemedicine should not be used

- Don't offer Conclusive telepathology opinions in the absence of necessary clinical inputs.
- Avoid giving conclusive telepathology opinions based on sub-optimal material submitted for review.
- When there is a discrepancy of opinions, insist for a comprehensive review of material and request for clarification regarding the possibility of mix-up, and advise re-examination or re-biopsy if issue is unresolved.

3.13 Telemedicine for follow-up, referral and second opinion of cancer patients

3.13.1 Post treatment follow-up & chronic care

- Follow-up visits are critical part of cancer management. Areas that need to be focussed during follow-up of a cancer patient include quality of life, treatment related side effects, and ruling out relapse of cancer or development of second malignancies.
- The telemedicine portal can be used for follow-up of those patients who live in remote areas. Registered practitioners in the vicinity of cancer survivors can perform the physical examination and communicate with the treating oncologist over the telemedicine portal.

- Patients can be educated regarding RED Flag signs that are hallmark of cancer recurrence or a second primary, and can be asked to report through telemedicine.
- In addition to routine physical examinations by primary care physicians, tumor markers and imaging studies can be recommended and reviewed through telemedicine portal.
- Telemedicine will improve the follow-up data as many patients are lost to follow-up due to gradual decrease in hospital visits over a period of time.
- Patients in complete remission after completion of curative treatment requiring only surveillance may be followed using telemedicine alternating with physical visits.
- In case of clinical suspicion, discrepancy in reports or if the patient is not satisfied, a physical consultation should be arranged.
- Telemedicine can be effectively used for survivorship services (e.g. psychological counselling, sexual and reproductive health concerns, life-style modifications) and patient-reported outcome surveys.
- Telemedicine may also be effectively used for educational and social rehabilitation and guidance on issues of employment / livelihood.

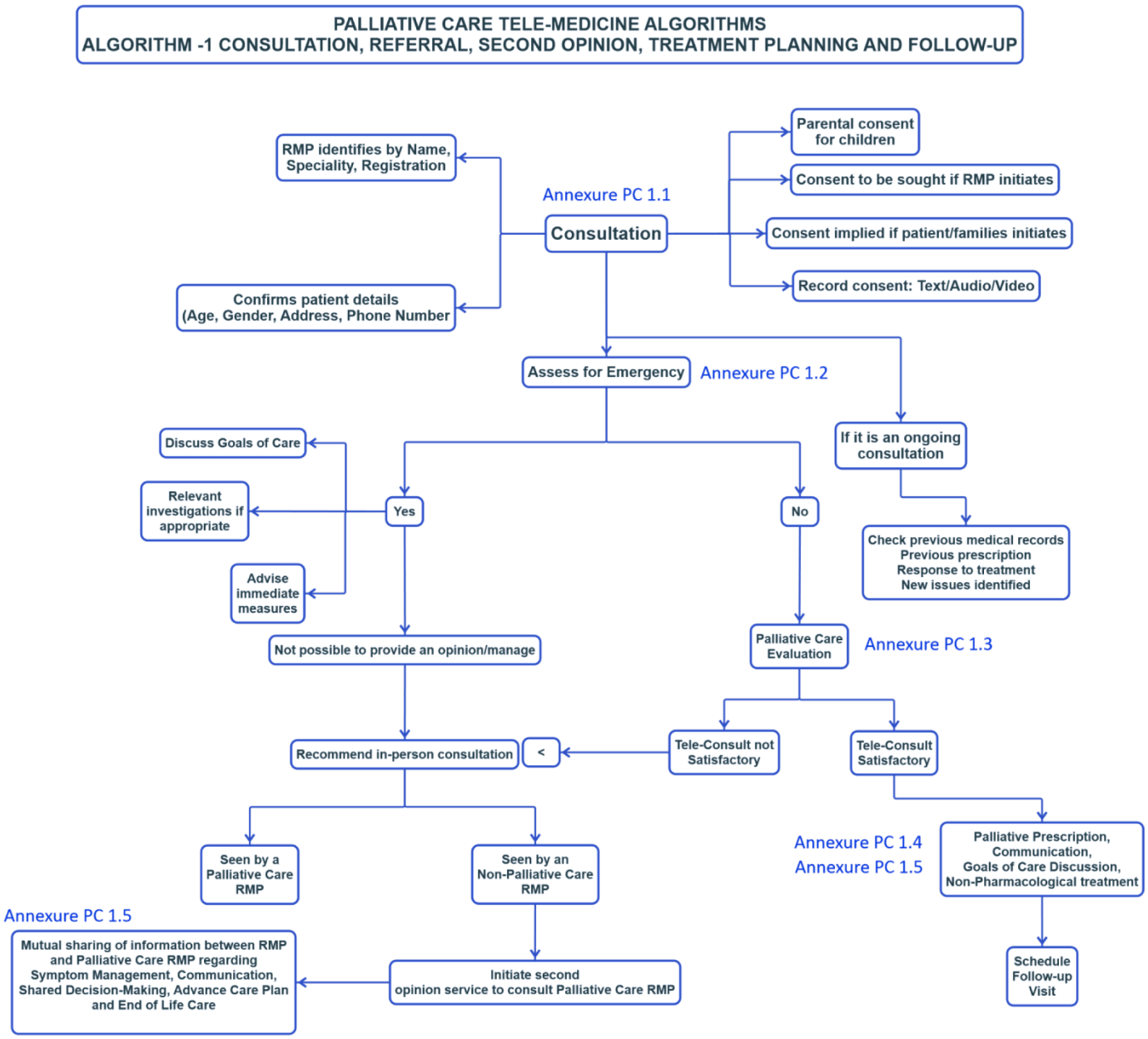
3.13.2 Referral

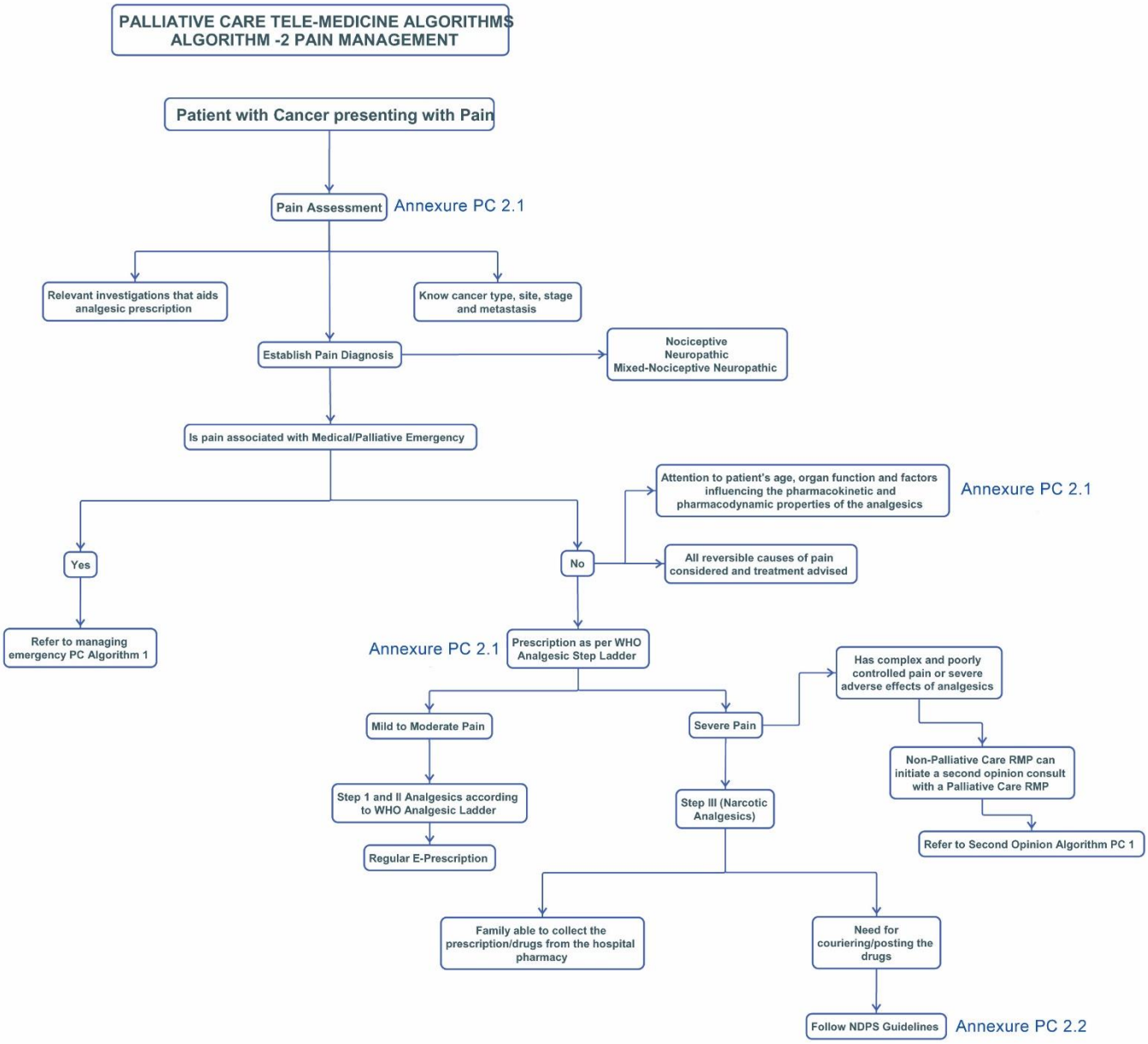
Telemedicine offers an excellent solution for appropriate and timely referral of cancer patients to tertiary care centres for comprehensive treatment and patients can be referred back to primary care physicians following completion of treatment. A standard format for referral including patient identification details, clinical summary and investigation reports should be used and reason for referral should be clearly mentioned.

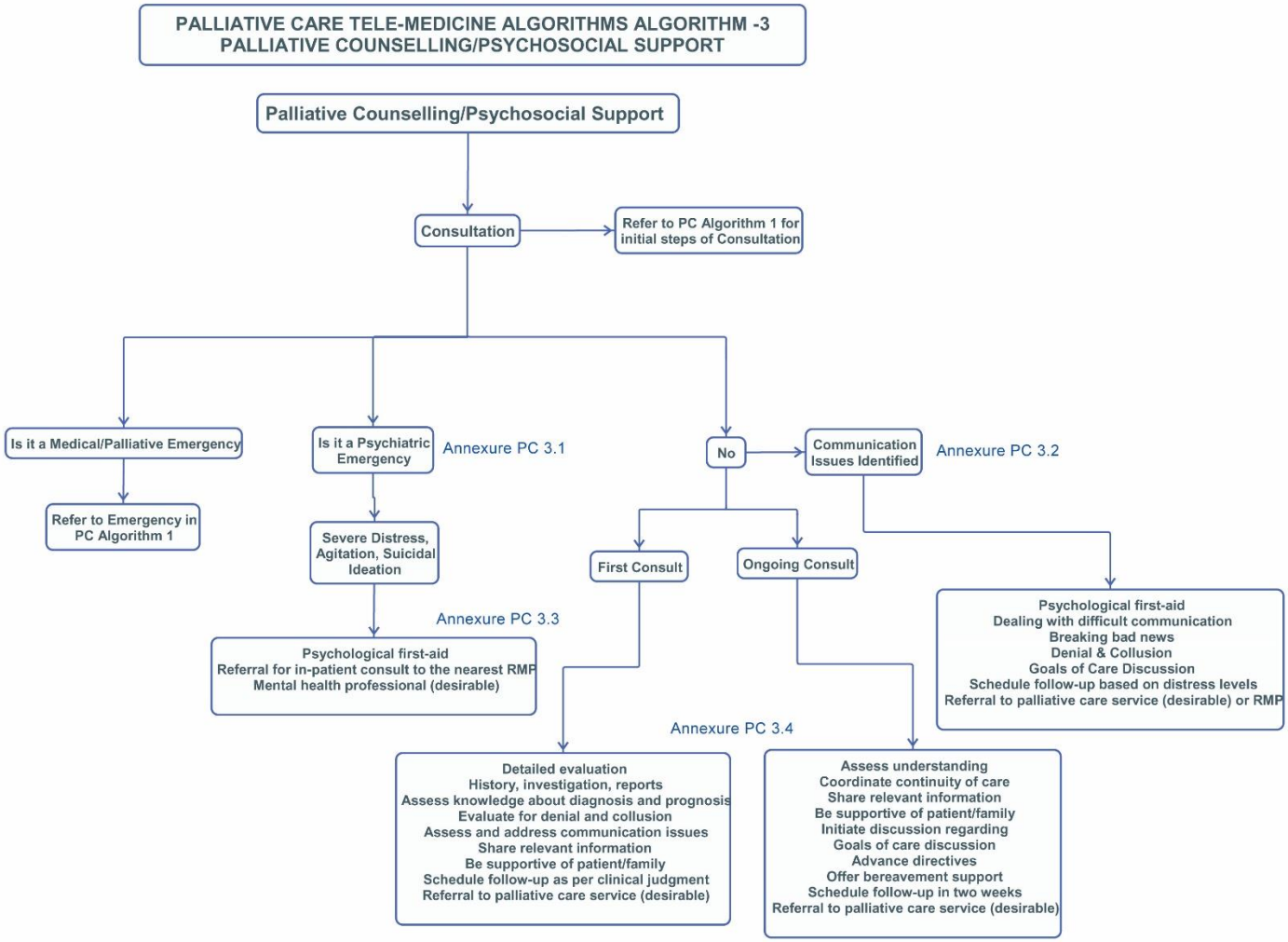
3.13.3 Second opinion

A second opinion from an expert clinician or a pathologist or radiologist may be needed in complex clinical situations, and while treating rare cancers. Telemedicine can play a major role while seeking a second opinion in such situations.

Annexures describing Algorithmic approach for telepalliative medicine.




PALLIATIVE CARE TELE-MEDICINE ALGORITHMS
ALGORITHM -2 PAIN MANAGEMENT
Patient with Cancer presenting with Pain
Pain Assessment
Annexure PC 2.1
Relevant investigations that aids analgesic prescription
Know cancer type, site, stage and metastasis
Establish Pain Diagnosis
Nociceptive
Neuropathic
Mixed-Nociceptive Neuropathic
Is pain associated with Medical/Palliative Emergency
Attention to patient's age, organ function and factors influencing the pharmacokinetic and pharmacodynamic properties of the analgesics
Annexure PC 2.1
Yes
No
All reversible causes of pain considered and treatment advised
Refer to managing emergency PC Algorithm 1
Annexure PC 2.1
Prescription as per WHO Analgesic Step Ladder
Has complex and poorly controlled pain or severe adverse effects of analgesics
Mild to Moderate Pain
Severe Pain
Non-Palliative Care RMP can initiate a second opinion consult with a Palliative Care RMP
Step 1 and II Analgesics according to WHO Analgesic Ladder
Step III (Narcotic Analgesics)
Refer to Second Opinion Algorithm PC 1
Regular E-Prescription
Family able to collect the prescription/drugs from the hospital pharmacy
Need for couriering/posting the drugs
Follow NDPS Guidelines
Annexure PC 2.2


PALLIATIVE CARE TELE-MEDICINE ALGORITHMS ALGORITHM -3
PALLIATIVE COUNSELLING/PSYCHOSOCIAL SUPPORT
Palliative Counselling/Psychosocial Support
Consultation
Refer to PC Algorithm 1 for initial steps of Consultation
Is it a Medical/Palliative Emergency
Refer to Emergency in PC Algorithm 1
Is it a Psychiatric Emergency
Annexure PC 3.1
Severe Distress, Agitation, Suicidal Ideation
Annexure PC 3.3
Psychological first-aid
Referral for in-patient consult to the nearest RMP
Mental health professional (desirable)
No
Communication Issues Identified
Annexure PC 3.2
First Consult
Ongoing Consult
Psychological first-aid
Dealing with difficult communication
Breaking bad news
Denial & Collusion
Goals of Care Discussion
Schedule follow-up based on distress levels
Referral to palliative care service (desirable) or RMP
Annexure PC 3.4
Detailed evaluation
History, investigation, reports
Assess knowledge about diagnosis and prognosis
Evaluate for denial and collusion
Assess and address communication issues
Share relevant information
Be supportive of patient/family
Schedule follow-up as per clinical judgment
Referral to palliative care service (desirable)
Assess understanding
Coordinate continuity of care
Share relevant information
Be supportive of patient/family
Initiate discussion regarding
Goals of care discussion
Advance directives
Offer bereavement support
Schedule follow-up in two weeks
Referral to palliative care service (desirable)

Further guides in the algorithms

Algorithm 1

PC 1.1 and PC 1.4 - Telemedicine Practice Guidelines. Available from: https://www.mohfw.gov.in/pdf/Telemedicine.pdf (Pages 12-19, 20-22)

PC 1.2 and PC 1.3 - Training manual for doctors and nurses under National Programme for Palliative Care-facilitator guide. Available from: https://dghs.gov.in/WriteReadData/userfiles/file/a/5127_1558685685054(1).pdf (Pages 81-90, 21-74)

PC 1.5 - Address Goals of Care- Smoothing discussions about prognosis and treatment. Available from: https://www.vitaltalk.org/topics/reset-goals-of-care/

Algorithm 2

PC 2.1 - WHO Guidelines for the Pharmacological and Radiotherapeutic Management of Cancer Pain in Adults and Adolescents. Available from: https://www.ncbi.nlm.nih.gov/books/NBK537492/

PC 2.2 - the Narcotic Drugs and Psychotropic Substances (Third Amendment) Rules, 2015. Available from: http://cbn.nic.in/html/NDPS3rdamend.pdf (Pages 26-27)

Algorithm 3

PC 3.1, PC 3.2 and PC 3.4 - Training manual for doctors and nurses under National Programme for Palliative Care-facilitator guide. Available from: https://dghs.gov.in/WriteReadData/userfiles/file/a/5127_1558685685054(1).pdf (Pages 67-74, 2-20, 67-74, 155-166)

PC 3.3 - Mental Health Challenges During COVID-19 Pandemic Guidance for Psychiatrists. Available from: https://indianpsychiatricsociety.org/wp-content/uploads/2020/05/IPS-NIMHANS-COVID-19-Final.pdf (Pages 25-37)

4 Application of Telemedicine in the Management of Diabetes

4.1 Background

Several studies have reported the usage of telemedicine for delivering clinical care services to patients with diabetes mellitus. Meta-analysis of 35 randomized controlled trials (RCTs) had showed that use of telemedicine in persons with diabetes had led to reduction in glycated haemoglobin (HbA1c) levels by 0.37% ($p < 0.001$) when compared to control group (23). Cochrane review of 21 RCTs had showed a reduction in HbA1c levels by 0.31% ($p < 0.001$) for patients who were receiving an interactive telemedicine intervention, using real time video or remote monitoring, delivered in addition or alternative to standard care (24). Another review of 46 articles had showed that telemedicine was found to be effective in reduction of blood glucose and blood pressure levels among patients with both type 1 and type 2 diabetes mellitus (25).

Studies on use of telemedicine for delivering diabetes care in India are very limited. In a recently published article, mobile van that was customized with telemedicine facility was used and found to be helpful in screening and management of diabetes among people living in underprivileged sections of Delhi (26). In another study, 69% of participants were aware about teleconsultation and 92% were interested in video mode of teleconsultation (27). It is becoming apparent that patients with diabetes need frequent visits to their diabetes specialist, and use of telemedicine could be easy and saves time and money.

The following guidelines have been formulated to improve physician's awareness of basic methods to practice diabetes care using telemedicine.

4.2 Goals of Telemedicine

1. To make healthcare accessible, more readily available to all people, and especially for those living in remote and rural areas, and persons who have a limitation of mobility, transport, time, living alone, and lack family support
2. To provide health care in times of national pandemic or other emergencies.

3. To provide accessible healthcare to people with diabetes via lifestyle changes, monitoring and medications
4. To provide education to prevent the onset of diabetes, self-management of diabetes, and prevent the progression of complications
5. To guide efficient access to emergency care

4.3 Indications for face to face outpatient consultation

At the beginning of consultation, an attempt must be made to discern if the person requires a face-to-face consultation. Here is a check list for the same and detailed evaluation will be found under the heading "emergency consultation".

1. Breathlessness
2. Recent (< 7 days) onset of weakness/paralysis of part of the body/neurological deficit.
3. Chest pain suggesting typical/atypical angina.
4. Complicated cases of fever with symptom such as (i) breathlessness (ii) altered sensorium (iii) severe abdominal pain
5. Low blood pressure, low oxygen saturation as detected by point of care testing
6. Complicated cases of pregnancy with diabetes.
7. Recently diagnosed type 1 diabetes. These patients may present with diabetic ketoacidosis and may require hospitalization. Further, patient and family will require education on self-administration insulin, home monitoring of capillary glucose, nutrition counselling, diabetes education and psychological counselling.
8. Clinical features of acute or acute-on-chronic diabetes complications such as
    i. Sudden onset vision loss or blurring.
    ii. Recent deterioration in kidney function, pedal edema or reduced urine output.
    iii. Hypertensive crisis.
    iv. Complicated foot and leg infection (e.g. necrotising fasciitis, limb threatening ischaemic & infections).
    v. Features of unstable heart failure or unstable angina/myocardial infarction.
    vi. Any other evidence of clinical or hemodynamic instability.
    vii. Hyperglycaemic crisis: Diabetes ketoacidosis and marked hyperglycaemia or hyperglycaemic hyperosmolar state. Any patient with hyperglycaemic

crisis; very high blood glucose levels, symptoms of ketoacidosis (vomiting, abdominal pain, drowsiness) or hyperglycemia with associated organ-specific complications.

viii. An episode of severe hypoglycaemia which required assistance from someone else or recurrent episodes of hypoglycaemia.

4.4 Responsibilities of physicians using telemedicine

4.4.1 High Risk Apparently Non-Diabetic Individuals

It is the physician's responsibility to ensure adequate and correct care is given to the patient even without a physical encounter. This requires careful assessment of the patient and their care. It includes

- Careful history taking
- Physical evaluation – to the extent possible
- Treatment
- Counselling

1. **Identification of high-risk individuals for development of diabetes** (28)

   Some patients may not be aware they are diabetic. Some patients may have glucose intolerance and others may have developed diabetes due to medication or stress. It is also known in our country that more than 1/2 of patients with diabetes do not know that they have diabetes. Risk factors include

   - One or both parents have diabetes
   - Obesity
   - History of gestational diabetes mellitus
   - History of polycystic ovarian disease
   - Sedentary lifestyle
   - Hypertension
   - Dyslipidaemia
   - History of giving birth to large baby (> 3.5 kg birth weight)
   - Stress

2. **Methods of screening for early diagnosis** (28)

   When they are not known to have diabetes but are at high risk, it is imperative to do some simple tests to arrive at a diagnosis.

   - Random blood glucose ≥ 200mg/dl with osmotic symptoms
   - Fasting blood glucose ≥126mg/dl, Post prandial blood glucose > 200mg/dl
   - HbA1c> 6.5%

3. Lifestyle education

The corner stone of diabetic management is lifestyle changes which includes

- Nutrition counselling
    - Individualised
    - To maintain ideal body weight
    - Adjusted macro- and micronutrients according to age, physical activity, and disease stage
- Exercise; a combination of aerobic resistance and flexibility exercises. To maintain 300 minutes per week of such activities.
- Stress management
- Weight loss can be achieved with diet, exercise and drugs if needed.

4.4.2 Education for patients with Diabetes

1. Lifestyle modification

- Counselling for tobacco – cessation of smoking.
- Alcohol- should be counselled against alcohol use. Those who are habituated should be counselled to take less than 60 ml per day. De-addiction referrals must be recommended.
- Physical activity - physical activity, apart from just burning calories has the advantage of improving insulin sensitivity, reducing blood pressure and lipids.
- Nutritional counselling- balanced diet based on their ideal body weight should be given and concept of food exchanges explained. A handout of the different diet charts of 1200 kcal, 1400 kcal, etc can be sent on an electronic platform like Whatsapp (29).
- Stress management- this may include meditation and yoga, to be practiced in addition to aerobic exercises.

2. Blood glucose monitoring

Diabetic patients or a younger relative in the household should be taught how to use a glucometer, advised about the frequency of self-monitoring of blood glucose (SMBG), and the target blood sugar values to be achieved. The testing should be at various times of the day that is pre and post all meals.

- Individualised targets-

The glycemic targets should be individualised as per the American Diabetes Association (ADA) and European Association for Study of Diabetes (EASD) guidelines; a newly diagnosed diabetic should have very tight control with

HbA1C of <6.5%, while a person with comorbidities can have a higher HbA1C target of 7-7.5%.(8,9) The blood glucose goals should be FBG 100-120 or 126 mg/dL in a young newly diagnosed patient and post prandial BG around 140-160mg/dL However, in an older long-standing diabetic with comorbidities the targets may be relaxed to FBG 100-140 mg/dL and PPBG of 140-180 mg/dL.

- Self-monitoring of blood glucose is recommended at least 2 to 3 times a week in patients who are on oral hypoglycaemic agents, while those who are on stable doses of insulin need to monitor 5 to 7 times a week. However, those patients who are up titrating the doses of insulin, may require monitoring blood glucose 3 to 4 times a day and at any time when symptoms of hypoglycaemia appear.
- Methods of monitoring-

  Monitoring of blood glucose should ideally be at home with the

  i. Glucometer
  ii. Continuous glucose monitoring system (CGMS), Ambulatory glucose profile (AGP) which will be useful for fine tuning the prescription
  iii. Each patient should maintain log of the glucose values with date and time and share the details with the physician at the time of the next consultation.

3. If on insulin

- Insulin injection techniques
  i. Preferred area of injection is in the abdomen about 3 cms away from the navel. Anterior and lateral aspects of the thigh are another preferred site and self-injection needs to be taught.
  ii. Site rotation should be explained to change the injection site every time to 2 cms away from the site of previous injection site to prevent it from undergoing lipodystrophy.
  iii. A printed schedule of insulin dose adjustment and titration can be given.
  iv. A printed diagram of sites and techniques of insulin injection may also be enclosed with prescription.

4. Hypoglycaemia identification and management

- The symptoms of hypoglycaemia should be explained.
- Management of the different stages of hypoglycaemia also should be explained to the patient.

- A leaflet on hypoglycaemia can be given to the patient.
- Symptoms of hypoglycaemia should be enquired about at every visit and appropriate counselling to avoid hypoglycaemia should be given.

5. Prevention of complications

The major goal of treatment of diabetes is to prevent micro and macrovascular complications. It should be explained to patients that tight glycaemic control will go a long way to achieve this objective.

- Frequency of complication screening (28)

  a. Annual screening

    i. Lipid profile- dyslipidaemia and targets of different lipoproteins
    ii. Serum creatinine and estimated glomerular filtration rate (eGFR).
    iii. Liver Function Test
    iv. Complete Blood Count
    v. Eye evaluation – fundus, acuity and glaucoma
    vi. ECG

  b. Quarterly- HbA1c

6. Foot care

- Self-examination with a mirror or children in the house to look at the feet on a daily basis is very important as this is the most common preventable complication in a diabetic. Testing sensation in the feet with a 10-gram monofilament should be taught to the patient and or a relative to detect a foot at risk of ulceration and implement appropriate preventive measures.
- Proper footwear

4.4.3 Review and monitoring

1. Progress regarding glycemia

The importance of monitoring should be emphasised with

i. Regular SMBG and
ii. 3 monthly HbA1c

2. Review of comorbid conditions

i. Obesity – BMI should be calculated at every visit and the importance of achieving a BMI of 23 kg/m^2 should be explained.

ii. Self-monitoring of blood pressure with an electronic BP apparatus is easy and can be done at home. Blood pressure should be checked at a frequency advised by the treating physician and a diary maintained and shared with the treating physician under optimal control.

3. Review and management of complications if any

- Neuropathy- History of neuropathy both positive and negative symptoms should be asked for.
- Nephropathy- If present control of albuminuria and the importance of glucose and blood pressure control should be emphasised and an ACE inhibitor or ARB may be prescribed as appropriate. The diet should be reviewed, and protein restriction may be advised, and a revised diet sheet should be given.
- Retinopathy- History of visual problems, floaters or loss of vison should be enquired about. If present patient should be asked for a physical review
- Coronary artery disease and cerebrovascular disease**:** History of dyspnoea on exertion or rest, pain either in the chest or other areas should be asked for. Symptoms suggestive of transient ischemic attack should be enquired about.
- Infections- In particular screen for symptoms of pulmonary TB.

4. Review of investigations

The reports should be reviewed and discussed with the patient.

5. Adult vaccination

Patients should be advised on hepatitis B, pneumococcal, and influenza vaccines and a printed schedule shared with them

6. Disability limitation and rehabilitation

- Post amputation care of the residual limb,
- Care of the other limb
- Counselling on the possibility that the other limb may also have a diabetic foot, if preventive steps are ignored
- Prosthesis and its suitability
- Physiotherapy.

4.5 Care for Patients with Type 1 diabetes

Type 1 diabetic patients need a little more care as they are young and may have more glycaemic variability (30). Because of their age and maturity, it is very important to -

- Involve their parents in their care as well in the counselling. Diabetes is a disorder which needs family support in times when the patient may feel low and defeated.
- Reinforce diet and exercise
- Assess blood glucose control, variability
- Counsel on insulin titration and give them an easy algorithm
- Counsel on hypoglycaemia
- Give them specific targets of glucose control
- Counsel on sick day rules
- Recognise symptoms of DKA – check urinary ketones
- Counsel on various delivery devices – including syringe, pen and pump
- Educate about importance of monitoring – SMBG, CGMS

4.6 What patient should know after telemedicine consult

4.6.1 High risk apparently non-diabetic individuals

i. Inadequate physical activity and dietary indiscretions pose an increased risk of weight gain and metabolic dysregulation.

ii. People who are at a high risk of developing diabetes should know about ideal body weight (height in centimetre minus-100=approximate ideal body weight) and dietary goals (requisite calories calculated as 22 kcal x ideal body weight + 25%/50% of it depending on the extent of physical activity, sedentary to moderate, respectively). Further, 500 kcal should be reduced or added depending upon the baseline ideal body weight.

iii. Indoor physical activity should be encouraged including cycling, stretching exercises, resistance exercises like push-ups, planks and sit-ups. In addition, accomplishing yoga and meditation could provide a mental solace and peace. Moreover, outdoor physical activity like brisk walking should also be promoted with full precautions of social distancing, masking and frequent sanitization. Sometimes, wearing a mask during exercise becomes uncomfortable and therefore, should only be removed when there are no other people in vicinity.

iv. They are advised to monitor their blood glucose (fasting or random) once in three/six months and if observed abnormal should be complemented with HbA1c and three-monthly monitoring of blood pressure.

4.6.2 Patients with diabetes

i. Patients with diabetes should be better equipped regarding knowledge about dietary modifications and exercise schedule. Macronutrients composition should be calculated based on ideal body weight and include 50% carbohydrates, 30% proteins and 20% fat (1/3rd each saturated fat/Polyunsaturated fatty acid (PUFA)/Monounsaturated fatty acid (MUFA)). In addition, the fibre content in diet must include 12-15gm per 1000 kcal to reduce the glycaemic variability and improve satiety (32).
ii. Physical activity may be accomplished indoor as well as outdoor as mentioned above.
iii. Patients should be well aware about hypoglycaemic symptoms and their management, particularly those who are on sulfonylureas and insulin.
iv. The bolus doses of insulin should be adjusted based on insulin carb ratio (500 / total daily dose of insulin) and insulin sensitivity factor (1500/total daily dose of insulin). Insulin carb ratio can be utilised by modulating the doses of insulin following the estimate of total amount of carbohydrate in a given meal. For example, total daily dose of insulin of a given individual is 50 units then the insulin carb ratio will be 10 which means for every 10 gm of carbohydrate metabolism, 1 additional unit of insulin is required. Suppose a patient consumes 50 gm carbohydrate in the breakfast then the dose of bolus insulin will be 5 units. Insulin sensitivity factor helps to achieve the postprandial glucose in target range based on pre-meal blood glucose and individual insulin sensitivity factor. For example, if pre-meal blood glucose is 190 mg/dl and the total daily dose of insulin is 50 units, then insulin sensitivity factor is 30 and the doses of insulin administered prior to next meal will be existing dose + 2 additional units
v. Basal insulin doses should be modified according to the fasting plasma glucose with a target of 90-130mg/dl by up titrating the doses by 2 units every alternate day. If fasting plasma glucose falls below 90mg/dl, then down titration is advised.
vi. In the event of hypoglycaemia insulin doses should be reduced or stopped for time being if the ambient blood glucose is <80 mg/dl.

vii. Patient should adhere to medications not only for anti-diabetic drugs but also to anti- hypertensive, lipid lowering drugs & other cardiac drugs like Aspirin & Clopidogrel.

viii. Self-monitoring of blood glucose is recommended at least 2 to 3 times a week in patients who are on oral hypoglycaemic agents, while those who are on stable doses of insulin need to monitor 5 to 7 times a week. However, those patients who are up titrating the doses of insulin, may require 3 to 4 times a day or else blood glucose should be done at any time when symptoms of hypoglycaemia appear. Fasting plasma glucose should be aimed between 90-130 mg/dl and postprandial glucose should be maintained between 140-180 mg/dl. However, it should be customised according to the age, concurrent comorbidities, hypoglycaemic unawareness, and life expectancy of the individual. Glycated haemoglobin should be targeted <7% in younger individuals, while between 7-7.5% in older people.

ix. Patients on oral hypoglycaemic agents should not modulate their doses unless warranted particularly if hypoglycaemic symptoms appear. Further, self-hike in doses of these medications should only be done after consultation with their physician. Routine observation of ambient high blood glucose can be taken care by accomplishing physical activity, avoiding inter-prandial snacking and reducing the calorie content for the next meal.

x. The recommended screening for diabetic complications particularly for retinopathy and nephropathy is annual if these complications are not present at first evaluation or they have been stable during follow-up. On the contrary, appearance of new onset of visual symptoms or deterioration in renal function should prompt for immediate and more frequent evaluation (6 months). ECG should be done once in a year or else if symptoms appear.

xi. Daily examination of foot should be performed and carefully look for nails, inter digital space, foreign body and plantar aspect of foot with self-mirror examination. In addition, any callosity, bunion or corn should also be examined. Never forget to inspect the shoes and slippers and never walk bare foot in the house.

xii. Development of fever, cough, urinary symptoms, unwarranted abdominal pain and deep skin/ear infections (carbuncle and malignant otitis externa) should alarm the patients to consult their family physician as soon as possible.

xiii. Urine/blood ketones should be examined if random plasma glucose exceeds >350 mg/dl or unprecedented abdominal pain or during any critical illness. In addition, patients on SGLT2 inhibitors if present to emergency should also have ketone estimation.

xiv. Some side effects of the medications used in the management of diabetes should be appreciated by the patients themselves including hypoglycaemia, genital mycotic infection, symptoms of urinary tract infection, pedal oedema and unexplained loss of appetite. Those who are administering insulin injections should rotate periodically to avoid insulin lipohypertrophy.

xv. Blood pressure should be monitored weekly for those who are on stable doses of anti-hypertensive medications with an aim to achieve a target of 130/80 mm/Hg. Those who have uncontrolled blood pressure should monitor daily and modify their doses in consultation with their physician.

xvi. Patients with diabetes may have visible (foot deformity, amputation, post stroke residual deficit and visual impairment) and invisible disabilities (depression, mood changes, erectile dysfunction, dyspareunia and cost of treatment) which should be counselled, discussed and managed accordingly (33).

xvii. Sick day guidelines for patients with type 1 diabetes are

- Never skip insulin, but do modify according to blood glucose
- Frequently monitoring blood glucose every 1-2 hrly
- Estimation of ketones 6 hrly
- Drink plenty of fluids with salt
- Increase short acting insulin doses by 20% if, random plasma glucose exceeds 200mg/dl
- If not able to take orally then seek for hospital assistance

4.7 Standard procedure for consultation

4.7.1 First consultation

The chronic care of diabetes and related disorders could be facilitated by telemedicine (34). However, telemedicine consultations require time, caution and focus on the part of the diabetes care team In addition to type 2 diabetes, gestational diabetes and type 1 diabetes management could also be helped by telemedicine (35–37). Whenever a patient is assessed during the first consultation it should be

ascertained that the patient can be managed by teleconsultation. If not, the patient should be advised to visit the nearest hospital for further management.

a) Indications for face to face outpatient consultation- Please see this in section 4.3.
b) Indications for emergency referral-

   If any of the above indications are met, the subject should be immediately advised a face-to-face outpatient consultation or visit to the nearest emergency service.
c) Preliminary arrangements to be done by doctor before first consultation, inform about methods and the need for obtaining reports prior to appointment-
    1. Before the consultation, appropriate online consultations and disclaimers must be obtained via the relevant platform.
    2. Either the doctor or the relevant clinical staff may contact the person with diabetes and provide instructions for using the platform. Particularly results of previous investigations or other medical records may need to be scanned and sent in advance to the doctor.
    3. The time of the appointment needs to be confirmed in advance.
    4. Sometimes people may ask, which tests need to be done, especially the person visiting their doctor for their first visit. These tests could include one or more of the following (or other tests as needed): Fasting plasma glucose, HbA1c, Kidney function tests, lipid profile, liver function tests, urine test for microalbuminuria.
    5. The doctor and team must make sure about a secure and good internet connection.
d) Maintenance of case records-
    1. All the prescriptions or consultation notes must be saved on a secure folder in the computer/or appropriate cloud platform.
    2. Wherever possible the reports must be integrated with the clinic's electronic medical record system.
e) Most common presenting complaints and methods to evaluate the history by patients-

   In cases of diabetes, presenting complaints may include

   - High blood glucose
   - High HbA1c

- Suspected diabetes related complication as ascertained by symptoms relating to eye, kidney, heart, feet.
- Side effects of medications.
- Abnormal parameters like blood pressure, lipids or other parameters.
- Any other co-existing medical condition

Methods to evaluate history told by the patient

In general, history taking mirrors general history taking in face to face meeting. Additional points to note during telemedicine assessments include-

i. Making sure patients are comfortable with the telehealth platform.
ii. Adequate questions are asked regarding onset, duration and aggravating/relieving factors of every symptoms.

f) Significant medical history – past, family, dietary, tobacco/alcohol/any addictions, drug allergies

In general, these evaluations form the basis of a diabetes-related history

i. Diabetes-related history
   - Date/year of diagnosis
   - Last HbA1c/blood glucose
   - Compliance with diet and exercise
   - Anytime on insulin
   - Occurrence of hypoglycemia
   - Frequency of home blood glucose monitoring

ii. Other aspects of medical history
   - Past medical illnesses
   - Addictions to tobacco/alcohol
   - Sleep patterns
   - Mood-related history such as depression
   - Drug allergies
   - Current medical therapy
   - Checklist for diabetes related comorbidities such as neuropathy, nephropathy, retinopathy, hypertension, stroke or heart disease.

g) Performing possible medical examination through telemedicine: foot examination, simple neurological examination, asking patient to check blood glucose and blood pressure.

1. General assessment: People with diabetes may be at risk of several complications. A quick assessment of whether the patient is in some discomfort or is comfortable, can speak normally and is speaking and communicating clearly would help to assess the general condition.
2. If a caregiver/relative is present with the patient, it may be important to establish a rapport with the care giver and find out if the activities of daily living are affected or not.
3. Always ask for important parameters which could be measured at home, such as: weight, blood pressure, pulse and capillary glucose values. Wherever possible appropriate training resources should be shared with the person.
4. Cardiovascular assessment: ask for pulse rate, presence of chest pain, palpitations or dyspnoea. Further assessment may not be possible.
5. Neurological assessment: with special regard to diabetes, doctors may ask for neuropathy symptoms such as tingling, burning or numbness. A quick assessment of speech, movements and responses to questions would help the doctor about central functions and motor functions.
6. Foot examination: Inspection of the feet for ulcers, cellulitis, gangrene, nail changes, deformities seen in neuropathy, as well as interdigital fungal infections are important in people with diabetes.

h) Treatment advice should be sent in PDF format which should have proper designation and registration number of doctors, mode of teleconsult, timing and ways to take medication and it should be explained to the patient with possible drug side effects and ways to titrate medication.

Treatment advice should be sent to the patient. The following are the points to note about the format.

i. Format should be ideally in PDF or easily downloadable format
ii. Mode, time and date of teleconsult should be mentioned.
iii. Name of drug (both generic and brand)
iv. Mode of medicine intake and duration
v. Side effects of medication should be documented
vi. In case of insulin therapy, contact numbers for dose titration and hypoglycaemia management.
vii. Date of follow-up

viii. Tests to be done at next follow-up should be mentioned.
ix. Sick day rules and instructions on urine ketone testing
x. Advanced therapies like insulin devices, pumps and CGMs when utilized, should be accompanied by instructions on their use, either shared on the teleconsultation platform or separately via e-mail or messaging.

i) Laboratory investigations, Self-monitoring of blood glucose (SMBG), Self-monitoring of blood pressure (SMBP) requested for next consultation should be clearly mentioned in the prescription which should include the following.
   i. Name of investigations for next visit
   ii. SMBG or SMBP advice should be structured in terms of time and frequency of testing.
   iii. If patients are using glucometers that connect with mobile phones, then instructions should be provided about their use and requisite permissions should be taken if the health care team accesses the same.

j) Significant counselling points for patients and care givers which should include the following
   i. Prevention of hypoglycaemia
   ii. Self-monitoring of blood glucose training, including glucometer testing and strengths and limitations of capillary blood glucose.
   iii. Insulin injection technique, insulin pump therapy (in case patient is on insulin pump), home blood/urine ketone monitoring in type 1 diabetes and dose titration.
   iv. If needed, doctor/paramedical staff should provide online training, or send pictorial video resources on insulin delivery system training/ capillary blood glucose testing
   v. Prevention of complications
   vi. Lifestyle modifications
   vii. If the patient is stressed or under depression proper referral for psychological counselling should be done

k) Corresponding timeline for next follow-up consultation
   i. The date of next consultation should be mentioned.
   ii. Procedure to obtain appointment for next visit should be mentioned.

iii. Phone numbers /e-mail addresses for seeking help should be mentioned.

4.7.2 Follow-up consultation

a) Mode of maintaining continuity in medical records with respect to comparison of different parameters like weight, HbA1C and blood pressure-
It is important to maintain continuity in follow-up reports. For this it is suggested that doctors maintain a small table in the consultation notes mentioning last visit's HbA1c, and weight; or other similar parameters. Certain electronic medical records/laboratory systems also help pull out past records and present data as graphs or line-diagrams.

b) Evaluating treatment adherence and life style modifications-

Follow-up notes should ascertain

- Compliance to lifestyle modifications
- Adherence to monitoring
- Adherence to medications

c) Changes to be done in treatment (minor changes can be done but for any major changes patient should be asked to come for face to face consult)-

Change to treatment

i. Minor changes which would not increase risk of hemodynamic instability may be carried out and documented over telemedicine consultation.
ii. Major changes of an acute care type will require hospital visits. However, major treatment changes such as initiating of insulin or a glucagon like peptide receptor agonist may be carried out online.

d) Next follow-up date and investigations to be done are to be mentioned.

e) Patient and care giver education are same as that for first visit mentioned above; at every point, limitations of telemedicine must be mentioned, discussed and documented.

f) Special scenario – delayed follow-up by patients-

i. Timely follow-up must be encouraged and emphasized
ii. Any case of delayed follow-up for chronic care of diabetes, beyond 6 months should be evaluated as a new subject (see section 4.7.1)

4.7.3 Emergency consultation

a) Diabetes conditions requiring emergency care

Emergencies in diabetes can be potentially life threatening and should be recognised immediately for proper referral of patient to healthcare facility. If patient is not able to consult due to the emergency, then the primary care giver should perform the teleconsultation, preferably through video.

1. Diabetic ketoacidosis
    - Diabetic ketoacidosis (DKA) or ketosis may be common in diabetic patients with COVID-19 and may modify the clinical outcome.
    - DKA is seen primarily with type 1 diabetes but may also be seen with type 2 diabetes.
    - Marked decrease or absence of insulin causes hyperglycaemia, metabolic acidosis, dehydration and electrolyte abnormalities.
    - Enquire about lack of adherence or missing insulin dose(s). It can be precipitated by stress of any nature (infections, physical or psychological stress).
    - Symptoms at presentation may be related to dehydration (giddiness, hypotension, increased heart rate, lethargy, and confusion) and metabolic acidosis (abdominal pain, vomiting, increased respiratory rate, altered mentation).
    - Requires hospital admission for management.
2. Hyperglycaemic hyperosmolar nonketotic syndrome
    - Seen with type 2 diabetes, more commonly in older individuals living alone and have lack of access or intake of adequate fluids.
    - Insulin levels in body are sufficient so that ketoacidosis does not usually occur.
    - Profound hyperglycaemia, dehydration, increased thirst and altered mentation are usually the presenting symptoms.
    - Requires hospital admission for management.
3. Hypoglycaemia
    - It can be symptomatic or asymptomatic.
    - Causes include irregular meal timings, inadequate food intake, inappropriate dosages of anti-diabetic medications.

- More frequent in patients taking insulin and in patients with type 1 diabetes.
- Can be more severe and prolonged in patients taking oral hypoglycaemic agents, particularly sulfonylureas.
- Classification of hypoglycaemia(8)
    i. Level 1: blood glucose level between ≥54 and <70 mg/dL
    ii. Level 2: blood glucose <54 mg/dL
    iii. Level 3: a severe event characterised by altered physical or mental status requiring assistance for treatment
- Symptoms include adrenergic (palpitations, sweating, tachycardia, increased hunger) and neuroglycopenic (confusion, syncope, coma)
- Symptoms occur in between meals or after physical activity
- Hypoglycaemia unawareness i.e. absence of symptoms of hypoglycaemia in the presence of blood glucose <70 mg/dL may occur if patient has recurrent episodes of hypoglycaemia.
- Severe hypoglycaemia or recurrent episodes of symptomatic hypoglycaemia requires hospital admission for management.

4. Acute coronary syndrome
    - Can present as an emergency in diabetic patients.
    - Triggered by other complications such as hypoglycaemia, profound hyperglycaemia, coexisting infections and any other physical or psychological stress.
    - Spectrum ranges from silent ischemia, typical symptoms of myocardial infarction and symptoms suggestive of cardiac failure.
    - Myocardial ischemia may present with non-cardiac symptoms such as nausea, vomiting, abdominal pain, dyspepsia like symptoms, shortness of breath, easy fatigability and weakness. Therefore, high index of suspicion to be maintained.
    - Requires evaluation and hospital admission for management.
5. Infections including skin and soft tissue infections
    - Uncontrolled hyperglycaemia predisposes to these infections.
    - Most common infections include bacterial infections of eyelid, boils, folliculitis, deep seated infections of skin, urinary tract infections.

- Presence of peripheral neuropathy increases the risk of severe infections which can be life threatening.
- Infection which is progressing rapidly, is deep seated, associated with tissue necrosis is an emergency.
- Mild infections may be treated with topical and systemic antimicrobials. Severe infections require hospital admission for parenteral antimicrobial administration and surgical intervention if required (33).

6. Ophthalmologic emergencies
    - Acute decrease in vision may be due to retinal detachment or vitreous haemorrhage in the presence of severe proliferative diabetic retinopathy.
    - Acute central retinal artery or retinal vein occlusion
    - Ocular infections including bacterial endophthalmitis and orbital rhinocerebral mucormycosis (mostly with diabetic ketoacidosis)
    - Herpes zoster affecting the trigeminal nerve may cause anterior uveitis or keratitis

b) Methods to identify emergency conditions through signs and symptoms

i. Teleconsultation should include the enquiry about the glycaemic control as well as presence of any symptoms suggestive of acute complications.

ii. Video consultation with the patient or the caregiver/healthcare provider is preferable for better understanding of the signs and symptoms and to assess the present condition of the patient, based on which referral to hospital may be considered.

iii. Presence of fever indicates infection. However, infections in diabetic patients may present without fever. Any new onset respiratory, gastrointestinal, urinary and neurological symptom should warrant investigation to rule out infection.

iv. For symptoms of infection of skin and soft tissues video consultation or sharing of photographs of the lesion should be considered. If in the physician's opinion the video consultation is not enough then face-to face visit or a referral to healthcare facility should be considered.

v. Adrenergic symptoms like palpitations, sweating, tachycardia, increased hunger or symptoms like confusion, syncope, unconsciousness occurring

in between meals, at midnight, after exertion or early morning headache may suggest episodes of hypoglycaemia.

vi. Symptoms of abdominal pain, vomiting, tachypnoea and fever should arouse the suspicion of diabetic ketoacidosis.

vii. Any new onset symptom, including change in sensorium, in elderly individuals should be taken seriously.

c) Treatment decisions – home management / re-assurance / referral

i. In the presence of the following conditions, the patient should be referred to a secondary or tertiary centre for appropriate evaluation and management

- Diabetic ketoacidosis, Hyperosmolar hyperglycemic state (HHS) severe hypoglycaemia, acute coronary syndrome, severe acute/extensive infections.
- Patient appearing toxic, distressed or in altered sensorium.
- Severe uncontrolled hyperglycaemia despite appropriate dosages of hypoglycaemic agents (including insulin).
- Presence of urinary ketones with/without symptoms suggestive of DKA (in a patient not on SGLT2 inhibitors).
- Presence of symptoms suggestive of HHS.
- History of one episode of severe hypoglycaemia or recurrent episodes of moderate hypoglycaemia.
- Symptoms suggestive of severe infection (high grade fever, moderate to severe respiratory symptoms, severe urinary symptoms, severe gastrointestinal symptoms with decreased oral intake, large area of skin and soft tissue infection, presence of necrosis, presence of blackish nasal discharge).
- Acute ophthalmological symptoms.

ii. The following may be managed at home itself

- Mild to moderate hypoglycaemia may be managed at home with modification of dosages of hypoglycaemic medications with good SMBG. If patient does not have facility of SMBG or is non-compliant, then may be referred for hospitalisation and stabilisation of the dose of medications.

- In presence of hypoglycaemia unawareness, the dosage of medications may be modified that aims towards a less strict glycaemic control for some period.
- Mild to moderate infections may be treated at home with appropriate topical and systemic antimicrobials.
- Appropriate control of blood pressure by modification of anti-hypertensive medications.

d) Mechanism for referral

i. Patients with uncontrolled severe hyperglycaemia, hyperglycaemic emergencies, severe hypoglycaemia, acute cardiovascular manifestations and infectious emergencies should be referred to a health care facility capable of managing such emergencies.

ii. This can be done by providing appropriate prescription to the patient/care giver mentioning the salient clinical features and the suspected complication.

iii. For moderate complications face-to-face consultation may be undertaken for proper assessment of the clinical condition and the need of in-patient treatment.

iv. For mild complications, teleconsultation may be sufficient for management.

4.8 Experiences on specific challenges faced in delivering care for diabetes through telemedicine

i. Lack of ownership and/or knowledge of use of digital platforms (smart phones etc.) for video consultation or transmitting images/records by significant proportion of patients.

ii. Poor internet connectivity at several locations resulting in call drops/poor quality of audio/video.

iii. Lack of awareness by patients about the names and doses of the ongoing medications. This makes it difficult to assess the treatment by audio only consultations.

iv. Hearing or vision impairments, particularly in elderly may hamper appropriate use of the communication device (smart phone) and in understating the instructions given.

5 Application of Telemedicine in the Management of Cardiovascular Diseases

5.1 Rationale of use of telemedicine

The care of patients at risk and or with Cardiovascular Diseases (CVDs) require lifelong adherence to treatment and behavioural change for risk management, and decreasing morbidity and premature deaths. It also requires periodic assessment of risk status, monitoring of complications, adherence to treatment and treatment revisions if required to optimize the risk management. The lifelong adherence to evidence-based treatment and practice of healthy lifestyle is important and that requires patient empowerment, and easy access to quality health care services.

There are several barriers for optimum care (availability, accessibility, affordability of health care services). The primary and secondary care level hospitals need to be strengthened in their capacity to provide all the required care to patients with CVD, due to lack of knowledge, skills, competence and limited available diagnostic tools. These centres will often need access to expert advice from tertiary care centres, which are predominantly located in major cities. Thus, access to healthcare services is important in ensuring continuum of care. Technology-based access to decision support system through telemedicine is an alternative means of providing healthcare services to patients, healthcare providers at primary and secondary care level hospitals, at government and in private sector. Telemedicine is one of the solutions to deal with the healthcare needs of patients with CVD in resource strained countries.

5.2 Goals of telemedicine

To reduce morbidity and mortality in patients at risk and or with established CVD by ensuring uninterrupted access to health care services using teleconsultations, complementing with conventional form of face-to-face health care services.

5.3 Scope and purpose of guidelines

The scope of the guidelines is to provide teleconsultations to patients at risk and with established CVD to promote self-care support, and health care providers for decision support for guiding evidence-based evaluation, risk stratification, treatment, follow-up and monitoring for complications, treatment revisions and timely referral to tertiary

care centres. The main purpose of developing guidelines for telemedicine is to ensure easy access to health care services by experts in the field, and for providing guidance to stakeholders for optimization of evidence-based care.

5.4 Aim

To enhance access to health care services at community level to reduce morbidity and mortality due to CVD

5.5 Objectives

The objectives of teleconsultations are to improve control of risk factors and prevention of cardiovascular events by facilitating access to expert health care services through teleconsultations at primary health care setup.

5.6 Role of teleconsultations in care of patients at risk and established CVD and during cardiac emergency

5.6.1 Primary prevention

Telemedicine services could play an important role in primary prevention of CVD for -

Patient level consultation- Patients with diagnosed hypertension, diabetes and or dyslipidemia on treatment, under follow-up could seek consultation directly for the following reasons -

- Continuation of medication
- Titration of dose based on results of the risk factors levels
- Guidance for practice of healthy lifestyle, diet, exercise
- Understanding warning signs of impending cardiovascular events and symptoms of CVD

Healthcare providers- Health care providers attending patients at primary and secondary care setting could access teleconsultations services seeking guidance for the following reasons-

- Evidence based evaluation of patients with hypertension, diabetes, and or dyslipidemia
- Risk stratification
- Use of evidence-based treatment
- Monitoring of risk factors for target goals
- Follow-up evaluation for risk control, CVD/events
- Guidance for need for referrals

Specialized consultation- Specialized teleconsultations services could be accessed by health care providers working at primary and secondary health care centres, private clinics and or nursing homes. The following stakeholders could seek guidance through teleconsultations services;

- General practitioners
- Specialist working in private clinics, nursing homes, primary and secondary care centres in government sector.

5.6.2 Established Coronary Artery Disease (CAD)

Telemedicine services would be accessed by stakeholders for management of patients with established CAD for the following -

- **Risk evaluation and risk stratification**
  - Evidence based management planning
  - Follow-up monitoring for risk management, detection of complications and treatment revision
  - Drug continuation
  - Management of CAD patients with complications (eg: heart failure, worsening angina) and comorbidities (eg: Chronic Kidney Disease (CKD) , diabetes) during follow-up, for -
    - Selection of drugs
    - Dose titration based on renal function, potassium level, blood pressure (BP) and heart rate (HR)
  - Decision of referral to tertiary care centre for assessment of-
    - Extent and severity of CAD
    - Evaluation of left ventricular (LV) function and risk stratification of sudden cardiac death in post-acute coronary syndrome patients
  - Guidance for need of referral to tertiary care centre.
    - Patients presenting first time with symptoms of angina (CAD)
    - Patients with CAD with past history of Acute Coronary Syndrome (ACS) not evaluated for LV function and risk for sudden cardiac death status
    - Patients with CAD with worsening angina and or symptoms of heart failure
    - Patients with CAD with CKD

- **Cardiac Emergencies**

In the case of patients with cardiac emergencies (acute coronary syndrome, acute heart failure, arrhythmias), health care providers at primary, secondary care hospitals in government and private sectors could access teleconsultations for the following reasons,

  - Assisting in making diagnosis using clinical data, ECG tracing, lab results through any software/app-based technology
  - Providing guidance by experts at tertiary care centres in delivering emergency care to stabilize patients hemodynamically before referral

5.7 Clinical support tools

Each primary and secondary health care centre both in government and private sectors seeking teleconsultations should have following clinical support tools for effective implementation of treatment guided through teleconsultations -

- Biochemistry lab facilities for estimation of -
  - lipid profile, blood glucose, renal function, electrolytes, haemoglobin and INR testing
  - Point of care devices for estimation of glucose, Troponin T/I
- ECG machine
- Weighing Machine
- BP instrument
- X-Ray chest
- Defibrillators with ECG monitor
- 24*7 helpline should be available at tertiary care centres by forming an App based group of experts to be available for providing teleconsultations services round the clock through app-based technology.
- Drugs used for treating hypertension, diabetes, dyslipidemia, heart failure, thrombolytic agents, antiplatelets, heparin, oral anticoagulants and oxygen supply should be available at secondary care hospitals and nursing homes/clinics

5.8 Skill building for the providers

Telemedicine could be used for capacity building of health care providers to enhance knowledge and skills for management of patients with CVDs.

- The knowledge and skills of health care providers would be enhanced by -

- Providing teleconsultations on given real case scenario in terms of processes of evaluation, diagnosis, risk stratification, evidence-based management planning and follow-up monitoring of patients.
- The webinar-based platform could be used for continuing medical education (CME) of the health care providers by structuring the schedule of CMEs in an annual calendar.

5.9 Empowering the patients

The services of teleconsultations could be used for empowering patients at risk and / or with CVD for the following -

- Educating patients with established CVDs about their disease, risk factors, potential complications and preventive measures -
  - To support self-management, and self-monitoring of risk factors and complications
  - To improve adherence to medication, practice of healthy lifestyle and follow-up visits
- Educating patients at risk of developing CVD about -
  - Risk factors of developing high BP, diabetes, dyslipidemia and obesity
  - Importance of practice of daily physical activity
  - Making choices for healthy and unhealthy foods including salt and saturated fats
  - Monitoring of body weight, BMI
  - Risks of tobacco consumption and harmful consumption of alcohol and sugary beverages
  - Importance of periodic monitoring of BP, glucose and lipid levels and body weight
  - Symptoms of CAD, ACS and importance of immediate seeking of medical attention in an event of symptoms of ACS

Patients at risk and established patients of CAD could seek teleconsultations through mobile phone or using e- Sanjeevani clinic portal.

5.10 Challenges

There are challenges in providing telemedicine services to wider audience due to

- Limited availability of experts in the concerned field of NCDs
- Issues related to availability and speed of internet connectivity

- Confidence of patients in seeking teleconsultations services
- Confidentiality of health data of patients and associated ethical issues
- Reliability of inputs of clinical data provided by the health care providers to make a treatment decision
- Lack of availability of clinical tools required at primary health care setup for making treatment decisions
- Non-availability of medicines required for treatment at primary health care setup

6 Application of Telemedicine in the Management of Stroke

6.1 Scope and Purpose

Stroke is an episode of acute neurological dysfunction caused by focal cerebral, retinal or spinal infarction or haemorrhage. Stroke is preventable and can be effectively treated with early detection and management. Stroke leads to significant disability and poses a huge burden to the society and caregivers.

Since the availability of specialized centres for acute stroke care may be limited and far from an index patient's residence, telemedicine is an important bridge that could help make a quick decision by the local physician to treat or transport the patient to a specialized centre. This guideline explains broad principles of using telemedicine for stroke ('Telestroke') and aims to provide a uniform patient assessment and care pathways for point-of-care acute stroke therapy, risk management, and post-stroke care to reduce morbidity and mortality. In addition, it facilitates follow-up care and rehabilitation of stroke patients.

These guidelines shall fall within the broad perspective of the telemedicine guidelines laid down by the Medical Council of India (6).

6.2 Broad objectives of Telestroke

1. Acute stroke care can be implemented using telemedicine by primary, secondary care hospitals in government and private sectors and the health care providers can use telemedicine for
   a. Diagnosis of stroke and assessment of stroke severity
   b. Guidance from tertiary care physicians/neurologists for providing emergency care, stabilizing patient and monitoring for stroke care, or referral for further management
2. Teleconsultation for acute neurological deficits/stroke should aim to guide family caregivers/ primary care physicians in triage and timely referral to the nearest health care facility with CT scan/infrastructure round-the-clock that can provide acute thrombolysis. Those hospitals capable of offering acute stroke management could be stratified in to

a. Primary Stroke Centre (PSC)
b. Comprehensive Stroke Centre (CSC) (see Annexure in page no 73 for definitions and scope)

Telestroke systems may also facilitate acute treatments by improving team communications between a hub (CSC), and spoke hospitals (PSC)

3. Telemedicine is also useful for post-stroke care through direct consultation of patient with physician or health care provider or through their primary care physician / healthcare providers (like Physiatrist - Physiotherapist / Occupational therapist / Speech-language pathologists / Nutritionist) with the expert in tertiary care.
4. Teleconsultation by physicians in PSC with experts in CSC is feasible for guidance and monitoring of stroke care. This may be established in respective districts through a hub and spoke model. This requires that the physicians and healthcare facilities that act as 'spokes' are trained in stroke management.

6.3 Organization of Telestroke network

The broad organization of telestroke could be considered under the following heads

6.3.1 Infrastructure

The infrastructure for telestroke consultation and management shall depend upon the situation and need for specific consultation. This could be provided using the following-

1) Audio call
2) Audio and video call
3) WhatsApp or any other portal of encrypted data transfer of laboratory reports +/- Imaging
4) Imaging transfer tool for rapid communication of high-quality imaging of the stroke patient
5) Government of India or State Government portal specifically designed for teleconsultation (eSanjeevani)
6) The tool could be very basic or specifically designed using the latest technology with faster data transfer ensuring safety and privacy.

6.3.2 Clinical support tools required for telestroke

Clinical support tools for management of acute stroke are likely to be available in the PSC or CSC facilities (see Annexure in page no 73 for the scope of service at different level of stroke care)

These could include the following-

a. Investigations – ECG, ECHO cardiogram, access to CT scan, Lab tests
b. Monitoring tools – Oxygen saturation, blood glucose, BP measurement, swallowing assessment
c. Drugs – IV thrombolysis, antiplatelets, anticoagulants, antidiabetics, antihypertensives, lipid-lowering agents
d. Stroke unit
e. Interventional neuro and radiology facility for specific patients with large vessel occlusion
f. Stroke rehabilitation facility

6.4 Telestroke in different situations

6.4.1 Telestroke for training on the recognition of stroke by community members and lay people

The following important symptoms should be emphasized in the community to recognize the stroke symptoms.

1. Numbness or weakness (paralysis), especially on one side of the body, including face
2. Loss of consciousness or altered consciousness
3. Decreased vision in one or both the eyes
4. Language difficulties, either in speaking or understanding
5. Difficulty walking; loss of balance or coordination
6. Confusion or loss of memory
7. Swallowing difficulties
8. Sudden severe headache with no known cause
9. Sudden severe nausea and vomiting especially with headache or dizziness

A six-lettered word "BEFAST" may be used for quick recognition of stroke even by a lay person to seek urgent medical attention -

B= Balance (unsteady gait)

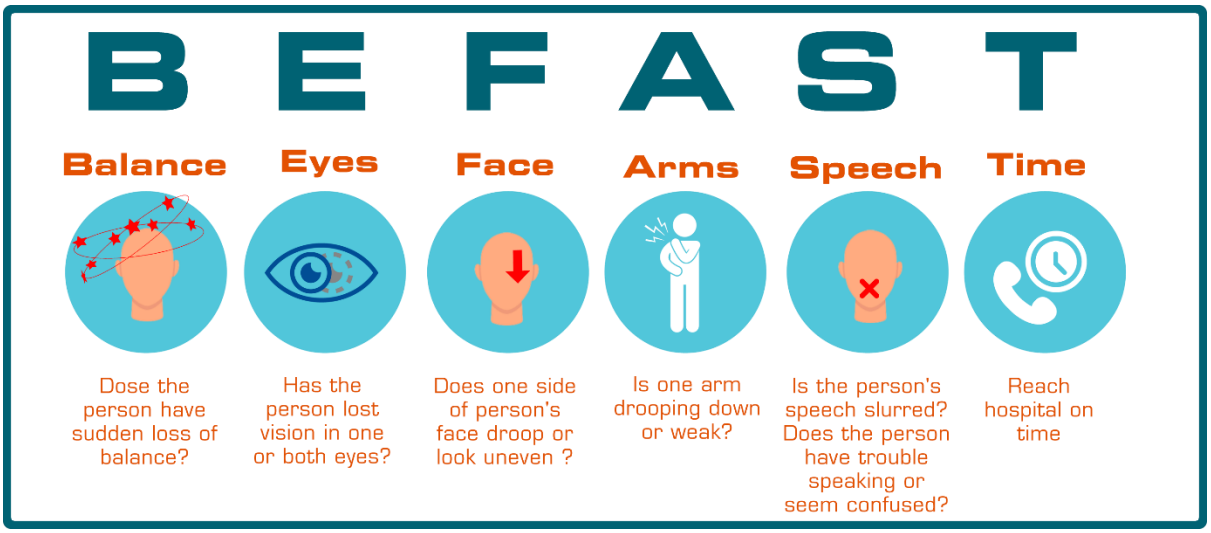
E= Eye (difficulties in vision, in one eye or one side of the visual field)

F = Face (drooping of face while smiling or showing teeth)

A= Arm, (drooping one of the outstretched arms)

S= Speech (slurred/garbled speech or inability to speak or understand commands)

T= Time (if any of the above alone or in combination are present and of sudden onset, this could be a stroke, and the patient should be transported to nearest hospital with stroke management facility)



6.4.2 Training of the doctors

Telemedicine could be an extremely helpful tool in teaching and training of physicians and neurologists at all levels of healthcare. At the primary care level, recognition of stroke, symptoms, severity and timely referral to the nearest stroke centre (PSC) should be in the training module. At the PSC and CSC level, it would involve training for acute stroke therapy using medical, interventional or surgical therapy as required. This will help empower training to reach out to all levels of the medical community.

6.4.3 Acute stroke management

Acute stroke care could be delivered using telestroke services by the following means-

- The basic principle will be built on a hub and spoke model for reaching out to the most remote places.
- Transfer of patient to the nearest facility by rapid teleconsult and decision making
- Using audio and video consultation with the nearest higher level of health care (PSC or CSC) for expert consultation and timely decision-making to treat. The consultation would involve history and clinical review, tele National Institute of Health Stroke Scale (NIHSS) and imaging transfer for quick review and decision-making to treat with intravenous thrombolysis or any other specific intervention as required.

Stroke is an emergency, and 'Time is Brain'. Any health care provider in any clinical setting should be able to triage for preliminary diagnosis and management. At the very basic level, the following could be immediately done -

a) Assess and manage ABCs (Airway, Breathing, Circulation)
b) Initiate cardiac monitoring
c) Maintain Oxygen saturation > 94%
d) Establish Intravenous (IV) access
e) Measure blood glucose and treat hypoglycaemia, if any
f) Determine the time of symptom onset or last known normal and obtain family contact information, preferably by a cell phone
g) Triage and RAPID TRANSFER of patient to the nearest PSC for acute thrombolysis or any other intervention and management of complications as required

Using mobile stroke unit service is also based on the premise of teleradiology and telemedicine with the treatment of acute stroke at the level of the community with timely dispatch to the nearest higher-level health facility. This is based on the concept of bringing the hospital to the patient.

Teleconsultation for the acute visit would include the following components as a part of comprehensive in-hospital stroke management. This could be well organized using teleconsultation for expert guidance.

a) Presenting complaints including time of onset or last seen normal
b) Any cardiac symptoms, relevant past history, comorbidity and medication history including anticoagulation
c) Quick neurological examination for deficits/ NIHSS/ modified Rankin Score (mRS) as relevant that is possible in virtual mode
d) Investigations: A non-contrast CT brain is mandatory. A CT angiogram or MRI brain may be done in selected cases based on ready availability but additional imaging should not be attempted which may delay the thrombolysis treatment
e) Medications: antiplatelet; anticoagulants as indicated; control of risk factors: hypertension; diabetes mellitus; cholesterol management etc
f) Lifestyle modification; exercise; smoking and alcohol cessation
g) Patient education and caregiver education

Annexure (page 73-89) provide detailed note on management of stroke from PSC level to CSC level.

6.4.4 Telestroke for post-stroke care and advice, including optimum secondary prevention and rehabilitation

This could be divided into two important components-

- Telestroke for the first-ever consultation for a previous stroke not investigated or evaluated. This would follow the same principles as stated in acute stroke management (section 6.4.3)
- Telestroke for follow-up consultation

The focus of follow-up consultation includes the following

1. Optimum secondary prevention based on the presumed stroke mechanism and review of any post-stroke complications. The secondary prevention would include overview or prescription for medications, including the following as per the specific need of the patient.
    a) Antiplatelets including aspirin and/or clopidogrel in ischemic stroke
    b) Anticoagulants (in cardio embolic stroke). Vitamin K Antagonist (VKA) or Novel Oral anticoagulants (NOAC) according to indication / preference / availability and affordability
    c) Antihypertensives
    d) Antidiabetics
    e) Lipid-lowering agents (statins/fibrates)
    f) Vitamin B12 / Folvite / D3 supplements as required
    g) Cessation of smoking/Alcohol consumption
    h) Carotid endarterectomy (CEA) and/or Carotid Artery Stenting (CAS) in cases of > 50% symptomatic carotid artery stenosis
    i) Management of cardiac ailments leading to embolic stroke
    j) Management of vasculitis/angiitis as required
2. Assessment of functional status Modified Rankin Score (mRS)
3. Recording of new complaints
4. Review of lab investigations
5. Changes in prescription
6. Follow-up investigations

7. Patient and caregiver education
8. Evaluation and urgent referral for any acute deterioration related either due to neurological or other medical reasons
9. Rehabilitation
    - Physiotherapy
    - Speech therapy/ Swallow therapy
    - Occupational therapy
    - Vocational training

6.4.5 Telestroke for assessment of patient care optimization

Patient outcome goals may be based on standardized stroke performance measures, as explained below. These require careful assessment, planning and implementation through in-hospital stroke management and post-stroke follow-up of patients using the following Standardized Stroke Performance Measures.

- Demonstration that rt PA was considered including Door-to-CT and Door-to-needle time
- Antithrombotic medication within 48 hours of hospitalization
- Lipid profile during hospitalization
- Deep vein thrombosis prophylaxis
- Discharge on antithrombotics
- Anticoagulation therapy for patients with AF/other cardioembolic stroke
- Screen for dysphagia
- Stroke education
- Smoking cessation
- Demonstration that a rehabilitation plan was considered
- Adherence to a healthy diet and exercise plan in people with risk factors
- Regular screening of the person for risk factors according to the protocol
- Maintaining the blood pressure levels, serum cholesterol and blood sugar levels within normal limits
- Good adherence to the protocols for screening complications
- Prevention of development of complications
- Improving the quality of life through disability limitation and rehabilitation in patients with complications

6.5 Challenges of telestroke

Setting up a hub and spoke model, integrated framework and network for stroke management requires the necessary technology set up, and accessibility to such technology. Training of health care workers and also the common people to recognise stroke and prompt arrival to hospital is very important. Training of the health care personnel at PSC from Emergency Department (ER) level to the stroke team is also another challenging area. The cost of treatment and management of stroke is also an important concern. The primary health care system and its weaknesses need to be addressed. Most importantly, there is need to disseminate information on telestroke to empower community, so that it is accepted as a system of care.

ANNEXURE

1. PROTOCOL FOR MANAGEMENT OF STROKE AT

A. BASIC STROKE CARE CENTRE

1. Diagnosis of stroke /Transient Ischemic Attack (TIA) should be made.

Presenting features of stroke

- Sudden numbness or weakness in the face, arm, or leg, especially on one side of the body
- Sudden confusion, trouble speaking, or difficulty understanding speech
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, loss of balance, or lack of coordination
- Impairment or loss of consciousness

Presenting features of TIA (that last less than 24 hours)

- Transient weakness, numbness or paralysis of face, arm or leg, typically on one side of your body
- Transient slurred or garbled speech or difficulty understanding others
- Transient blindness in one or both eyes or double vision
- Curtain like appearance in front of eye (Amaurosis fugax)
- Transient dizziness or loss of balance or coordination

To distinguish from stroke mimics

- Conditions that may cause focal or global symptoms that may mimic stroke symptoms and signs (brain tumors, subdural haemorrhage, epidural haemorrhage, poisoning, symptoms caused by trauma, shock, stokes-adams syndrome, hypertensive encephalopathia, infections like HIV, Tuberculosis and syphilis).
- Care to take proper history of the development of symptoms and further investigations can help in ruling out these conditions.

2. Blood glucose level. Hemogram, Coagulation profile, ECG. should be available 24/7
3. Airway support is recommended for patients with acute stroke with a decreased level of consciousness or compromised airway due to bulbar dysfunction.
4. Oxygen by mask at the rate of 4-6 litres/min should be stared to maintain oxygen saturation of > 94 %.

5. Hypoglycaemia/hyperglycaemia in patients with acute stroke to be treated to achieve normoglycemia
6. Antiplatelet therapy, aspirin (150 mg stat) to be given if CT rules out intracranial haemorrhage (possible only when CT is done), and patient has not been thrombolysed. If within window period for Intravenous thrombolysis (IVT) or mechanical thrombectomy, then it is NOT recommended to give aspirin. Give aspirin after 24 hours of stroke.
7. Routine use of heparin in acute ischemic stroke, including cardioembolic strokes, is NOT recommended.
8. Mild to moderately elevated blood pressure should not be routinely treated in the acute phase of stroke as this may worsen the outcome. A blood pressure level of > 220 /110 mm Hg should be treated with IV labetalol. (see BP protocol in page 80 under regimen for Acute Ischemic Stroke with IV rtPA)
9. If patient is getting IV thrombolysis, blood pressure should be kept below 185/110
10. No drastic lowering of blood pressure in acute ischemic stroke. DO NOT GIVE sublingual nifedipine
11. Intravenous line with normal saline should be started. DO NOT GIVE dextrose containing solutions, except for correcting hypoglycaemia
12. Swallowing assessment should be done prior to oral feeding.
13. Fever in patients with acute stroke should be treated; the temperature should be lowered with antipyretics.
14. Nursing care to prevent pressure sores. Rehabilitation, including passive physiotherapy to be instituted from the first day of the stroke.

B. INDICATIONS FOR REFERRAL TO STROKE CENTRE (PSC)

1. High NIHSS (more than or equal to 5) and if within 24 hours (suitable for IVT or Mechanical thrombectomy)
2. All strokes for CT scan (if not available locally) to diagnose ischemic versus haemorrhagic subtypes. (Mandatory for stroke prevention)
3. A possible candidate for IV thrombolysis. If the patient is a possible case for mechanical thrombectomy as decided in triage, patient should be directed to comprehensive stroke centre with fastest possible secure transport bypassing PSC
4. Altered consciousness
5. Severe headache

6. Uncontrolled seizures
7. Uncontrolled severe hypertension
8. Irregular / laboured breathing
9. Recurrent TIAs
10. Cardio embolic strokes for secondary prevention with anticoagulants and INR monitoring.

C. MANAGEMENT AT STROKE CENTRE (PSC)

1. Identification of acute stroke
2. All patients with acute stroke/ TIA should have a CT scan (plain) immediately and interpreted within 30 minutes
3. Basic investigations, as suggested in Basic Stroke Care Centre, plus platelets and PT/ INR to be done.
4. Thrombolysis protocol where applicable
5. BP protocol where applicable
6. Routine use of corticosteroids, plasma volume expanders, not recommended
7. Treatment as listed in Basic Stroke Care Centre to be followed
8. Swallowing assessment protocol to be applied.
9. Antiplatelet therapy, aspirin (150 mg) should be given immediately for patients with acute ischemic stroke who are not candidates for thrombolytic therapy / mechanical thrombectomy

D. REFERRAL TO COMPREHENSIVE STROKE CENTRE (CSC/HUB)

1. Possible candidate for mechanical thrombectomy as seen clinically along with CT scan/ CT angio findings. Since the procedure should be initiated within 6 hours of onset of stroke, the time estimate should be made accordingly so that patient reaches CSC within 4.5 hours of onset allowing the CSC to reimage the patient and initiate Cath lab procedure.
2. PSC should transfer the patient after injecting the bolus of IV tPA and with infusion running (Drip -n-ship).
3. Large hemispheric infarct on CT with impending herniation with need for decompression hemicraniectomy
4. Large intracerebral haemorrhage requiring surgical treatment
5. Cerebellar strokes in need of surgical intervention

6. A comprehensive evaluation for stroke in young/cardio-embolic strokes/large vessel extracranial disease/ unusual stroke syndromes like arterial dissection, Moya Moya Disease or vasculitis etc., and recurrent strokes

Definition and scope of service for 3 levels of Stroke Care

Program Metrics	Basic Stroke centre	PSC	CSC
Program Director / Team Leader	Sufficient knowledge of cerebrovascular disease, an MBBS or Preferably an MD (Medicine) physician	Sufficient knowledge of cerebrovascular disease (An MD (Medicine) physician / or a Neurologist if available	Neurologist or Stroke-Neurologist with extensive training and experience in Stroke management
Acute Stroke Team	May comprise of a trained physician or Nurse at least 6 hours of stroke education annually.	Available 24/7, at bedside within 15 minutes; at least 8 hours of stroke education annually. May comprise of a trained physician	Available 24/7, at bedside within 15 minutes; at least 8 hours of stroke education annually. Resident or staff physician, trained in acute stroke management
Stroke Unit	No designated beds for acute care of stroke patients	Stroke unit or designated beds for the acute care of stroke patients	Stroke unit + Dedicated neuro intensive care beds for complex stroke patients available 24/7
Initial Assessment of Patient	physician, nurse practitioner, or physician assistant	Emergency Department physician	Emergency Department physician
Diagnostic Testing Capability	Access to basic labs, CT (may not be available within the facility)	CT, labs, CTA, 24/7, and cardiac imaging when necessary (MRI if available but not mandatory)	CT, MRI, labs, CTA, MRA, other cranial and carotid duplex ultrasound, TEE, TTE, catheter angiography 24/7 and cardiac imaging when necessary
Neurologist Accessibility	24/7 via telemedicine	24/7 via in person or telemedicine	Meets concurrently emergent needs of multiple complex stroke patients; Written call schedule for attending physicians providing availability 24/7
Neurosurgical Services	Not available, may need transfer to PSC/CSC	May not be available, may need transfer to CSC	24/7 availability: Neurointerventionalist; Neuroradiologist; Neurologist; Neurosurgeon

Telemedicine	Within 20 minutes of it being necessary	Available	Available
Treatment Capabilities	Airway support, oxygen, correction of blood glucose level, management of blood pressure	IV thrombolytics; may need transfer of patients to CSC for difficult cases or probable endovascular treatment.	IV thrombolytics; Mechanical Thrombectomy, Microsurgical neurovascular clipping of aneurysms; Neuroendovascular coiling of aneurysms; Stenting of extracranial carotid arteries; Carotid endarterectomy; Endovascular therapy
Transfer protocols	With one PSC or CSC	For neurointervention or Neurosurgical procedure	Receiving transfers, may tranfer back to PSC or ASRH for continuation of treatment after stabilising the patient to reduce the load of stroke service
Staff Education Requirements	minimum of twice a year	minimum of twice a year	Nurses and other ED staff - 4 hours annually; Stroke nurses - 8 hours annually
Provision of Educational Opportunities	Provides educational opportunities to primary health care workers and ambulance personnel	Provides educational opportunities to emergency and ambulance personnel; Provides at least 2 stroke education activities per year to public	Provides educational opportunities to emergency and ambulance personnel; Provides at least 2 stroke education activities per year to public
Clinical Performance Measures	Non-Standardized Measures: Organization chooses 4 measures, at least 2 are clinical measures related to clinical practice guidelines	Standardized Measures: core stroke measures	Standardized Measures: core stroke measures and comprehensive stroke measures
Research	N/A	N/A	Participates in patient-centred research that is approved by the Institutional Review Board
Annual review standard	One Reviewer, One Day	One Reviewer, One Day	Two Reviewers, Two Days

Adopted and modified from American Stroke Association (38)

In the Indian context the role of different Stroke Centres can be sub served by

1. **Basic Stroke Centre** – All hospitals / health facilities can be equipped and trained to meet these criteria.

2. **Primary Stroke Centre (PSC)-** All District level hospitals and all Medical College and hospitals (without a Neurosurgery and Neurointervention facility) can serve as PSC. Any Multispeciality Private Hospital with the requisite infrastructure can also serve as PSC
3. **Comprehensive Stroke Centre (CSC)-**Medical colleges and postgraduate teaching hospitals with neurology, neurosurgery and neurointervention facilty 24/7 with the requisite infrastructure will serve as CSC. Amy private multispeciality institute with the above mentioned criteria also can be designated as CSC.

2. PROTOCOL FOR IV THROMBOLYSIS FOR ACUTE ISCHEMIC STROKE (AIS)

Inclusion Criteria (Must be all 'YES')

1. Age >=18 years – 80 years
2. A significant neurologic deficit expected to result in long term disability
3. Non-contrast CT scan showing no hemorrhage or well-established large infarct acute ischemic stroke symptoms with onset (last known well) clearly defined, less than 4.5 hours before thrombolysis will be given
4. Consent form/Risks/Benefits: Discussed and documented in the medical record.

Exclusion Criteria

Contraindications include any of the following

1. Current intracranial or subarachnoid hemorrhage
2. CT demonstrates multilobar infarction (hypodensity>1/3 cerebral hemisphere)
3. Recent (within 3 months) intracranial or intraspinal surgery/ serious head trauma/prior stroke
4. Severe uncontrolled hypertension (>185/110mm Hg)
5. Presence of intracranial conditions that may increase the risk of bleeding (vascular neoplasms, arteriovenous malformations or aneurysm)
6. Active internal bleeding
7. Bleeding diathesis including but not limited to platelet < 100 000/mm; current use of oral anticoagulant with INR>1.7; PT>15 seconds, current use of direct thrombin inhibitors or direct factor Xa inhibitors with sensitive lab tests, administration of heparin within 48 hours with elevated aPTT, administration of LMWH in 24 hours

Thrombolysis should not be delayed by coagulation testing unless there is a history of coagulopathy and history of current anticoagulation intake

Warnings

These conditions may increase risk of unfavourable outcomes but are not necessarily a contraindication to treatment-

1. Glucose less than 50 mg/dl or greater than 400mg/dl *(If presenting neurological symptoms appear not to be due to ischemia, treatment for correcting glucose level* may *be given)*
2. Seizures at onset of stroke if residual deficits are due to post-ictal state rather than due to ischemia. If rapid diagnosis of vascular occlusion can be made, treatment may be given.
3. Only minor or rapidly improving stroke symptoms
4. Hypertension - systolic blood pressure >175 mm Hg and diastolic blood pressure > 110 mm Hg
5. Recent major surgery or procedures (e.g. coronary artery bypass graft, obstetrical delivery, organ biopsy, previous puncture of non-compressible vessels), particularly within 14 days
6. Recent gastrointestinal or genitourinary bleeding (within 3 weeks)
7. H/o recent intracranial hemorrhage
8. Recent h/o serious trauma
9. Recent myocardial infarction (within 3 months)
10. High likelihood of left heart thrombus (eg, Mitral stenosis with atrial fibrillation)
11. Acute pericarditis / subacute bacterial endocarditis (SBE)
12. Diabetic hemorrhagic retinopathy or other hemorrhagic ophthalmic conditions
13. Septic thrombophlebitis or occluded AV cannula at seriously infected site
14. Hemostatic defects including those secondary to severe hepatic or renal disease
15. Any other condition in which bleeding constitutes a significant hazard / would be particularly difficult to manage because of its location.
16. Severe hepatic dysfunction
17. Renal dysfunction due to any cause including dehydration
18. Prior hypersensitivity to tissue plasminogen activator
19. Advanced age>90 years

20. Pregnancy
21. Lactating woman
22. Patient on GpIIb-IIIa inhibitors

The regimen for treatment of acute ischemic stroke with IV rtPA

1. Infuse ALTEPLASE 0.9 mg/ kg (maximum of 90 mg) over 60 minutes with 10% of the dose given as a bolus dose over 1 minute) and rest of the dose as an unfusion over 60 mins / Or TENECTEPLASE at a dose of 0.20 mg/Kg body weight for a maximum dose of 20 mg IV bolus.
2. Admit the patient to Intensive Care Unit (ICU) or a stroke unit for monitoring.
3. Perform neurological assessments every 15 minutes during the infusion of rt PA and every 30 minutes for the next 6 hours and then every hour until 24 hours from treatment.
4. If the patient develops a severe headache, acute hypertension, nausea or vomiting, discontinue the infusion (if the agent is still being administered), and obtain a CT scan of the brain on an emergent basis.
5. Measure blood pressure every 15 minutes for the first 2 hours, every 30 mins for the next 6 hrs & then every hour until 24 hours from treatment.
6. Administer antihypertensive medications to maintain blood pressure at or below these levels. (below 185/110)
7. If diastolic BP 105 – 120 mmHg or systolic BP is 180 – 230 mmHg, intravenously administer 10 mg labetalol over 1 – 2 minutes. May repeat or double the dosage or labetalol every 10 to 20 minutes to a maximum dose of 300 mg. As an alternative, can start with the initial bolus dose of labetalol (20 mg) and then follow with a continuous labetalol infusion given at a rate of 2 – 8 mg/min.
8. If diastolic BP 121-140 mm Hg or systolic blood pressure > 230mm Hg. Intravenously administer 10 mg labetalol over 1-2 minutes. May repeat or double labetalol every 10 minutes to a maximum dose of 300 mg. As an alternative, can start with the initial bolus dose of labetalol and then follow with a continuous labetalol infusion given at a rate of 2 – 8 mg/ min. If the blood pressure is not controlled, consider starting infusion of sodium nitroprusside.
9. If diastolic blood pressure > 140 mmHg, start infusion of sodium nitroprusside at a rate of 0.5 mg/kg/min with close hemodynamic monitoring

10. Delay placement of Nasogastric tubes, indwelling bladder catheters, or intra-arterial pressure catheters during first 24 hours

Intravenous rtPA (0.9 mg/kg, maximum dose of 90 mg) is strongly recommended for carefully selected patients who can be treated within 3 hours of the onset of ischemic stroke and carries a Grade I- A recommendation (for rtPA under 4.5 hours, it's a Grade I, B-R). Intravenous administration of rtPA (Alteplase/ Actilyse) is currently the only approved therapy for the treatment of patients with acute ischemic stroke. Earlier treatment (within 90 minutes) may be more likely to result in a favourable outcome. Treatment with rtPA is associated with a risk of symptomatic intracranial haemorrhage in 1.6 % to 3.8% as per different studies. Close observation and monitoring of the patient and early management of arterial hypertension are critical. The use of anticoagulants and antiplatelet agents should be delayed for 24 hours after treatment. Once post thrombolysis brain imaging excludes any bleed.

Dose of rtPA (Alteplase)	0.9 mg/Kg: (Max 90mg), 10% Bolus over 1 minute 90% infusion over 60 minutes
Dose of TENCETEPLASE	0.20 Mg/Kg: IV bolus (Max 20 mg)
DO NOT GIVE	Aspirin/heparin/warfare/clopidogrel or other antithrombotic drugs within 24 hours of thrombolysis

National Institute of Health Stroke Scale (NIHSS)

NIHSS or Stroke Severity score provides the information regarding the severity of stroke and is recorded at hospital admission. It serves as a measure of improvement for follow-up. Total NIHSS score from 0-42 is recorded by adding up the individual scores.

Tested item	Response	Scores
1A	Level of consciousness	0 - Alert
		1 - Drowsy
		2 - Obtunded
		3 - Coma/unresponsive
1B	Orientation questions (2)	0 - Answers both correctly
		1 - Answers 1 correctly
		2 - Answers neither correctly
1C	Response to commands (2)	0 - Performs both tasks correctly
		1 - Performs 1 task correctly
		2 - Performs neither
2	Gaze	0 - Normal horizontal movements
		1 - Partial gaze palsy
		2 - Complete gaze palsy
3	Visual fields	0 - No visual field defect
		1 - Partial hemianopia
		2 - Complete hemianopia

		3 - Bilateral hemianopia
		0 - No visual field defect
4	Facial involvement	0 - Normal
		1 - Minor facial weakness
		2 - Partial facial weakness
		3 - Complete unilateral palsy
5	Motor function (arm)	0 - No drift
	a. left	1 - Drift before 10 s
	b. right	2 - Falls before 10 s
		3 - No effort against gravity
		4 - No movement
6	Motor function (leg)	0 - No drift
	a. Left	1 - Drift before 5 s
	b. Right	2 - Falls before 5 s
		3 - No effort against gravity
		4 - No movement
7	Limb ataxia	0 - No ataxia
		1 - Ataxia in 1 limb
		2 - Ataxia in 2 limbs
8	Sensory	0 - No sensory loss
		1 - Mild sensory loss
		2 - Severe sensory loss
9	Language	0 - Normal
		1 - Mild aphasia
		2 - Severe aphasia
		3 - Mute or global aphasia
10	Articulation	0 - Normal
		1 - Mild dysarthria
		2 - Severe dysarthria
11	Extinction/ Inattention	0 - Absent
		1 - Mild loss (1 sensory modality lost)
		2 - Severe loss (2 modalities lost)

Modified Rankin scale

The modified Rankin Scale (mRS) is used to measure the degree of disability in patients who have had a stroke. It gives an estimate of the functional status of the patient and the supervision needed. It is recorded at the time of admission to the hospital (provides the status of the subject prior to occurrence of current episode of stroke), at discharge and at 28 days and 3 months follow-up. It is a clinician-reported measure and pre-stroke MRS can also be collected from history from patient's relatives.

Modified Rankin scale	
Symptoms Score	
a) Patient doesn't have any symptoms?	0
b) Patient is able to carry out all usual duties and activities without any assistance?	1
c) Patient can look after own affairs without assistance?	2

d) Patient requires some assistance in doing activities and can walk by himself or herself without any support?	3
e) Patient needs assistance for walking and attending own needs?	4
f) Patient is bedridden/incontinent and requires constant care?	5
g) Is the patient dead?	6

Barthel Index

Barthel Index is an ordinal scale (100-point rating scale) used to measure performance in activities of daily living (ADL). It measures the degree of assistance required by an individual on 10 items of mobility and self-care, a higher number is a reflection of greater ability to function independently following hospital discharge.

Index item	Score	Description
Chair/bed transfers	0	Unable to participate in a transfer. Two attendants are required to transfer the patient with or without a mechanical device
	3	Able to participate but maximum assistance of one other person is require in all aspects of the transfer
	8	The transfer requires the assistance of one other person. Assistance may be required in any aspect of the transfer
	12	The presence of another person is required either as a confidence measure, or to provide supervision for safety
	15	The patient can safely approach the bed walking or in a wheelchair, lock brakes, lift footrests, or position walking aid, move safely to bed. Lie down, come to a sitting position on the side of the bed, change the position of the wheelchair, transfer back into it safely and/or grasp aid and stand the patient must be independent in all phases of this activity
Ambulation	0	Dependent in ambulation
	3	Constant presence of one or more assistance is required during ambulation
	8	Assistance is required with reaching aids and/ or their manipulation. One person is required to offer assistance
	12	The patient is independent in ambulation but unable to walk 50 meters without help, or supervision is needed for confidence or safety in hazardous situations.
	15	The patient must be able to wear braces if required, lock and unlock these braces assume standing position, sit down, and place the necessary aids into position for use. The patient must be able to crutches, canes or a walk arette, and walk 50 metres without help or supervision
Ambulation / Wheelchair *(if unable to walk)*	0	Dependent in wheelchair ambulation
	1	Patient can propel self-short distances on flat surface, but assistance is required for all other steps of wheelchair management

Only use this item if the patient is rated "0" for ambulation, and then only if the patent has been trained in wheelchair management	3	Presence of one person is necessary and constant assistance is required to manipulate chair to table, bed etc
	4	The patient can propel self for a reasonable duration over regularly encountered terrain. Minimal assistance may still be required in tight corners or to negotiate a kerb 100mm high
	5	To propel wheelchair independently, the patient must be able to go around corners, turn around, manoeuvre the chair to a table, bed, toilet, etc. the patient must be able to push a chair at least 50 metres and negotiate a kerb
Stair climbing	0	The patient is unable to climb stairs
	2	Assistance is required in all aspects of chair climbing, including assistance with walking aids
	5	The patient is able to ascend/ descend but is unable to carry walking aids and needs supervision an assistance
	8	Generally, no assistance is required. At times supervision is required for safety due to morning stiffness, shortness of breath etc
	10	The patient is able to go up and down a flight of stairs safely without help or supervision. The patient is able to use hand rails, cane or crutches when needed and is able to carry these devices as he/she ascends or descends
Toilet transfers	0	Fully dependent in toileting
	2	Assistance required in all aspects of toileting
	5	Assistance may be required with management of clothing, transferring or washing hands
	8	Supervision may be required for safety with normal toilet. A commode may be used at night but assistance is required for emptying and cleaning
	10	The patient is able to get on/off the toilet. Fasten clothing and use toilet paper without help. If necessary the patient may use a bed pan or commode or urinal at night, but must be able to empty it and clean it
Bowel control	0	The patient is bowel incontinent
	2	The patient needs help to assume appropriate position and with bowel movement facilitatory techniques
	5	The patient can assume appropriate position, but cannot use facilitatory techniques or clean self without assistance and has frequent accidents. Assistance is required with incontinence aid such as pad etc
	8	The patient may require supervision with the use of suppository or enema and has occasional accidents
	10	The patient can control bowels and has no accidents, can use suppository, or take an enema when necessary
Bladder control	0	The patient is dependent in bladder management is incontinent or has indwelling catheter
	2	The patient is incontinent but is able to assist with the application of an internal or external device

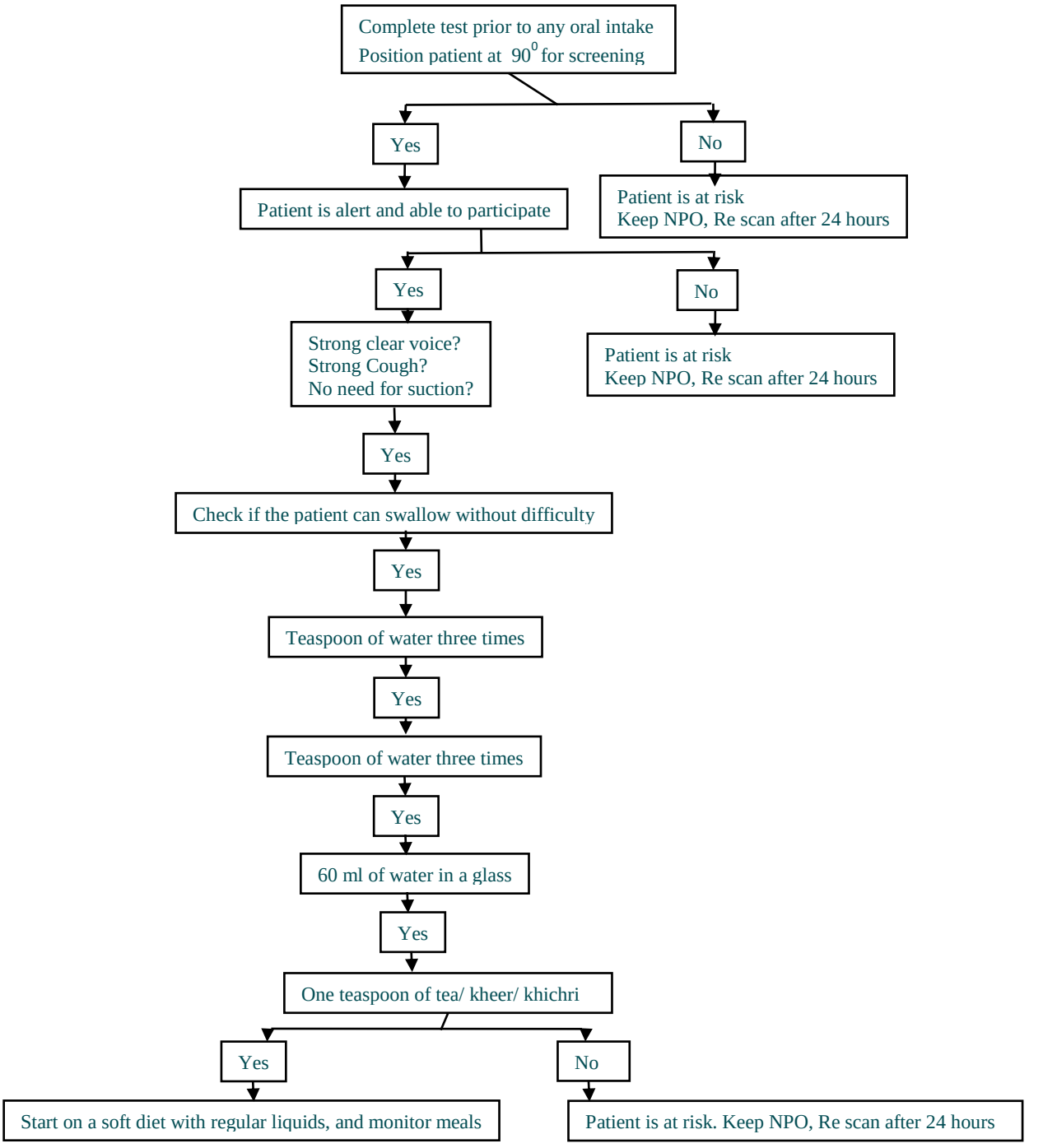
	5	The patient is generally dry by day, but not at night and needs some assistance with the devices
	8	The patient is generally dry by day and night, but may have an occasional accident or need minimal assistance with internal or external devices
	10	The patient is able to control bladder day and night, and/or is independent with internal or external device
Bathing	0	Total dependence in bathing self
	1	Assistance is required in all aspects of bathing, but patient is able to make some contribution
	3	Assistance is required with either transfer to shower/bath or with washing or drying including inability to complete a task because of condition or disease etc
	4	Supervision is required for safety in adjusting the water temperature or in the transfer
	5	The patient may use a bathtub a shower or take a complete sponge bath. 0the patient must be able to do all the steps of whichever method is employed without another person being present
Dressing	0	The patient is dependent in all aspects of dressing and is unable to participate in the activity
	2	The patient is able to participate to some degree, but is dependent in all aspects of dressing
	5	Assistance is needed in putting on and or removing any clothing
	8	Only minimum assistance is required with fastening clothing such as buttons, zips, bra, shoes etc
	10	The patient s bale to put on remove corset, braces, as prescribed
Personal hygiene (Grooming)	0	The patient is unable to attend to personal hygiene and is dependent in all aspects
	1	Assistance is required in all steps of personal hygiene, but patient able to make some contribution
	3	Some assistance is required in one or more steps of personal hygiene
	4	Patient is able to conduct his/her own personal hygiene but requires minimal assistance before and or/ after the operation
	5	The patient can wash his/her hands and face. Comb hair, clean teeth and shave. A male patient may use any kind of razor but must insert the blade, or plug in the razor without help, as well as retrieve it from the drawer or cabinet. A female patient must apply her own make-up, if used but need not braid or style her hair
Feeding	0	Dependent in all aspects and needs to be fed, nasogastric needs to be administered

	2	Can manipulate an eating device, usually a spoon, but someone must provide active assistance during the meal
	5	Able to feed self with supervision. Assistance is required with associated tasks such as putting milk/sugar into tea, salt pepper, spreading butter, turning a plate or other set up activities
	8	Independence in feeding with prepared tray, expect may need meat cut, milk carton opened or jar lid etc. the presence of another person is not required
	10	The patient can feel self from a tray or table when someone puts the food within reach. The patient must put on an assistive device if needed cut food and if desired use salt and pepper, spread butter etc

Score	Interpretation
00 - 20	Total dependence
21 - 60	Severe dependence
61 - 90	Moderate dependence
91 - 99	Slight dependence
- 100	Independence

Score	Prediction
Less than 40	Unlikely to go home - Dependent in mobility - Dependent in self care
60	Pivotal score where patients move from dependency to assisted independence
60 - 80	If living alone will probably need a number of community services to cope
More than 85	Likely to be discharged to community living - Independent in transfers and able to walk or use wheelchair independently

3. PROTOCOL FOR SWALLOWING TEST



Signs of a patient having difficulty in swallowing:

1. Gurgly, wet sounding voice
2. Coughing while swallowing
3. Leftover food in the mouth

If NPO for three days and more: Start non-oral feeds such as nasogastric tube feeding.

4. ESSENTIAL ELEMENTS TO DESIGNATE A STROKE CENTRE

Patient care services	Support services
Acute stroke team Written care protocols Emergency medical services Stroke Unit (could be in ICU)	Commitment, support of Head of the Institute Neuroimaging services, Cath Lab Lab. Services

Patient Care Services

A. Acute Stroke Team

1. Multidisciplinary personnel with expertise in diagnosing and treating stroke- may include stroke physician/emergency physician / neurologist (will include the roster of emergency physician personnel)
2. The minimum team should include a stroke physician and another healthcare provider (stroke nurse, etc.)
3. Someone from the team should be available 24/7
4. The team should have a logbook to track response times, diagnosis, treatments and outcomes of stroke.

B. Written Care Protocols

1. Designed, adapted and utilized by the team; should include use of written protocols for patients eligible to receive IV rtPA treatment and other acute therapies such as stabilization of vital functions and management of blood pressure in the emergency department.
2. Protocols should also provide information regarding initial diagnostic tests and initial use of medications.
3. Should be reviewed/updated at least once per year.

C. Emergency Medical Services

1. A collaborative relationship between ICU which will serve as stroke units and emergency medical services personnel must be integrated to improve services and reduce transport delays.
2. Calls for possible stroke should be assigned high priority for evaluation and transport.
3. Educational activities should be offered at least twice a year.

D. Emergency Department (ED) Physicians/Nurses/etc.

1. Personnel should be trained to diagnose and initiate treatment of acute strokes.
2. Personnel should know about stroke team and its role.
3. ED should document performance measures such as time from symptom onset to treatment.

4. Training for ED should occur at least twice a year to update them about stroke diagnosis and treatment.

E. Stroke Unit

1. Geographically distinct space that can be within ED or ICU or medical or neurological ward, which must provide continuous telemetry monitoring, written care protocols and BP monitoring at all times
2. Personnel should have expertise in managing stroke
3. Should have clear admission and transfer policy

Support Services

A. Neuroimaging service

1. CT scan
2. Available 24/7
3. Completed within 15 minutes of being ordered
4. Evaluation within 15 minutes.

B. Laboratory Services

1. Emergency blood urea/creatinine/PT/INR/Platelet count/Hemoglobin/Serum Na/K
2. Available 24/7
3. Completed within 15-30 minutes of being ordered

C. Essential Equipment in Emergency Department

1. Pulse Oximetry
2. Glucometer
3. BP instrument
4. ECG

D. Essential medication in Emergency Department specifically for stroke

1. Recombinant Tissue Plasminogen Activator (rTPA) – 50 mg/20 mg vials – 2
2. InjectionV Labetalol (10 mg)
3. Injection Enalaprilat
4. Injection Ranitidine
5. Injection Hydrocortisone
6. Inj Avil
7. Injection Lasix
8. Injection Levetiracetum / Fosphenytoin or Phenytoin / Injection Lorazepam 4 mg

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