

National Telemedicine Guidelines

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Foreword

The provision of appropriate healthcare is becoming more challenging. A number of factors are contributing to this: changing demographics, increasing demand for healthcare services, changing expectations, relative shortage of healthcare professionals and caregivers, and shortfalls in healthcare facilities.

In the last decade or so technology has made profound and game changing inroads into the healthcare sector. Singapore, therefore, has learned to implement various care models wherein technology is leveraged to overcome some of the challenges being faced. The Telemedicine space is at an incipient stage of development at this point in time, but there is a lot of potential additional value to be derived from this mode of healthcare service delivery.

Telemedicine can certainly help address a number of current gaps in the system such as making healthcare resources (e.g. specialist services) more readily available in a timely manner to those who need it, bridging the constraint of distance and saving time and costs if done right.

This set of guidelines has been formulated to help healthcare providers embrace technology to deliver healthcare services by ensuring patient and provider safety when delivering services via Telemedicine.

I would like to thank all who have helped produce these guidelines and hope practitioners find the National Telemedicine Guidelines useful in their work.

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Executive Summary

The National Telemedicine Guidelines (NTG) aim to address the relevant components for the delivery of Telemedicine services by healthcare providers through four domains: “Clinical Standards and Outcomes”, “Human Resources”, “Organisational”, and “Technology and Equipment”. The principles outlined in these Guidelines are meant to ensure patient and provider safety and to provide a holistic approach to execute the delivery of Telemedicine services in Singapore. The content within each domain is further divided into sub-sections.

These Guidelines are intended as a body of knowledge with the aim of making it easier for Singapore’s healthcare providers, patients, and caregivers to understand and embrace the delivery of healthcare services through Telemedicine, and thus to allay any of their concerns relating to clinical practice, human resources, as well as organizational and technology issues. At this point, the Guidelines are broad and generic since the Telemedicine landscape is still maturing in Singapore. Individual specialities are encouraged to customise the National Telemedicine Guidelines to meet the specific requirements of their respective fields. To be relevant, the National Telemedicine Guidelines will be regularly updated.

In Telemedicine the element of technology in the delivery of healthcare services sometimes may make it difficult to comprehend concepts which are understood in a straight forward manner in the traditional mode of healthcare services delivery. One such concept is the standard of care which is to be understood at a “systems” and at a “transactional” level. At the “systems” level a number of interactions for example in various settings involving a number of healthcare professionals come together to deliver good quality care to an individual. The interactions at the individual level can be considered a transaction and a certain standard of care is to be maintained in all these transactions. Whether or not it is reasonable to deliver a particular healthcare service by Telemedicine is determined by the clinical context, the clinical objectives and the compatibility of technology to meet those clinical objectives.

The National Telemedicine Guidelines are provided as a general guide only and providers will need to take into account their unique circumstances and context in applying the guidelines. Providers remain fully responsible for meeting all legal and ethical requirements and must exercise due diligence when delivering Telemedicine services. It is acknowledged that many healthcare specialties in Singapore may be at early stages in the adoption of Telemedicine (with Telemedicine serving as an adjunct to traditional modes of healthcare delivery) while some speciality areas have reached a level of maturity to enable Telemedicine to substitute for traditional modes of healthcare delivery in specific situations

(e.g. remote diabetic retinopathy screening). Given this diversity and mindful of ensuring patient safety, the guidelines aim to be generic in nature, and not to unduly constrain the development of Telemedicine in Singapore.

The National Telemedicine Guidelines have been endorsed by the following professional bodies: Agency for Integrated Care (AIC), Academy of Medicine, Singapore (AMS), College of Family Physicians, Singapore (CFPS), Case Management Society of Singapore (CMSS), Health Sciences Authority (HSA), Pharmaceutical Society of Singapore (PSS), Singapore Nurses Association (SNA).

The principles in NTG are meant to aid the healthcare providers in fulfilling the essentials of Telemedicine service delivery. The principles - depending on the level of importance - are listed in the Guidelines through the usage of “must” (mandatory), “should” (strongly encouraged), and “may” (truly optional). The must- do sections of the Guidelines are referenced in the table below for the reader’s use.

Clinical Standards and Outcomes

Duty of Care, *page 11*

Standards of Clinical Care, *page 11*

Communication with Patients and Caregivers, *page 12*

Privacy and Patient Confidentiality, *page 14*

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Technology and Equipment

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Introduction

With the advancements in the field of technology there is no denying the increasing contribution of Telemedicine in the healthcare sector. Though in terms of geography Singapore is a small city state (710 km²), and it may seem that Telemedicine can only be relevant for nations with vast geographical expanses, Telemedicine has a unique (urban Telemedicine) role to play in Singapore.

Singapore is facing challenges similar to those in other developed nations - meeting the healthcare demands of an ageing population, accommodating the increasing burden of non-communicable diseases etc. Shortages of healthcare professionals, specialist, and caregivers, and providing better care for the elderly or individuals with mobility issues are some areas where Telemedicine can fill gaps - providing access where there was none previously or increasing the overall level of care.

In 2011 an informal survey was conducted to understand the Telemedicine landscape of Singapore. The survey revealed that a number of Telemedicine projects were ongoing in the country and that there was a need for leadership and direction in the form of guidelines.

Objective of NTG

At a broad level the objective of the NTG is to encourage and moreover support the uptake of Telemedicine at the national level.

Target group

The target group of the NTG are the healthcare providers (healthcare professionals and organisations), patients, and caregivers.

Development of the National Telemedicine Guidelines

The lack of guidance and the value proposition of Telemedicine for Singapore prompted development of these Guidelines.

The NTG have been developed over the course of a year with the guidance of the National Telemedicine Advisory Committee (NTAC). NTAC comprised leading Telemedicine practitioners of Singapore spanning almost all health sectors, disciplines and care settings. The Committee also had representation from professional bodies like Academy of Medicine, Singapore (AMS), College of Family Physicians, Singapore (CFPS), Pharmaceutical Society of Singapore (PSS), Case Management Society of Singapore (CMSS), and Office of the Chief Nursing Officer (CNO).

NTAC met on a regular basis to work on develop the guidelines using literature and lessons from international precedents (Australia, Canada, Japan, and U.S.). Feedback of the final draft of the NTG was obtained through an extensive consultation of relevant stakeholders.

In the development of these Guidelines the research comprised literature review and learning from international precedents (Australia, Canada, Japan, and U.S.).

To ensure relevance and fit, NTG will have to be reviewed regularly. This First Edition of the NTG is intended as a key step in establishing the initial strategic direction for Telemedicine in Singapore. Subsequent editions of the NTG would be more comprehensive, offering more extensive guidance to Singapore's healthcare providers.

Definitions, Scope and Interpretation of the Guidelines

As the National Telemedicine Guidelines provides guidance on best practices in Telemedicine interactions, it is necessary to define Telemedicine. “Telemedicine” (which term is used interchangeably with “Telehealth” in these Guidelines) refers to the systematic provision of healthcare services over physically separate environments via Information and Communications Technology (ICT) and distinguishes between four main dimensions/domains of Telemedicine as follows:

- (a) Tele-collaboration, which refers to interactions between (facility-based or mobile) onsite and remote healthcare professionals for clinical purposes e.g. referral, co-diagnosis, supervision or case review. The distinguishing feature is that healthcare professionals are involved at both ends of the interaction and a patient may or may not be involved in the same Telemedicine interaction e.g. radiologist-clinician as well as consultant-junior-with patient situations. Tele-collaboration is used in many forms of remote specialty consultations e.g. Tele-radiology and Tele-pathology in current practice.
- (b) Tele-treatment, which refers to interactions between remote healthcare professionals and patients/caregivers for the purposes of direct clinical care e.g. triage, history, examination, diagnosis and treatment including robotic surgery from a remote location. The distinguishing feature is that a patient or caregiver is involved directly at one end of the interaction and this creates (or presupposes the existence of) a professional-patient relationship. Tele-treatment is used in the remote delivery of primary care and many forms of specialty care e.g. Tele-geriatrics, Tele-psychiatry, Tele-neurology and also Tele-dermatology.
- (c) Tele-monitoring, which refers to biomedical and other forms of data collection directly from patients (or through caregivers) by remote systems, which are used by healthcare professionals for clinical purposes such as vital signs monitoring and home nursing. Tele-monitoring is used in remote chronic disease management e.g. management of hypertension (blood pressure), diabetes (blood glucose) and coronary heart disease (weight, ECG). The distinguishing feature is that a healthcare professional or organisation is engaged at one end i.e. excludes self-monitoring where the patient or the caregiver collects health data but does not have a healthcare provider involved at the other end as part of an organized arrangement. Another feature of Tele-monitoring is that it need not create (or presuppose the existence of) a professional-patient relationship even though the healthcare organisation as a whole might owe a duty of care to the patient.
- (d) Tele-support, which refers to the use of online services for non-clinical (i.e. educational and administrative) purposes to support the patient, and caregiver.

Examples include health education, care administration and the use of treatment prompts in chronic disease management. Tele-support is generally not addressed in these guidelines which focuses on the key activities that are (or ought to be) regulated for patient safety reasons i.e. that fall within scope of the first three domains.

Given the diversity of Telemedicine settings, it is important to distinguish between the various domains as different considerations may apply to each. For example, Tele-treatment, involving a patient at one end, raises considerations that may not arise in an interaction involving healthcare professionals only i.e. Tele-collaboration. Another example is how certain forms of Tele-monitoring (e.g. 24 hour real-time surveillance) may not have a direct analogue in the traditional mode of health care delivery (i.e. face-to-face consultation) which creates uncertainty regarding the applicable standard of care. Exchanging information for clinical purposes between providers and patients/caregivers over the telephone, through text messaging (SMS) or other similar application (e.g. iMessage, WhatsApp) also falls within the scope and definition of Telemedicine. However, any guidelines stated herein are intended to apply to Telemedicine generally unless otherwise specified (i.e. explicitly restricted to a particular domain or domains of Telemedicine).

Another important distinction drawn in the guidelines is that between “healthcare organisations” and “healthcare professionals” involved in the provision of Telemedicine. Certain obligations in the guidelines only apply to individual healthcare professionals *as* healthcare professionals while other obligations accrue only to the broader healthcare organisation that delivers the overall “system” or “infrastructure” of care for the patient. For example, healthcare organisations may have specialized non-healthcare staff (e.g. IT staff) who assume responsibility for certain aspects of a Telemedicine service (e.g. maintenance of equipment) which nevertheless plays a critical role in the delivery of high-quality healthcare. Hence, **the guidelines explicitly differentiate between the responsibilities of “healthcare organisations” and “healthcare professionals”, and refers to “healthcare providers” when a particular guideline applies to both groups.**

Finally, there is a very diverse spectrum of healthcare organisations, from giant healthcare conglomerates with multi-national operations, to large hospitals with thousands or hundreds of staff to solo General Practitioners operating out of private medical clinics. While the National Telemedicine Guidelines aims to be comprehensive in scope and is open to adoption by all healthcare organisations regardless of size, there can be no “one-size-fits-all” approach. Hence, healthcare organisations are encouraged to tailor the application of the Guidelines to their individual circumstances in line with the spirit of what it seeks to achieve.

1. Clinical Standards and Outcomes

1.1 Duty of Care

Due to the nature of a Telemedicine encounter (e.g. care of a patient often involving a team of healthcare professionals, care not delivered in a traditional care setting, technology limitations), there is an emerging necessity to be clear when a “duty of care” has been established and to ensure accountability for the care of the patient at all stages. The following are some points to be kept in mind:

- a) The “duty of care” must be established in all Telemedicine encounters to clarify any and all ongoing responsibility(s) for the patient/caregiver as well as the roles and responsibility of other health care professionals involved.
- b) Healthcare professionals should collaborate with each other to clearly define their roles and responsibilities (e.g. who would deliver which aspect of care, ranging from the responsibility of ordering tests, to follow-ups, to keeping a record of the notes, etc).
- c) The patient and caregiver should be given clear and explicit direction at the Telemedicine encounter as to who has ongoing responsibility for any required follow-up and ongoing health care.

1.2 Standards of Clinical Care

The lack of face-to-face contact raises the important question of whether Telemedicine allows health care providers to reasonably meet the standard of care where a direct analogue to the traditional mode of health care delivery may not exist. The following are some principles for Healthcare providers to adhere to, to ensure that the standard of care is maintained in Telemedicine:

- a) Any Telemedicine service must be provided as part of a structured and well organized system and the overall standard of care delivered by the system must not be any less compared to a service not involving Telemedicine.
 - i. Where a face-to-face consult is not reasonably practical, it is permitted to deliver care exclusively via Telemedicine as this is better than not having any access to care at all.
 - ii. Where face-to-face consultations are reasonably practical, the delivery of care via Telemedicine must not compromise the overall quality of care provided as compared with non-Telemedicine care delivery.
- b) Prior to commencing Telemedicine services to a patient, the healthcare provider must be satisfied that the patient is suitable for a Telemedicine interaction and that the standard of care delivered via Telemedicine is reasonable considering the specific context.

- i. A face-to-face evaluation/consultation where reasonably practical must be done before or very soon after commencement of Telemedicine services. For the avoidance of doubt, this requirement does not apply where the Telemedicine service does not involve any Tele-treatment e.g. Tele-radiology.
 - ii. The reasonableness of delivering care via Telemedicine is determined by the clinical context, the clinical objectives and the compatibility of technology to meet those objectives.
 - iii. Other considerations include the literacy level of the patient, the level of training of the healthcare professional, and the availability of satisfactory alternatives
 - iv. The adequacy of the Telemedicine interaction to meet the desired standard of care should be discussed with the patient and caregiver. The patient and caregiver should be informed of other suitable alternatives that are available.
- c) The standard of care must be upheld by all healthcare professions involved in the Telemedicine interaction. Telemedicine opens up numerous options for referral and coordinated care. Proper referral and other necessary protocols should be put in place to avoid fragmentation of care, and all parties involved should be aware as to who is responsible for each aspect of care.
 - d) The healthcare profession should follow existing Clinical Practice Guidelines (CPGs) where they provide for the delivery of care by Telemedicine. These CPGs may need to be modified to address the specific context of Telemedicine. It is recommended that any and all such modifications to the CPGs are approved by the governing bodies of the specific healthcare disciplines.
 - e) To deliver quality care and meet the requisite standard of care in Telemedicine, a range of issues need to be addressed by healthcare organisations. These issues include informed consent, privacy/confidentiality, documentation, and protocols, each of which will be discussed in subsequent sections.
 - f) As far as reasonably possible, the technology component of Telemedicine should be incorporated in the normal workflow of clinical processes by the healthcare organisation so that the quality of care as delivered by Telemedicine is integrated within the organisation's governance and oversight of its other clinical processes.

1.3 Communication with Patients and Caregivers

A Telemedicine interaction is different from the traditional gold standard of a face-to-face encounter. It is a tool to surmount barriers, primarily accessibility, to healthcare. Given the limitations of some Telemedicine applications, it may not be equivalent to a face-to-face consultation; its use will depend on the factors of clinical context and clinical goals, and whether the Telemedicine technology applied is reasonably appropriate and compatible

with these two factors. Thus, communication with patients and caregivers should be modified accordingly to suit this healthcare delivery mode. The following principles will aid in ensuring suitability:

- a) Healthcare professionals should be trained in the use of the technology and equipment, and of appropriate behaviours and communication skills required in a Telemedicine interaction.
 - i. If technical and environmental limitations affect the quality of a Telemedicine consultation such that minimum standards cannot be met, the consultation must be terminated and alternative technologies or rescheduling/postponement of the consultation must be considered.
 - ii. Training will ensure that the healthcare professional is able to provide the required attention to the patient while operating technology/equipment, and is familiar with all the necessary protocols to deliver good quality care via Telemedicine.
 - iii. In the context of a consultation involving Telemedicine, some of the necessary skills include taking into account any delay in audio or video, giving sufficient time for the patient to respond, adequate lighting, camera angles and resolution to achieve the clarity of images needed for the specific Telemedicine application etc.
 - iv. The healthcare professional should also be familiar with any limitations of the technology used, and alternatives available that would complement or better deliver care (e.g. face-to-face consultations).
 - v. Healthcare organisations should have special training programs in place to educate the staff involved with Telemedicine about proper protocols, technology, equipment, behaviour, and communication.
- b) The healthcare provider should discern whether a patient is a suitable candidate for a Telemedicine interaction.
- c) The healthcare provider should familiarise patients and caregivers with the Telemedicine communication protocols before engaging them in the Telemedicine interaction. Patients and caregivers should have access to information in an easy-to-understand manner (written or verbal communication, audio-visual aids, etc)
- d) Depending on the requirements of the clinical discipline and other factors (e.g. specific clinical application of a technology), communication protocols should be adapted to meet these requirements.
- e) Healthcare organisations should provide avenues for feedback from patients, caregivers, and healthcare professionals to regularly refine and improve the quality of the Telemedicine encounter.

1.4 Clinical Outcomes

As with any other care processes, organisations providing Telemedicine services should monitor and improve the quality of their services to achieve the best possible outcomes. It is recommended that healthcare providers have in place a quality-based, systematic method of tracking the clinical outcomes of the various Telemedicine services. In this regard, Healthcare providers should define the process and outcomes data to be collected, evaluated and tracked for the various Telemedicine services.

1.5 Privacy and Patient Confidentiality

The use of technology in Telemedicine poses many new challenges which have not been faced with traditional face-to-face consultation. Confidentiality of patient information has surfaced as one of the key concerns which needs to be addressed. Healthcare organisations must ensure that patient information and records are protected by having a confidentiality policy in place. Healthcare providers must comply with the applicable existing legislation and regulations to ensure that the patient's healthcare information is protected. For example, the Personal Data Protection Act (PDPA), the SMC Ethical Code and Ethical Guidelines (ECEG).

1.6 Informed Consent

The patient must be given the freedom to make informed decisions. Hence it is essential that the patient, as in a traditional face-to-face consultation, be given all the necessary details regarding his/her care and that informed consent is obtained in accordance with applicable laws and regulations. The following principles are to be considered:

- a) Healthcare providers should obtain informed consent (which may be implied or expressed) before starting any service or intervention following principles and processes similar to standard practice for the particular healthcare service.
- b) Explicit consent should be obtained from the patient for medical acts that would normally require explicit consent in the traditional health care setting (e.g. video or audio recording of the sessions, use of data for research or educational purposes).
- c) Healthcare providers should share relevant information with the patient and caregiver, as appropriate, before the beginning of any Telemedicine interaction. This information includes informing the patient of the objective of the Telemedicine interaction, the role and responsibility of the provider and the patient during the Telemedicine interaction, other people participating in the interaction, care documentation requirements, risks and benefits, and that he/she has the choice to decline to participate in the Telemedicine interaction.

- d) Patients and caregivers should be informed of any cost of using Telemedicine in their care, including charges of the specific services (e.g. whether reimbursable through Medisave compared to other claimable alternative modes of care delivery)
- e) As far as possible, the consent process should be integrated with the existing routine care processes.

2. Human Resources

2.1 Human Resource Plans and Policies

Human resource plans and policies should fully take into account any unique human resource and operational requirements involved in delivering Telemedicine (e.g. 24 hour operations). Below are some principles that are to be considered:

- a) Consideration of human resource requirements and development of human resource plans and policies should be part of the development and ongoing management of Telemedicine programmes.
 - i. Healthcare organisations providing Telemedicine services should ensure the right supply and mix of appropriately-trained staff, based on the needs of the programme.
 - ii. Human resource plans and policies related to Telemedicine should be reviewed regularly due to the evolving nature of the field.
- b) Telemedicine-specific policies should be integrated into existing human resources policies and new policies for Telemedicine should be created only when necessary.
 - i. Organisations should identify and update existing human resource policies requiring revision to accommodate Telemedicine issues related to patient safety and quality of health care delivery etc.
 - ii. For example where Telemedicine operations are conducted around the clock, relevant guidelines such as the Employment Act guidelines on working hours should be adhered to.

2.2 Roles and Responsibilities

The delivery of Telemedicine services may require the creation of new roles and responsibilities or modifications to the existing roles and responsibilities of the healthcare team delivering healthcare services to patients. To take advantage of integration/coordination opportunities as well as to avoid unnecessary duplication of services without sustaining if not improving the quality of service to patients, the following principles should be kept in mind:

- a) Telemedicine programs, like any other health service delivery program, should have position descriptions that clearly articulate the roles and responsibilities of the staff engaged in Telemedicine activities.
 - i. Position descriptions of personnel engaged in Telemedicine activities should be reviewed regularly because of the evolving nature of the field.

- ii. Organisations providing Telemedicine services should have a position description that acknowledges the diverse and central role of persons responsible for coordinating Telemedicine services.
- b) The organisation should define and document the reporting and working relationships in place to support the delivery of Telemedicine services. For example it should clearly identify, the relevant staff to be approached for assistance regarding technical issues during a video conferencing session.
- c) Organisations providing Telemedicine services should evaluate staff performance in carrying out their Telemedicine duties and should reflect these observations in the formal performance evaluations.

2.3 Licensing & Credentialing / Privileging

Licensing, credentialing, and privileging frameworks exist for various health professions to ensure that only properly qualified health professionals provide their services to the public in accordance with organisational standards. In this regard, the following requirements and principles are to be kept in mind:

- a) Licensable health care professionals delivering Telemedicine services from or within Singapore must be registered and licensed with the respective regulatory and licensing body.
 - i. A licensed healthcare provider in Singapore providing Telemedicine services to patients residing in another country or who supervises, directs or collaborates with an overseas healthcare provider to provide Telemedicine services to patients residing in Singapore, must adhere to the same standards that they are held to when treating a resident in Singapore.
 - ii. A licensed healthcare provider in Singapore intending to provide Telemedicine services to patients residing in another country should adhere to and meet licensing requirements imposed by the country that the patient is residing in. Preferably the provision of such Telemedicine services should be done in collaboration with a healthcare provider licensed in the patient's country.
- b) Healthcare professionals delivering clinical services through Telemedicine must be privileged no differently than if such services did not involve Telemedicine.

2.4 Competency and Qualifications

The healthcare workforce delivering Telemedicine services should be adequately qualified and competent. Organisations providing Telemedicine services should have policies and procedures to ensure that all staff involved in Telemedicine have the necessary qualifications and competencies to practice Telemedicine safely. The following principles are to be kept in mind:

- a) Where specific qualifications are prescribed by the relevant regulatory bodies to ensure that Telemedicine services meet minimum standards, healthcare professionals and staff involved in Telemedicine should possess the prescribed qualifications. For example, the necessary qualifications to practice Tele-robotic surgery.
- b) In any event, organisations providing Telemedicine services should have policies and procedures to ensure that all relevant staff have the appropriate competencies to practice Telemedicine safely. For the avoidance of doubt, the necessary competencies can be developed through structured On-the-Job Training (OJT).

2.5 Education, Orientation and Training

Relevant education, training, and orientation is necessary to ensure that healthcare providers involved in Telemedicine stay abreast with the latest advances in the field and deliver safe and good quality services. The following principles are to be considered:

- a) Healthcare professionals providing Telemedicine services should have the necessary education, training/orientation and ongoing professional development needed for the safe provision of quality health services. The formality and degree of training provided should be commensurate with the complexity of the Telemedicine service to be provided.
- b) Healthcare organisations should have in place orientation and structured On-the-Job Training (OJT) programmes as required to ensure that staff involved in Telemedicine possess the necessary skills and competencies for the safe provision of quality health services. The training records should be properly maintained for audit purposes.
- c) Organisations providing Telemedicine services should link training and job performance evaluation, and encourage feedback on Telemedicine training sessions.

2.6 Reimbursement

Organisations offering Telemedicine services should have strategies for retaining personnel that include reviewing compensation to ensure that it is fair and equitable.

3. Organisational

3.1 Organisational Readiness

Organisational readiness is important in ensuring the long-term success of Telemedicine services. Organisational readiness has three key components: (a) planning readiness, (b) workplace environment readiness and (c) technical readiness.

- a) **Planning Readiness:** The intent to deliver Telemedicine services should include careful up-front planning. Organisations considering provision of Telemedicine services are encouraged to have a Telemedicine plan, which should be developed in consultation with all relevant stakeholders and consider clinical, educational and administrative requirements as relevant.
- b) **Workplace Environment Readiness:** Further, organisations providing Telemedicine services should ensure that the workplace is ready for Telemedicine prior to implementation and that plans are in place to address and support the components of workplace readiness. This includes:
 - i. Being aware of legislation and professional and regulatory and licensing requirements that impact the delivery of Telemedicine services e.g. organisations registered under the Private Hospitals & Medical Clinics Act (PHMCA) must fulfil their obligations under the Act (cross-referencing Section 1.5.a.);
 - ii. Being structurally ready (i.e. physical setting facilitates the use of Telemedicine equipment);
 - iii. Having administrative support policies and procedures in place;
 - iv. Having effective communication processes in place;
 - v. Having a change management plan in place to deal with the impact of implementing Telemedicine services; and
 - vi. Ensuring readiness of human resources (e.g. qualified staff; adequate education, training, and orientation; professional development programmes);
- c) **Technical Readiness:** Finally, organisations considering provision of Telemedicine services should ensure that the technical environment is ready for Telemedicine prior to implementation, and put plans in place to address and support the components of technical readiness for example:
 - i. Network capacity and system interoperability;
 - ii. Technical feasibility;
 - iii. Bandwidth;
 - iv. Verification of fidelity of data transmission;
 - v. Data security;
 - vi. Maintenance and support; and
 - vii. Availability of technical support.

3.2 Organisational Accountability

Accountable organisations are those that take ongoing responsibility for their activities and actions. Accountability relating to the delivery of Telemedicine services should address the following elements: (a) governance framework, (b) privacy and confidentiality, (c) documentation and storage of patient records, (d) liability and risk management; and (e) inter-jurisdictional services.

- a) **Governance Framework:** Healthcare organisations should clearly define roles and responsibilities, and delineate accountabilities for those involved in the delivery of Telemedicine services.
 - i. In organisations providing Telemedicine services, there should be senior management accountability for such services, including the supervision of all persons directly responsible for developing, coordinating, and operating Telemedicine services.
 - ii. Organisational policies, procedures, standards and guidelines should address requirements specific to “networked” services such as shared central services (e.g. scheduling) or infrastructures (e.g. bridges) which go beyond site requirements; and
 - iii. Healthcare organisations providing Telemedicine services should consider the specific applications (e.g. Tele-geriatrics, Tele-psychiatry) and programme types (e.g. research, pilot, ongoing service) when developing organisational policies, procedures, standards, and guidelines and review these more frequently than in other health service areas due to the rapid changes in Telemedicine technology and the need for flexibility and sensitivity to innovation when dealing with Telemedicine services.
- b) **Privacy and Confidentiality:** Organisations providing Telemedicine services must have policies and procedures in place to protect the confidentiality of information. Telemedicine security policy and procedures should be integrated with those for electronic health records, whenever possible.
- c) **Documentation and Storage of Patient Records:** There should be policies and procedures for documentation, storage and retrieval of patient records that respect the confidentiality of the information.
- d) **Liability and Risk Management:** Healthcare organisations providing Telemedicine services should take steps to manage risks within the Telemedicine program ensuring that they have a documented risk management plan in place.
- e) **Inter-Jurisdictional Services:** Where relevant, healthcare organisations should have policies and procedures in place to guide inter-jurisdictional services that takes into account cultural differences and expectations, geographical and time zones differences, liability insurances, technology infrastructure interoperability and compatibility, and other relevant issues.

3.3 Ensuring Quality & Safety

As with other health service programmes, Telemedicine services should be regularly monitored through organisational quality improvement activities and the impact of Telemedicine on cost, quality and accessibility of care should be evaluated. The following are the principles to be kept in mind in this regard:

- a) Healthcare organisations must apply their safety procedures and protocols to Telemedicine services, as applicable, and ensure that the use of Telemedicine does not compromise patient safety (e.g. 5 rights of medication administration, patient identifiers to identify the patient etc.).
- b) Healthcare organisations providing Telemedicine should implement a continuous and ongoing quality improvement program and continually monitor the quality of Telemedicine services.
- c) Each healthcare organisation should be aware of best practices relating to Telemedicine and adapt and change processes as such practices evolve.
- d) Some evaluation parameters may include: (i) patient outcomes and satisfaction; (ii) provider satisfaction; (iii) technical quality of service; (iv) quality of communication; (v) performance metrics; (vi) costs; (vii) utilization; and (viii) improved access to care.

3.4 Continuity

While many Telemedicine services in the past have been primarily project and pilot-programme oriented an integrated system of ICT should be in place to enable continuity of care and to leverage on Telemedicine as a strategic resource that increases and improves each healthcare organisation's – and the healthcare system's – capacity to deliver services across distances. Business sustainability should be duly considered so as not to compromise patients' interests (e.g. patient's investments in Telemedicine hardware are not rendered unusable due to business closure). To this end, proactive consideration is to be given to the following:

- a) Telemedicine services should be integrated, as much as possible, into existing health care services as well as existing administrative policies, guidelines and procedures.
- b) Healthcare organisations offering multiple Telemedicine services should have mechanisms in place to facilitate coordination of the Telemedicine services including management of the equipment and physical space.
- c) When two or more healthcare organisations are involved in Telemedicine service delivery, an agreement between the healthcare organisations should be established that addresses detailed protocols for data preparation, transmission, receipt, mutual responsibilities and the identification/management of liabilities.

- d) Healthcare organisations providing Telemedicine services should have policies and procedures to ensure accountability and sustainability of the Telemedicine services, bearing in mind the need for some central coordination of Telemedicine communications as Telemedicine applications become more complex (e.g. homecare, pre-operative care at a distance, regionalization of health facilities).

4. Technology and Equipment

4.1 Procurement Practices

Telemedicine equipment can range from laptops and smartphones, to medical peripherals (e.g. cameras, electronic stethoscopes) to monitoring devices (e.g. blood pressure monitors, weight scales) etc. It is necessary that the organisation have the essential equipment to deliver Telemedicine services. As with other health service programs, Telemedicine programs require sound procurement practices. The following are some guiding principles:

- a) The organisation should follow set policies and practices when buying or otherwise procuring Telemedicine equipment. Policies and procedures should relate to:
 - i. Gathering input from users;
 - ii. Assessing the equipment's ability to meet user needs;
 - iii. Following set purchasing criteria;
 - iv. Determining the impact on the current delivery of Telemedicine services;
 - v. Assessing the equipment's ability to adapt to future growth and changes in Telemedicine services; and
 - vi. Purchasing from licensed dealers for registrable medical devices.
- b) When purchasing Telemedicine equipment, a 'user requirement document' should be prepared first, and potential equipment sources assessed against this document. Some of the criteria that should be considered are:
 - i. Functionality of the equipment for the identified health needs;
 - ii. Ease of use;
 - iii. Price;
 - iv. Conformance to recognised standards;
 - v. Clinical guidelines;
 - vi. Track record of the equipment, and performance demonstration;
 - vii. Ability to interface with necessary peripherals;
 - viii. Service/support;
 - ix. Speed of operation;
 - x. Means of communication (e.g. Internet Protocol (IP), Integrated Services Digital Network (ISDN), POTS, Wi-Fi, 3G, 4G, Bluetooth);
 - xi. Acceptability to users;
 - xii. Financial stability of vendor;
 - xiii. Interoperability;
 - xiv. Mandatory requirements / certification (e.g. Health Sciences Authority);
 - xv. Review of upgrade path for equipment;
 - xvi. Portability;
 - xvii. Scalability;
 - xviii. Robustness e.g. uptime; and

- xix. Data security and accuracy.

4.2 Safety

In terms of safety and standards, Telemedicine equipment should be treated the same as any other equipment used in the delivery of health care services. The following are the principles to be kept in mind in this regard:

- a) Organisations providing Telemedicine services must comply with all relevant safety laws, regulations. Necessary clearances need to be obtained from relevant authorities (e.g. Health Sciences Authority, National Environment Agency and Infocomm Development Authority to import Telemedicine equipment).
- b) Organisations providing Telemedicine services must ensure that infection control policies and procedures are followed in the delivery of Telemedicine services, wherever applicable (e.g. dis-infection of Telemedicine equipment between patients, where devices come into direct contact with patients).

4.3 Security

For healthcare providers to meet the goal of providing quality patient care, the confidentiality, integrity, availability and reliability of Telemedicine services needs to be ensured. Healthcare providers must have appropriate IT security policies, standards and processes to ensure the secure operations of Telemedicine services. These policies should conform to international IT security standards such as the ISO 27001/2, and where applicable, must be in compliance with relevant existing Acts such as PDPA. Some of the IT security technical controls that should be considered in a Telemedicine setting include:

- a) Authentication features to securely identify the users;
- b) End-to-end security design to ensure the confidentiality and integrity of the patient and service provider communications; and
- c) Audit trails on all Telemedicine consultations to be enabled for record keeping purposes.

4.4 Diagnostic Quality

The delivery of diagnostic quality images and audio is essential for safe, effective and efficient Telemedicine service delivery. The following should be considered:

- a) Whenever possible, organisations providing Telemedicine services follow application-specific diagnostic quality guidelines and standards. For example, “Tele-radiology Guidelines 2007” by College of Radiologists, Singapore (Academy of Medicine Singapore).
- b) In the absence of application-specific diagnostic quality guidelines and standards, the literature on efficacy/effectiveness is consulted.

4.5 Reliability

Reliability of technology and equipment is essential for safe, effective and efficient delivery of Telemedicine services. The following are to be considered:

- a) Organisations providing Telemedicine services should adhere to reliable standards and guidelines where they exist. Examples of some optional standards that exist are IEC 60601, 61010 for medical and laboratory equipment respectively.
- b) Organisations providing Telemedicine services should take steps to ensure equipment reliability that may include the following where applicable:
 - i. Efforts be made to initially purchase the appropriate equipment;
 - ii. A check list is instituted for post-installation testing of equipment;
 - iii. Preventive maintenance e.g. routine maintenance of medical equipment which entails scheduled QA and/or maintenance to ensure that the equipment is safe and functioning as intended
 - iv. Pre-session calibration (as and when required) of equipment using checklists;
 - v. Users be trained in proper use of equipment;
 - vi. Service level agreements in place with vendors; and
 - vii. Contingency plans are in place.
- c) Organisations providing Telemedicine services should track equipment reliability using logs that record:
 - i. Start time;
 - ii. End time;
 - iii. Technical problems;
 - iv. User problems; and
 - v. How problems were resolved.
- d) Organisations providing Telemedicine services should take steps to ensure reliability of the telecommunications network by having:
 - i. Quality of service agreements in place with telecommunication providers or vendors; and
 - ii. Access to additional lines or alternate connectivity when required for mission critical services.

4.6 Acceptability

Acceptability of technology and equipment is essential for safe, effective and efficient delivery of Telemedicine services. Organisations providing Telemedicine services should take steps to maximize equipment acceptability that include:

- a) Purchase of user-friendly equipment;
- b) Appropriate education, training, and orientation of users;

- c) Ongoing evaluation of equipment acceptability; and
- d) Existing standards and guidelines.

4.7 Interoperability

Interoperability of systems (computers, communication devices, networks, software, and other IT components) with other components of the health system is necessary for effective and efficient delivery of Telemedicine services. Some interoperability standards that can be referred to are ISO/TR 16056, and ISO/TS 16058. Suggested measures to ensure interoperability within the health system should include:

- a) Purchasing standards-based equipment (e.g. Continua Health Alliance endorsed devices); and
- b) Conducting conformance and interoperability testing prior to full-scale deployment.

4.8 Scalability

Scalability is an important consideration when planning Telemedicine programs and purchasing necessary equipment and technology. Organisations providing Telemedicine services should take steps to facilitate required scalability when purchasing equipment and technology. Some considerations include:

- a) Developing an overall plan that includes a needs assessment with user input and considers future growth and change;
- b) Using scalability as a requirement in the procurement process e.g. vendor's ability to provide and support scalable solutions; and
- c) Using lifecycle planning (a "refresh strategy") once equipment is purchased which acknowledges new requirements and upgrades that emerge, as well as the need to replace equipment, and plan accordingly.

4.9 Maintenance

Maintenance of technology and equipment is essential for safe, effective, and efficient delivery of Telemedicine services. Organisations providing Telemedicine services should have processes in place to ensure the safety and effectiveness of equipment which may include the following:

- a) Preventive maintenance such as:
 - i. Network checks;
 - ii. Equipment checks;
 - iii. Software updates;
 - iv. Keeping a supply of necessary and appropriate spare parts;
 - v. Interoperability checks;

- vi. Log analysis;
 - vii. Pre-session testing (as and when required); and
 - viii. Reference to standards like IEC 62353 for Medical electrical equipment
- b) Individuals performing maintenance have appropriate training;
 - c) Lifecycle planning (a “refresh strategy”) for required updates and replacement of equipment;
 - d) Quality assurance measures in place (i.e. pre-session testing);
 - e) Clear accountability for all equipment; and
 - f) Education of staff about maintenance requirements.

4. 10 End-of-Life (EOL) Considerations for Equipment

In concert with the principle of lifecycle planning identified in the Scalability and Maintenance Sections, as new equipment, technology, and parts are purchased, e-waste (Waste Electrical and Electronic Equipment (WEEE)) will be created. Organisations providing Telehealth services must have processes in place to ensure the safe recycling or reuse of any e-waste generated.

4. 11 Equipment Calibration

Telemedicine equipment should be treated the same as any other equipment used in the delivery of health care services. Critical equipment that has a significant effect on the test result should be calibrated by the following recognised calibration laboratories to ensure measurement traceability to the International System of Units (SI):

- a) Laboratories accredited by Singapore Accreditation Council (SAC)
- b) Laboratories accredited by SAC’s Mutual Recognition Arrangement (MRA) partners
- c) National Metrology Centre (NMC), A*STAR, Singapore
- d) NMC’s MRA partners (www.bipm.org)

For equipment calibration by accredited laboratories in (a) and (b), the calibration reports should be endorsed by the respective accreditation body i.e. carrying the accreditation body’s mark in the reports.

The list of SAC accredited calibration laboratories and MRA partners can be found in SAC’s website, www.sac-accreditation.gov.sg.

4. 12 Current Standards and Guidelines

As standards and guidelines for Telemedicine equipment and technology contribute to the overall quality of Telemedicine service delivery, organisations providing Telemedicine

services should follow existing guidelines and standards, where applicable. A number of such standards and guidelines exist e.g. application-specific: teleradiology, telepharmacy; and application non-specific: diagnostic imaging [e.g. Digital Imaging and Communications in Medicine (DICOM)], health messaging [e.g. Health Level Seven (HL7)].

Appendix A (Glossary of Terms)

Healthcare provider – healthcare organisation and healthcare professional involved in the provision of Telemedicine.

May – means that adherence to the mentioned requirement is truly optional.

Must - means that adherence to the mentioned requirement is mandatory, usually by virtue that it is an existing legal or statutory obligation.

Should - means that adherence to the mentioned requirement is strongly encouraged but there may exist valid reasons in particular circumstances to ignore a specific recommendation, as long as the full implications are understood and carefully weighed before choosing a different course.

Staff – refers to non-medical personnel involved in the delivery of Telemedicine services.

Users – refers to healthcare professionals, staff, patients, and caregivers, as the case may be.

Appendix B (Abbreviations)

DICOM – Digital Imaging and Communications in Medicine

HL7 - Health Messaging Level 7

NTG – National Telemedicine Guidelines

PDPA - Personal Data Protection Act

SMC ECEG - SMC Ethical Code and Ethical Guidelines

WEEE - Waste Electrical and Electronic Equipment

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