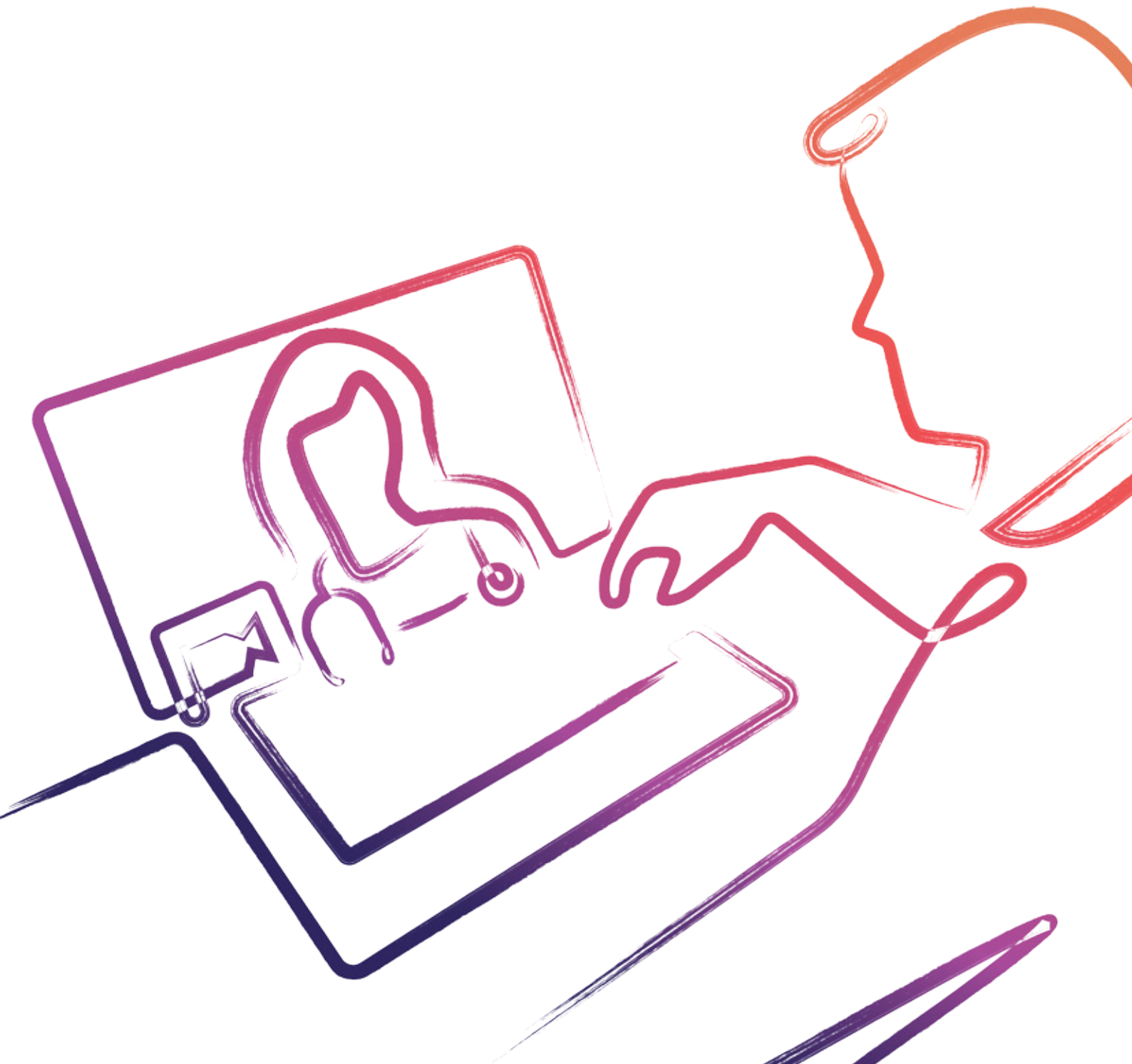


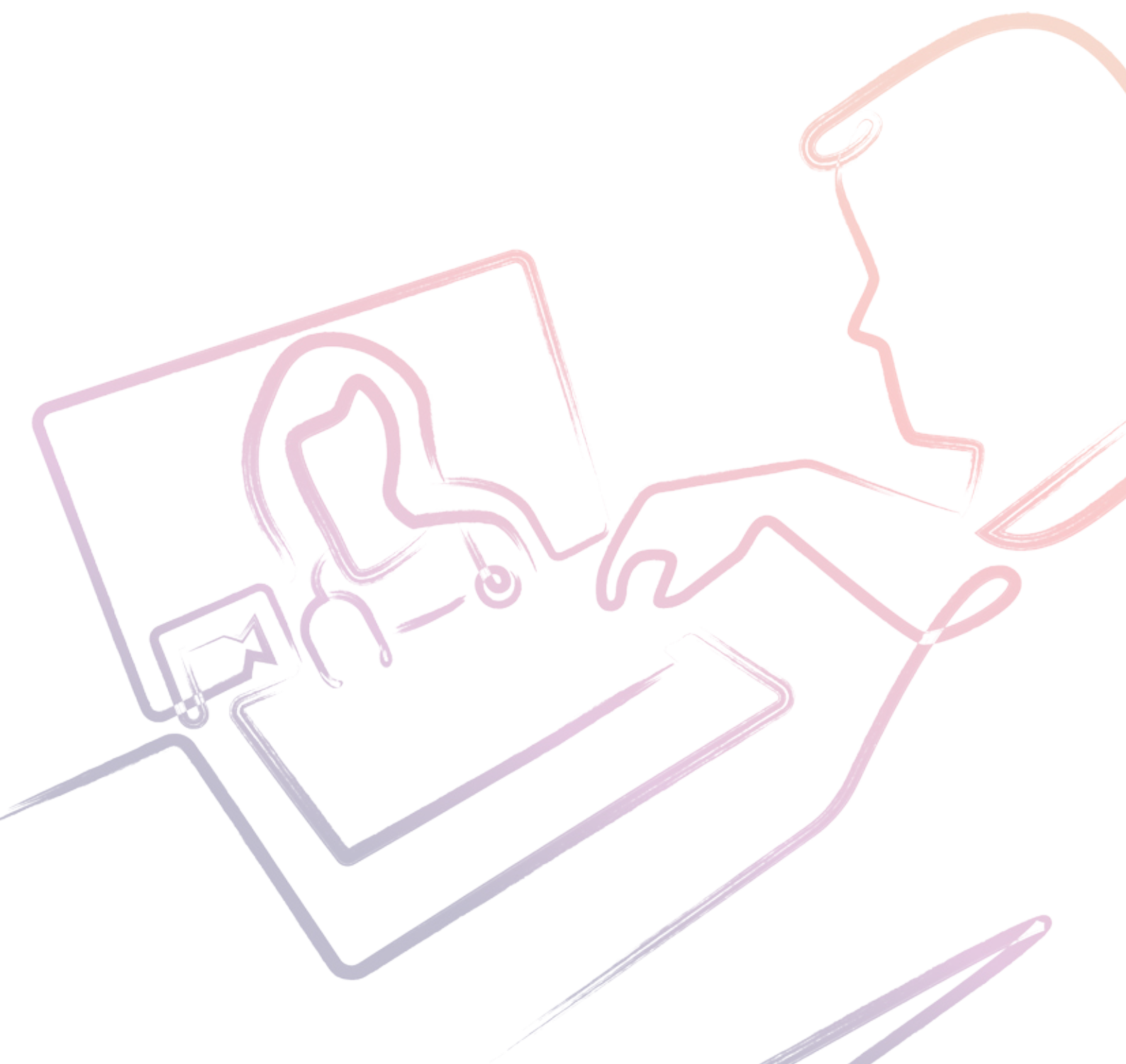


WHO-ITU Global standard for accessibility of telehealth services





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Glossary

Telehealth: delivery of health care services, where patients and providers are separated by distance. Telehealth uses ICT for the exchange of information for the diagnosis and treatment of diseases and injuries, research and evaluation, and for the continuing education of health professionals.

Disability: the result from the interaction between health conditions or impairments that a person experiences and environmental barriers that may hinder their full and effective participation in society on an equal basis with others.

Assistive technology: any product (including devices, equipment, instruments and software), especially produced or generally available, used by or for persons with disability for participation; to protect, support, train, measure or substitute for body functions/structures and activities; or to prevent impairments, activity limitations or participation restrictions.

Accessibility: the degree to which a product, device, service or environment (virtual or real) is available to as many people as possible.

Accessibility feature: an additional content component that is intended to assist people hindered in their ability to perceive an aspect of the main content.

Electromagnetic compatibility: the ability of electrical equipment and systems to function acceptably in their electromagnetic environment, by limiting the unintentional generation, propagation and reception of electromagnetic energy which may cause unwanted effects such as electromagnetic interference or even physical damage in operational equipment.

Electromagnetic interference: the effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radiocommunication system, manifested by any performance degradation, misinterpretation, or loss of information which could be extracted in the absence of such unwanted energy.

Abbreviations and acronyms

This document uses the following abbreviations and acronyms:

ASR	Automated Speech Recognition
ATA	American Telemedicine Association
DTLS	Datagram transport layer security
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
ICT	Information and Communication Technologies
ITU	International Telecommunication Union
SMS	Short Message Service
SRTP	Secure real-time transport protocol
TTS	Text-to-speech
UHC	Universal health coverage
VRI	Video remote interpretation
WCAG	Web Content Accessibility Guidelines
WebRTC	Web real time communication
W3C	World Wide Web Consortium
WHO	World Health Organization

Executive Summary

The World Health Organization (WHO) defines telehealth as the “delivery of health care services, where patients and providers are separated by distance. Telehealth uses information communication technology for the exchange of information for the diagnosis and treatment of diseases and injuries, research and evaluation, and for the continuing education of health professionals” (1). Telehealth is a service that has been widely applied in many countries for decades now. During the Covid-19 pandemic, the use of telehealth services has increased substantially in many countries, becoming a basic need for the general population, enabling people in real time to contact health care providers from home. As such, telehealth contributes to achieving universal health coverage (UHC) in countries by improving access to quality and cost-effective health services for patients regardless of their setting. It is particularly valuable for those who live in remote areas and for marginalized populations.

While telehealth provides the means for an equitable health service provision, in reality many persons with disabilities experience difficulties and challenges accessing and using telehealth services. There is more and more evidence that especially in low- and middle-income countries persons with disabilities cannot benefit from telehealth services due to highly inaccessible formats of delivery. For example, very often telehealth platforms are not compatible with devices such as screen readers that facilitate people with vision impairment to access information, or the lack of captioning or volume control in video conferencing impedes persons who are deaf or hard of hearing to interact with health professionals virtually. It is, therefore, critical to upscale efforts to address the “digital divide” faced by persons with disabilities, in order to ensure equitable access to telehealth services and address any structural inequalities.

This document provides a list of technical requirements that telehealth platforms must have to ensure accessible telehealth service provision for persons with disabilities. All requirements are based on the best available evidence, as well as the comprehensive feedback and input collected from civil society and the industry.

Specific requirements are provided for people with different types of impairments:

1. Requirements for persons with vision impairment and blindness

Requirement 1 – The functioning of the telehealth platform should be compatible with assistive devices like screen readers or Braille keyboards

Requirement 2 – Colour contrast and screen magnification shall be available to allow people to view images and text on the screen during virtual visits

Requirement 3 – Services using telephone calls shall be accessible for a person with vision impairment who cannot access the digital platform

Requirement 4 – “Telehealth apps” should avoid processes that require downloading specific software onto devices, specific platforms, different passwords and variable software development or support when possible

Requirement 5 – Videos included on telehealth platforms should not include background music as it makes it difficult to listen to relevant information

Requirement 6 – Ambiguous wording and inaccurate descriptions in videos should be avoided

2. Requirements for deaf and hard of hearing persons

Requirement 7 – Video conferencing shall provide captioning and a monitored chat box that has volume control provisions along separate windows

Requirement 8 – Text messaging shall be included as a service to be used when the video or audio are not working well along with a chat box. Text messaging shall be set up to allow text communication to and from patients

Requirement 9 – Remote sign language interpretation or a video remote interpretation (VRI) system should be implemented and made available

Requirement 10 – Videos on telehealth platforms should include clear subtitles (easy to read and large font size) and avoid background music as it makes it difficult to listen to relevant information

Requirement 11 – The screen used for telehealth should be large enough for lipreading

3. Requirements for persons with speech difficulties

Requirement 12 – Platforms should include voice synthesizers and/or text-to-speech generators which can translate what people with speech impairment say

4. Requirements for persons with mobility impairments

Requirement 13 – The control of virtual visit applications should not be too restrictive in size, so that users with physical challenges will not have difficulty using the fine motor movements required to operate the platform

Requirement 14 – The telehealth platform shall not explicitly require fine motor coordination e.g. double clicking which is difficult instead of single clicking

Requirement 15 – The telehealth platform should avoid scrolling or using menu options to access information as much as possible

5. Requirements for persons with mental health conditions and psychosocial disabilities

Requirement 16 – The telehealth platforms should avoid unexpected, irrelevant, and inappropriate content that can be upsetting and trigger negative feelings and reactions

Requirement 17 – The telehealth platform shall explain the measures implemented to ensure that usage and data remain safe, private, and secure in effort to avoid negative thinking regarding the possibility of related undesirable consequences

Requirement 18 – The telehealth platform should avoid using complicated user interfaces and language that are difficult to understand and providing inadequate guidance on how to complete tasks

Requirement 19 – The telehealth platform should avoid unnecessarily effortful tasks and allowing malfunctioning features to persist

Requirement 20 – The telehealth platform should avoid presenting low-quality information as this contributes to distrust

6. Requirements for persons with developmental and intellectual disabilities

Requirement 21 – Key documents and information provided by healthcare provider should be provided in accessible formats, such as in easy read formats

Requirement 22 – The telehealth platforms shall allow for more than two people to participate in a meeting, e.g. people who provide personal support to persons with developmental and intellectual disabilities should be able to attend their meetings with healthcare providers

Requirement 23 – Simple educational material on how to use telehealth services should be made available on the telehealth platform

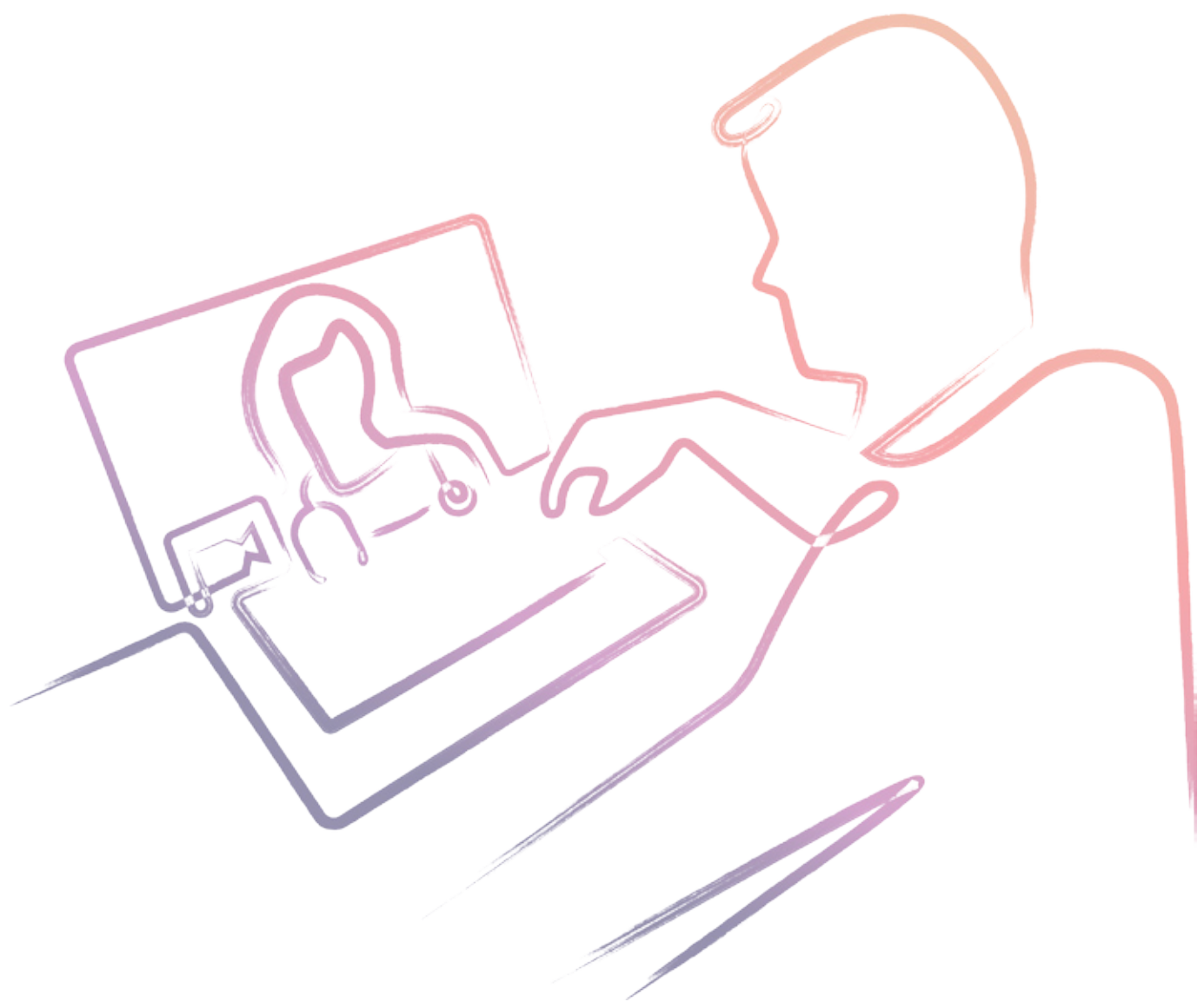
7. Requirements for persons with learning disabilities

Requirement 24 – The layout of the text, instructions, documents and worksheets on the telehealth platform should be easily accessible for persons with dyslexia and other learning disabilities

Requirement 25 – The text content should be made readable and understandable, and users need to be provided enough time to read and use content

This publication is a joint global standard of the WHO and the International Telecommunication Union (ITU) that is technically aligned with ITU Recommendation ITU-T F.780.2 (Accessibility of telehealth services).

The requirements in this document are intended for adoption by Member States as regulations or legislation and should also be voluntarily implemented by healthcare professionals and manufacturers.





1 Background

The WHO defines telehealth as the “delivery of health care services, where patients and providers are separated by distance. Telehealth uses Information and Communication Technologies (ICT) for the exchange of information for the diagnosis and treatment of diseases and injuries, research and evaluation, and for the continuing education of health professionals” (1). Telehealth can contribute to achieving universal health coverage (UHC) in countries by improving access to quality and cost-effective health services for patients regardless of their setting. It is particularly valuable for those who live in remote areas, for vulnerable groups and ageing populations.

Telehealth is a service that has been introduced and used in many countries for decades now. With the rapid evolution of technology, most families have at least one digital device that can provide the means for communication between a patient and a healthcare provider. During the Covid-19 pandemic, however, the use of telehealth services has increased substantially in many countries. Telehealth has become a basic need for the general population, especially for those in quarantine, enabling patients in real time through contact with health care providers to access advice on their health problems. In fact, a recent WHO report showed that telehealth is the most common modality adopted by countries for service provision during the pandemic (2). The report also shows that there is a trend of increasing utilization of telehealth as the income level increases, although even among low-income countries 42% of those with service disruptions during the Covid-19 crisis report utilizing this technology.

While telehealth provides the means for an equitable health service provision, in reality many persons with disabilities experience difficulties and challenges accessing and using telehealth services. There is more and more evidence that especially in low- and middle-income countries persons with disabilities cannot benefit from telehealth services due to highly inaccessible formats of delivery. For example, very often telehealth platforms are not compatible with devices such as screen readers that facilitate people with vision impairment to access information, or the lack of captioning or volume control in video conferencing impedes persons who are deaf or hard of hearing to interact with health professionals virtually. A list of different challenges that persons with disabilities experience in a telehealth environment are included in section 3. It is, therefore, critical to upscale efforts to address the “digital divide” faced by persons with disabilities, in order to ensure equitable access to telehealth services and address any structural inequalities.

Most of the common challenges faced by persons with disabilities can be addressed through standardization and regulation. The development of standards for telehealth is an important and valuable process to help ensure accessible, effective and safe

delivery of healthcare. There are examples of existing guidelines in different countries. For example, the American Telemedicine Association (ATA) has created practice guidelines that are being adopted by numerous professionals (3). The Government of New South Wales has adopted a telehealth framework and implementation strategy for the 2016–2021 period (4). The Web Content Accessibility Guidelines (WCAG) are universal guidelines used in many countries and practices (5). However, none of these guidelines and standards cover all areas of accessibility which end-users with disability might experience.

Purpose of the standard

The standard provides a comprehensive set of technical requirements that telehealth platforms must include to ensure accessible telehealth service provision for persons with disabilities. It is proposed that the standard is 1) implemented by governments as regulations in order to ensure that persons with disabilities have an equal access to telehealth services as others, and 2) adopted voluntarily by manufacturers of telehealth platforms or healthcare professionals. In addition, the document can be used by civil society groups and organizations of persons with disabilities to advocate for accessible telehealth services.



2 Methodology and development process

For the development of the document, WHO and ITU adopted an inclusive stepwise approach, involving closely civil society including persons with disabilities and their representative organizations, as well as the industry. The starting point in the development of the document was the identification of challenges and barriers that persons with disabilities experience when accessing telehealth services. For the purpose, a scoping literature review on barriers to telehealth services was carried out in relevant medical databases such as PubMed, as well as in the grey literature. Search terms relevant to telehealth (e.g. telehealth, telemedicine, digital health, e-health services), disability (e.g. disability, persons with disabilities, people with disabilities) and barriers (e.g. barriers, access, inequality, gaps, challenges) were used to identify studies relevant to the topic.

A second step included a consultation process with civil society and the industry. A set of barriers was identified through the scoping review, which served as a basis for discussion in a seminar organized by WHO and ITU in March 2021, where the input and perspective of civil society, including persons with disabilities and their representative organizations, was sought. Participants identified a list of the most common challenges that were incorporated in the standard. In addition, an online survey was circulated seeking additional contributions. After a complete set of challenges was defined, the corresponding requirements to address these barriers were determined. A workshop organized by ITU with the participation of representatives from the industry was held in June 2021 to obtain their perspectives as informants.

This document outlines the most important requirements on concrete accessibility features for equitable delivery of telehealth services. As such these requirements need to be adopted by governments when planning and implementing telehealth services, by manufacturers when designing the telehealth platforms to ensure a universal design, or by healthcare providers when delivering healthcare services. The current standard includes the necessary requirements that will help ensure equitable, accessible, effective and safe delivery of telehealth. However, the methods of implementation of these requirements may vary depending on resources available or technological advancements. A guidance document containing specific recommendations on how each of the requirements can be addressed to ensure compliance with the current standard will be issued in the future.

The requirements included in this standard are built around groups of persons with different impairments. There are three main reasons why this approach has been taken.

Firstly, the starting point in the development of the document were the challenges that persons with disabilities experience when using telehealth services. As persons with disabilities are a diverse group of individuals, the challenges, hence also the corresponding requirements vary substantially and cannot be grouped into one category. Secondly, the document contains specific requirements for features that need to be incorporated in the design of the telehealth platforms. These features will then enable healthcare providers to adapt their services to the different needs and priorities of persons with disabilities. For example, an available feature that provides the option of changing size and font of text will allow healthcare providers to select the most appropriate font and size of text depending on the patient. As such, a list of requirements structured around types of disabilities will facilitate practitioners to have information on the specific needs of different populations, e.g. persons with hearing loss or persons with psychosocial disabilities. Finally, this document aims to standardize a whole sector. As many countries provide specialized telehealth services such as tele-audiology focusing on a specific subpopulation, it is important that this document outlines specific requirements for different subpopulations.



3 Challenges that persons with disabilities face in telehealth environment

This section outlines common challenges that persons with disabilities experience when accessing and using telehealth services. The section is divided into seven subsections, outlining challenges that persons with vision impairment and blindness, persons who are deaf or hard of hearing, persons with speech difficulties, persons with mobility issues, persons with mental health conditions and psychosocial disabilities, and persons with developmental, intellectual or learning disabilities experience. Some of the challenges may overlap across different groups.

3.1 Persons with vision impairment and blindness

- ✓ Telehealth platforms are often not compatible with some specific assistive devices like screen readers or Braille keyboards
- ✓ Scanned documents, text images, infographics or diagrams have no alternative text
- ✓ Background music interferes with audio voice over
- ✓ Colour contrast and screen magnification are also important elements of accessible virtual visits that, if missing, do not allow people to view images and text on the screen, also reducing access to their own medical records and lab results
- ✓ The health care provider is not sensitized on the specific needs of people with vision impairment
- ✓ A lack of fixed phone line means that there are less options for people with vision impairment when a digital platform is not accessible
- ✓ Software providers of “Telehealth apps” may not consider accessibility for persons with disabilities
- ✓ Smartphones tend to use touch screens which are not always as navigable as phones with larger buttons

3.2 Persons who are deaf or hard of hearing

- ✓ Unstable connection over the phone presents barriers
- ✓ Inadequate captioning or volume control in video conferencing
- ✓ Unstable internet interferes with the video signal (e.g. video/audio delay) making lip-reading and sign language less clear
- ✓ Text messaging can be a solution when the video or audio are not working well, but it is often not available as an option in telehealth platforms
- ✓ Background music during videos and background noise during consultations presents a barrier for people who are hard of hearing
- ✓ Small screens of smartphones can make lip-reading and sign language less clear
- ✓ Lack of speech-to-text generators
- ✓ Bad signal-to-noise ratio does not allow for good communication
- ✓ When captioning is available, no speech-to-text reporters and real time captioners are used
- ✓ In the context of Covid-19, wearing masks during telehealth services can impede people relying on lip-reading to communicate
- ✓ When audio signal is not good, lack of an option to use a microphone to improve audio
- ✓ Lack of options for scheduling sessions through text or email when audio phone systems are not accessible
- ✓ No option to include accommodation requests in an online platform for scheduling
- ✓ The size on screen for sign language interpretation is not appropriate
- ✓ Lack of hearing loop on phone available¹

3.3 Persons with speech difficulties

- ✓ Voice synthesizers and text-to-speech generators are not available on telehealth platforms

¹ Note: If a user decides to use a phone to participate in a telehealth session, it is the responsibility of the user to select a Hearing Aid Compatible phone.

- ✓ Standard timetabling does not accommodate people who need more time for communication
- ✓ Pace and tone and rhythm of voice being used when synthesizing might be a challenge
- ✓ Telehealth services sometimes offer only phone numbers as the way to communicate with the healthcare providers
- ✓ Unstable or poor audio quality can be a challenge for people who have speech difficulties who might be required to repeat the same sentences many times – causing fatigue and deteriorating speech
- ✓ Services and platforms which do not allow video or have poor video quality limit the possibility to rely on non-verbal communication

3.4 Persons with mobility impairments

- ✓ Platforms' icons and navigation systems are too restrictive in size or not structured in a way that is easy for people with fine motor movement difficulties to use (e.g. requiring people to double click instead of single click)
- ✓ Insufficient time limits to respond or to complete tasks, such as to fill out online forms

3.5 Persons with mental health conditions and psychosocial disabilities

- ✓ Unexpected, irrelevant, and inappropriate content can be upsetting
- ✓ Sufficient information is not provided on how the telehealth service ensures safety, privacy, and security, including the role of the user in achieving these goals, which can foster negative feelings and discourage usage
- ✓ Sufficient guidance is not provided on how to use the telehealth service
- ✓ Difficulty using complicated and unnecessarily effortful user interfaces on the platform and troubleshooting or overcoming system errors
- ✓ Difficulty trusting resources with poor information quality and design

3.6 Persons with developmental and intellectual disabilities

- ✓ Use of technical language by the provider or administrative personnel may be difficult to understand and lead to misinterpretation

- ✓ Health information in the platforms is not simple and accessible, key documents are not in easy read formats
- ✓ People who provide personal support to persons with intellectual disabilities are not included in the conversation
- ✓ Simple educational material on how to use telehealth services is not available

3.7 Persons with learning disabilities

- ✓ Text and documents on online platforms are sometimes difficult to follow for persons with dyslexia. For example, underlining and italics can make words 'run together', or flow charts, illustrations and diagrams can be too difficult to follow and understand
- ✓ Complex navigation mechanisms and page layouts are difficult to understand and use
- ✓ Complex sentences are difficult to read and long passages of text difficult to follow
- ✓ Moving, blinking, or flickering content, and background audio cannot be turned off



4 General technical requirements

This clause describes requirements on concrete accessibility features that healthcare providers and manufacturers of telehealth platforms need to ensure when delivering telehealth services. The requirements are based on the challenges identified and included in Section 3. Some of the requirements might overlap across different groups of persons with disabilities.

It is also recommended that telehealth services in general, and accessible telehealth services in particular, provide proper electromagnetic compatibility (EMC) as well as guidance on its application during their telehealth sessions, as described in Annex 1.

4.1 Requirements for persons with vision impairment and blindness

Requirement 1 The functioning of the telehealth platform should be compatible with assistive devices such as screen readers or Braille keyboards, removing barriers for people who are blind or visually impaired.

- ✓ Screen readers are considered one of the most basic accessibility tools for people with vision impairment, enabling them to “see” their screen. The assistive device communicates what a person without a visual impairment can see through non-visual methods such as sound icons and text-to-speech. The screen reader can also translate the information on the screen and display it in Braille. This means users can navigate the screen, type, read and edit text more efficiently and accurately. It is considered the most basic accessibility feature a platform can have for people with vision impairment.

Requirement 2 Colour contrast and screen magnification shall be available to allow people to view images and text on the screen during virtual visits.

- ✓ Colour contrast means that there is enough contrast between the text or image and its background for people with vision impairments to be able to read the text or see the image even if they cannot access all the colours. The WCAG provide specific guidance on the ratios of contrast.

- ✓ Screen magnification enlarges text and images on the screen up to 20 times their display size which makes the content more visible for people with poor vision. The magnification follows the user's activity on the screen from typing to moving their cursor. The size of the cursor can also be increased which enables it to be found more easily on the screen.
- ✓ Alternative text needs to be provided for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language. The WCAG provide specific guidance on how alt text can be added.
- ✓ The same applies also for telehealth patient portals that store online medical charts, images, and messages that allow patients to access their medical history and lab results.

Requirement 3 Services using telephone calls shall be accessible for a person with vision impairment who cannot access the digital platform (even though many users may not have a fixed line at home).

- ✓ Services must be accessible to people with vision impairment. Thus, if the digital platform is inaccessible, telephone calls are another suitable option. Using a phone can present some challenges but certain laws such as the Telecommunications Act of 1996 in the US ensures that all telephone devices are accessible to people with vision impairment.

Requirement 4 "Telehealth apps" should avoid processes that require downloading specific software onto devices, specific platforms, different passwords and variable software development or support when possible.

- ✓ "Telehealth apps" that require downloading place further barriers for people with vision impairment. People with vision impairment already face more challenges when accessing products and navigating telehealth platforms. The steps in the process to getting the service they need be the bare minimum.

Requirement 5 Videos included on telehealth platforms should not include background music as it makes it difficult to listen to relevant information.

- ✓ People with vision impairment depend on information being communicated through sound, such as through their screen reader, or touch, such as through their Braille keyboard. Background noise of any kind can make it hard for users with vision impairment to focus on the relevant information that is being conveyed as they might have no other means of accessing the information unlike people without vision impairment.

Requirement 6 Ambiguous wording and inaccurate descriptions in videos should be avoided.

- ✓ People with vision impairment depend on descriptions when they are not able to visualize content such as videos and images. Ambiguous or inaccurate wording can be confusing or convey incorrect information. It is critical that the descriptions provide the same information with or without the visual aspect.

4.2 Requirements for deaf and hard of hearing persons

Requirement 7 Video conferencing shall provide captioning and a monitored chat box that has volume control provisions along separate windows.

- ✓ Real time captioning allows persons who are deaf and hard of hearing to access video and spoken content. This is especially important for persons who are hard of hearing if the audio is not clear and vital for persons who are deaf and who need captioning. If there is a background noise, all participants may not understand what is being said. This also solves the problem of speakers mumbling or having strong accents. Captioning is vitally important for all if the speaker is not visible because without visual representation of the speaker, there is no possibility of lip-reading.
- ✓ It is recommended to use professional human captioners, preferably specialized in medical/health related captioning, and only use Automated Speech Recognition captioning (ASR) when the former is not possible, as it is still not accurate enough regarding accented speech and extraneous noise. If ASR is used, it needs monitoring for accuracy by the healthcare provider to avoid miscommunication. A chat box is essential to recap diagnosis and treatment plan, it is also required to type correct wording if ASR fails to pick voice correctly for accurate real time captioning.
- ✓ Use of ASR in telehealth appointments: Some video conferencing platforms already offer an automated captioning feature which is often based on Artificial Intelligence that can recognize continuous speech using speech-to-text software to deliver live captioning. Artificial intelligence, as part of the speech recognition process, will try to match what it recognizes as speech against a vocabulary list of terms. ASR and their accuracy and usefulness also depend on Wi-Fi, quality of audio in the call, speaker voice, accent and acoustics.
- ✓ It is advisable for accuracy of medical treatment prescribed that professionals providing captioning are supporting communication. If this is not possible,

healthcare professionals need to monitor text output and provide correct information in the chat box.

- ✓ For mental health assessments, automated speech recognition apps shall not be used as they can provide confusing information.

Requirement 8 Text messaging shall be included as a service to be used when the video or audio are not working well along with the chat box. Text messaging shall be set up to allow text communication to and from patients.

- ✓ For persons who are deaf or hard of hearing, the use of text messaging when video or audio are not accessible is important. Most people already use and understand how text messaging works as most are users of smart phones and familiar with this technology. This will help users of telehealth services to communicate with their health providers and the other way around.

Requirement 9 Remote sign language interpretation or a video remote interpretation (VRI) system should be implemented and made available to persons who are deaf and hard of hearing as a standard part of telehealth services.

- ✓ A VRI client needs to call the VRI service and start the VRI session. It is assumed that the health service provider has a communication environment capable of receiving the communication requests (voice/video invitation) from the VRI agent. The VRI client terminal must be able to display and play two sets of audio and video signals: the VRI agent and the medical personnel. Also, it is desirable that the image of the VRI agent is at least as large as the medical personnel so that the sign language can be easily read. As not all hard of hearing and deaf people use sign language, a speech-to-text software should be available as an option on the platform.

Requirement 10 Videos on telehealth platforms should include clear subtitles (easy to read and large font size) and avoid background music as it makes it difficult to listen to relevant information.

- ✓ Guidance on developing subtitles is available elsewhere.²

² ISO/IEC 20071-23:2018, Information technology – User interface component accessibility – Part 23: Visual presentation of audio information (including captions and subtitles), <https://www.iso.org/standard/70722.html>.

Requirement 11 The screen used for telehealth should be large enough for lip-reading.³

- ✓ Lip-reading allows someone to better understand what is being verbally communicated. This is done through observing the movement of the speaker's lips as well as their facial expressions and body language, especially when using a hearing aid and in noisy situations. Therefore, to visualize the movements of someone's face, the screen must be large enough to provide enough detail.

4.3 Requirements for persons with speech difficulties

Requirement 12 Platforms should include voice synthesizers and/or text-to-speech generators which can communicate what people with speech impairment say.

- ✓ An adaptive technology option should be available for people with speech difficulties. If those people cannot use their voice or their words are garbled, they can benefit from using a text-to-speech app or feature on the telehealth platform or a voice synthesizer that, using software technology, will communicate what they are saying. Text-to-speech (TTS) is a type of assistive technology that reads digital text aloud. With a click of a button or the touch of a finger, TTS can take words or sentences on a computer or other digital device and convert them into audio. A voice synthesizer is a type of TTS that allows a computer or other machine to read words out loud in a real or simulated voice played through a loudspeaker.

4.4 Requirements for persons with mobility impairments

Requirement 13 The controls of virtual visit applications should not be too restrictive in size, so that users with physical challenges will not have difficulty using the fine motor movements required to operate the platform.

- ✓ People with mobility issues find it difficult to control the small muscles in their hands. Therefore, activities such as controlling the cursor, writing, or typing may be challenging. Larger controls of virtual visit applications will allow people with mobility issues to navigate the telehealth platform more easily.

³ Whenever the telehealth service is provided from a healthcare facility to the house of the user, quality issues that might appear at user's side like sound quality, use of quality microphone or headset, or control of screen size are outside the scope of this document. The implementer of the telehealth service might provide an advice to the user in this regard. When the telehealth service is provided from a healthcare facility to another facility or clinic, then the platform provider is responsible for the quality of the service at user's end.

Requirement 14 The telehealth platform shall not explicitly require fine motor coordination e.g. double clicking which is difficult instead of single clicking.

- ✓ People with mobility issues find it difficult to control the small muscles in their hands. Therefore, an activity such as double clicking becomes a barrier to these users and renders activities on the telehealth platform inaccessible.

Requirement 15 The telehealth platform should avoid scrolling or using menu options to access information as much as possible.

- ✓ People with mobility issues find it difficult to control the small muscles in their hands. Therefore, controlling the cursor or using specific keys to navigate the screen becomes more challenging and means that users may not be able to access all the information they need.
- ✓ Sufficient time needs to be provided to people with mobility issues to respond or to complete tasks, such as to fill out online forms.

4.5 Requirements for persons with mental health conditions and psychosocial disabilities

Requirement 16 The telehealth platform should avoid unexpected, irrelevant, and inappropriate content that can be upsetting and trigger negative feelings and reactions.

- ✓ People with mental health conditions and psychosocial disabilities may be negatively affected and impacted by exposure to personally sensitive content. If anticipated, it is important to avoid any such information. If it is necessary to convey personally sensitive content, there must be a trigger warning to make users aware of the potentially upsetting content ahead of time. Users should also be provided with a choice in information format, such as text instead of images or video with audio, that conveys meaning in a less emotionally immersive way.

Requirement 17 The telehealth platform shall explain the measures implemented to ensure that usage and data remain safe, private, and secure in an effort to avoid negative thinking regarding the possibility of related undesirable consequences.

- ✓ Ensuring safety, privacy and security remains a critical challenge for some telehealth platforms. Unfortunately, persons with mental health conditions and psychosocial disabilities may also feel uncomfortable using telehealth platforms due to a fear of undesirable consequences such as a data breach,

problematic use and threats to privacy. It is crucial that telehealth services clearly state their stance on the safety, privacy and security of personally identifiable information that is being shared online and misused. This will help make persons with mental health conditions and psychosocial disabilities more comfortable with considering and using telehealth services.

Requirement 18 The telehealth platform should avoid using complicated user interfaces and language that are difficult to understand and providing inadequate guidance on how to complete tasks.

- ✓ Complicated and difficult to understand user interfaces can create barriers for persons with mental health conditions and psychosocial disabilities. The struggle to navigate the platform may be upsetting and cause users to avoid using the telehealth service.
- ✓ Telehealth platforms should use simple language and be easy to use and navigate. Platforms should also provide adequate support to help users quickly recover from user-generated errors. This increases the accessibility of the service to people with mental health disorders who may already be apprehensive about telehealth.

Requirement 19 The telehealth platform should avoid unnecessarily effortful tasks and allowing malfunctioning features to persist.

- ✓ The telehealth platform should be simple and easy to use as intended. This increases the accessibility of the service to persons with mental health conditions and psychosocial disabilities who may already be apprehensive about telehealth. Increasing the ease of use by minimizing the mental effort to access information is critical. However, the effort to perform a task must allow for adequate deliberation.
- ✓ Malfunctioning platforms can trigger catastrophic thinking and a reduced willingness to troubleshoot. The telehealth platform should be constantly monitored for system errors and that identified errors are swiftly communicated to users when necessary and resolved.

Requirement 20 The telehealth platform should avoid presenting low-quality information as this contributes to distrust.

- ✓ Information on telehealth platforms must be up-to-date, relevant, credibly sourced, balanced and easily perceived and understood by persons with mental health conditions and psychosocial disabilities. Using an appropriate writing style and tone, easy to read language, pictograms and sound files can help ensure that the content is clear and accessible. Platforms that

feature a simple information structure, layout and design can also be useful in achieving this aim.

4.6 Requirements for persons with developmental and intellectual disabilities

Requirement 21 Key documents and information provided by healthcare provider should be provided in accessible formats, such as in easy read formats.

- ✓ Persons with intellectual disabilities experience limitations in adaptive behavior such as conceptual skills which include language, literacy and number concepts. Information needs to thus be made easier to read and process. This means avoiding jargon, complicated words, abbreviations or symbols. It is good to summarize the most important points that need to be conveyed. Complex information should be simplified by explaining it using examples from everyday life. It is good to break information down into smaller sections using short sentences, bullet points and sub-headings. The text needs to be minimum 14pt with extra space between the lines. Including pictures that illustrate the content of the text can also help. Even for persons without intellectual disabilities, this easy-to-read text will be more accessible for everyone.

Requirement 22 The telehealth platforms shall allow for more than two people to participate in a meeting, e.g. people who provide personal support to persons with developmental and intellectual disabilities should be able to attend their meetings with healthcare providers.

- ✓ People who provide personal support promote well-being and enhance individual functioning for persons with intellectual disabilities. This includes making information easier to understand and ensuring it is communicated directly to persons with intellectual disabilities. Communication difficulties between persons with intellectual difficulties and healthcare providers may lead to inaccuracies in the understanding or reporting of concerns, symptoms and history. Personal support can be required to access and participate in meetings and follow through on the recommendations.

Requirement 23 Simple educational material on how to use telehealth services should be made available on the telehealth platform.

- ✓ People with intellectual disabilities may have trouble using telehealth services due to the complexity of the systems or lack of digital literacy. Educational material that is easy to read allows persons with intellectual disabilities to use the platform. The material should explain what telehealth

is, how to schedule telehealth, how to prepare for telehealth and how to participate in telehealth. This material could also come in the form of videos using both images and language that is simple and easy to understand.

4.7 Requirements for persons with learning disabilities

Requirement 24 The layout of the text, instructions, documents and worksheets on the telehealth platform should be easily accessible for persons with dyslexia and other learning disabilities.

- ✓ Persons with dyslexia can have difficulties following the text or graphs if these are not easily accessible. For example, the use of underlining or italics may make words 'run together', whereas bold text for titles and sub-headings or to draw attention to important information or key vocabulary is very important. Text boxes or borders for headings, as well as highlighting important text is instrumental. Including logical and easy-to-follow flow charts, illustrations and diagrams to break down large sections of text or to demonstrate a particular procedure is also important. Keeping paragraphs short and sentences simple is also helpful. More information on potential solutions can be found in the WCAG.

Requirement 25 The text content should be made readable and understandable, and users need to be provided enough time to read and use content.

- ✓ Some persons with learning disabilities experience great difficulty in recognizing written words or inferring the meaning of a word or phrase from context, especially when the word or phrase is used in an unusual way or has been given a specialized meaning. Therefore, the text included on the platform should be presented in a readable way, and if needed, specific definitions or the expanded forms of acronyms or abbreviations should be available.
- ✓ Many persons with learning disabilities need more time to complete tasks than the majority of users: they may take longer to physically respond, to read things, to find things or they may be accessing content through an assistive technology that requires more time. Therefore, if certain tasks are to be completed through the platform, enough time should be allocated, or if healthcare providers request patients to undertake tasks, they should provide sufficient time.
- ✓ More information and concrete solutions can be found in WCAG Accessibility Standards.



5 Technical requirements during the planning phase

The healthcare service providers and manufacturers of telehealth platforms should develop a system to facilitate administrative advance planning for persons with disabilities. This system should provide easy to use communication techniques and ensure that these are in place so that healthcare professionals can anticipate users' specific needs when setting up telehealth appointments. The administrators should:

- ✓ Provide accessible ways and means to make the initial appointment via email, short message service (SMS) and online booking system
- ✓ Allocate enough time for telehealth appointments with persons with disabilities and specific needs
- ✓ Develop robust and transparent registration process to identify if an individual has any communication/information needs relating to a disability or sensory loss:
 - Record these needs in a clear, unambiguous and standardized way – electronically or using paper records (administrative systems or documents)
 - Ensure recorded needs are 'highly visible' by means of highlight, alert or flagging up in the system. Whenever a service user's record are accessed by other staff members, they should be prompted to take action to communicate appropriately with the service user
 - Share information about a service user's communication needs as part of existing data sharing processes, after obtaining patient permission and in accordance with existing information governance frameworks
 - Take steps to ensure the service user receives information they can access and are able to understand, because it has been delivered in the way that was requested
- ✓ Brief training/sensitization of healthcare providers on how to use telehealth services when communicating with persons with disabilities should be provided. This can be done through a short tutorial included on the telehealth platform or through other means. For example, healthcare providers should know to use a microphone close to their mouth, e.g. headset with close talk microphone, or microphone alone; speak slowly and articulate, reformulate sentences with simple words, etc



6 Security

Consistent with the guidelines on web-based remote sign language interpretation or video remote interpretation systems (6), real time communication through the web real time communication (WebRTC) must be protected according to the following WebRTC standards:

6.1 Datagram transport layer security (DTLS)

DTLS is a communication protocol designed to protect the privacy of data and prevent eavesdropping and tampering.

6.2 Secure real-time transport protocol (SRTP)

SRTP is an encrypted RTP that is used to send and receive encrypted audio and video.

6.3 Encryption

In the case of encryption, WebRTC uses the standard encryption algorithm, which is widely used internationally. Accordingly, advanced encryption standard (AES) shall be used.

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7. Medical electrical equipment – Part 1–2: General requirements for basic safety and essential performance – Collateral Standard: Electromagnetic disturbances – Requirements and tests. International electrotechnical commission. 2014.
8. ITU-T K.127. Immunity requirements for telecommunication equipment in close proximity use of wireless devices. International Telecommunication Union. 2017.
9. ITU-T K-136. Electromagnetic compatibility requirements for radio telecommunication equipment. International Telecommunication Union. 2019.
10. ITU-T K-137. Electromagnetic compatibility requirements and measurement methods for wireline telecommunication network equipment. International Telecommunication Union. 2019.

Annex. Electromagnetic compatibility for accessible telehealth

Electromagnetic compatibility (EMC) is the ability of electrical equipment and systems to function acceptably in their electromagnetic environment, by limiting the unintentional generation, propagation and reception of electromagnetic energy which may cause unwanted effects such as electromagnetic interference (EMI) or even physical damage in operational equipment.

Since much, if not most, of telehealth requires ICT and electromagnetic equipment, EMC becomes an essential part of telehealth for its successful and effective deployment. This is especially true for accessible telehealth, as it is expected that parties under telehealth care must involve persons with disabilities and specific needs, and that party will be extremely vulnerable if the requirements of EMC are not correctly met. This is also true in the case of home telehealth, where the patient receives services in their home.

Therefore, the practitioner of telehealth is expected to develop an appropriate EMC management plan that meets the requirements of relevant standards that will support the proper use of ICT in telehealth. This annex gives some guidelines on EMC for accessible telehealth.

The telehealth provider is required to be aware of the needs of EMC and provide appropriate set-ups according to the established relevant standards, in the following ways:

For the case of medical equipment, it is expected that the Standard on Electromagnetic disturbances – Requirements and tests (7) has been consulted and implemented.

For other types of equipment used in telehealth, ITU-T K.127 (8) and ITU-T K.136 (9) (for wireless communication) and ITU-T K.137 (10) (for wired communication) are to be used. Further details will be developed for future study.

Appendix. Relevant ITU recommendations

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [IEC-60601] IEC 60601–1-2 (2014) *Medical electrical equipment – Part 1–2: General requirements for basic safety and essential performance – Collateral Standard: Electromagnetic disturbances – Requirements and tests*
- [IEC-61000] IEC-61000–4-39 *Electromagnetic compatibility (EMC) – Part 4–39: Testing and measurement techniques – Radiated fields in close proximity – Immunity test*
- [ITU-T K.127] ITU-T Rec. K.127 (2017) *Immunity requirements for telecommunication equipment in close proximity use of wireless devices*
- [ITU-T K.136] ITU-T Rec. K.136 (2018) *Electromagnetic compatibility requirements for radio telecommunication equipment*
- [ITU-T K.137] ITU-T Rec. K.137 (2018) *Electromagnetic compatibility requirements and measurement methods for wire-line telecommunication network equipment*
- [NIST FIPS.197] National Institute of Standards and Technology NIST FIPS 197 (2001), *Advanced Encryption Standard (AES)*, <https://doi.org/10.6028/NIST.FIPS.197> (Accessed 24 January 2022)



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