Accelerating
the digital transformation
of the Health sector in the Américas

ALL-IN-ONE

Telehealth platform primary health care with focus on non-communicable diseases

Basics devices requirements for a Telehealth project

PAHO
Pan American Health Organization
World Health Organization
Americas Region

ALL-IN-ONE

Telehealth platform primary health care with focus on non-communicable diseases

Basics devices requirements for a Telehealth project

Information Systems and Digital Health Unit.
Department of Evidence, and Intelligence for Action in Health (EIH)

Washington, D.C., 2025

PAHO Pan American Health Organization World Health Organization Americas Region

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1. Context

The all-in-one Telehealth Platform program proposed by PAHO, and which is part of the concept of digital public good, is based on the availability of a comprehensive platform for managing teleconsultations.

Based on this initiative, PAHO proposes to "accelerate" the implementation processes of telehealth programs, facilitating the necessary software for the integration of care between reference centers and primary care areas or low complexity centers.

This program also contemplates the possibility of carrying out tele-education processes for remote areas. It is based on two fundamental concepts, the asynchronous teleconsultation, and the synchronous consultation. It contemplates service models between patients and health teams and health teams among themselves (second opinion).

The program proposes:

- Availability of adequate software in terms of interoperability and security for the comprehensive provision of telehealth services according to the feasibility analysis carried out by the country.
- Collaboration for the implementation and adaptation to existing systems
- Support in the identification process and definition of locations/institutions that have the level of necessary maturity to implement telehealth services.
- Support for the implementation of telehealth services for remote care, in its different modalities and in accordance with current regulations in the country.
- Preparation of strategies, adapted to the local reality, to establish asynchronous t elehealth services for collaboration between health teams (second opinion) based on the logic of integrated health service networks.
- Support in terms of organizational change management and knowledge transfer to provide services in the field of telehealth under training strategies and training for health teams and resources for patient education.

The following document details the necessary devices to implement a teleconsultation scheme to connect a reference center with:

- low complexity hospitalization centers
- primary care centers
- health teams in the field

Detailed infrastructure requirements for telehealth program

This equipment proposal contemplates the implementation of the telemedicine program, with the perspective of connecting primary care centers with reference hospitals. This Infrastructure plan contemplates several levels of services depends on the implementation plan

The document raises the coverage of equipment for the implementation of telemedicine software and for the equipment of care centers both at the level of the reference health centers and the primary care point and provided infrastructure requirements for different settings (inpatient, outpatients, home visits, field work, etc)

These devices were selected to focus on primary care and non-communicable disease management.

2. Proposed infrastructure

The following infrastructure was budgeted based on the implementation of a telemedicine program for primary care. It includes equipment for the reference level and the primary care centers.

Reference center

Server
Server for hosting the software platform

Point of care
PC for clinics where patient care will be performed
Mobile devices for telemedicine services
- Notebook or
- Tablet

Situation Room
Monitor for the central level situation room
PC for the central level situation room

Low complexity hospitals
(Inpatients)

Point of care
Mobile devices for telemedicine services
- Notebook or
- Tablet

Specific devices for teleconsultation in clinical wards
Telemedicine Kit
PC for health team office

Situation Room
recommended for education and second opinion process)
Monitor for the situation room
PC for the situation room

Primary care facility (Clinics)

Point of care
PC for clinics where patient care will be performed
Mobile devices for telemedicine services
- Notebook or
- Tablet.

Situation Room
recommended for education and second opinion process)
Monitor for the situation room
PC for the situation room

Field Health Teams

Mobile devices for telemedicine services
- Notebook or
- Tablet

Telemedicine Kits (ultraportable)
Extra external batteries.

3. Telemedicine kit

TeleKIT | Basic

- All-In-One Vitals Telehealth Monitor
- Electrocardiogram
- Digital Stethoscope
- Manual Digital Camera
- Ultrasound
- Stadiometer
- Scale (Medical grade)
- Spirometer

TeleKIT | Maternity module

Fetal monitor.

TeleKIT | X Ray module

Portable X Ray Machine

- **Portable:** Recommended for permanently assigned care spaces with sufficient infrastructure (mainly electrical service) in hospital facilities or primary care centers.
- **Ultra portable:** Recommended for field health teams, hospital facilities or primary care centers without permanently assigned physical space. It is also recommended for those centers that, although they have assigned physical space, do not have the necessary infrastructure (especially electrical installation and security).

All-In-One Vitals Telehealth Monitor

Non Invasive Blood Pressure
Measuring method: Oscillometric Technique
Measuring range: 0mmHg~300mmHg
Maximal standard deviation: ≤ 8mmHg
Inflation time: <20s (typical adult cuff)
Overpressure protection limit: 300mmHg
Measuring range:
SYS: 30mmHg~270mmHg
DIA: 20mmHg~235mmHg
MAP: 10mmHg~220mmHg

Temperature
Measuring range: 32 °C ~43 °C
Measuring accuracy: ±0.2 °C
Response time: ≤ 5s
Probe: Infrared ear probe

SpO2
Technique: Dual-wavelength LED
SpO2 measuring range: 0%~100%
SpO2 measuring accuracy: ±3% (range from 70%~100%)
PR measuring range: 30bpm~250bpm
PR measuring accuracy ±2bpm
Sensor type: Adult, Pediatric

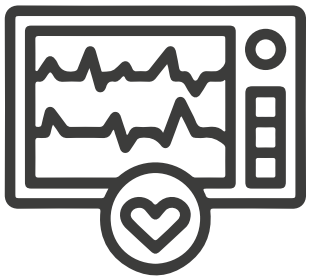
Blood Glucose
Measuring range: 20 - 600 mg/100ml (1.1-33.3mmol /L)
Measuring time: 6s
Sample volume: ≥ 0.7 microlitre
Measuring method: Electrochemical biosensor method

ECG
Measuring range: 30bpm~240bpm
Measuring accuracy: ±2bpm or ±2%
Display scale: 5.0mm/mV±10%
Common-model rejection ratio: ≥ 60dB
Option: ECG leadwire

Security
- FDA-cleared and HIPAA-compliant

Integration / interoperability
- Patient identification through HL7 patient data query messages or ADT services. If not possible, it should ensure a secure method for patient record association
- Biosignal and vitals transfer using HL7 messages

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)
- Yes



Electrocardiogram

Physical Specifications
Dimensions 420mm×330mm×120mm
Weight 5kg (Excluding recorder paper and battery)
Display 8 inch, 800×600 multicolor LCD screen (touch screen as optional)

Power Supply
Mains Supply:
Operating Voltage = 100V-240V
Operating Frequency = 50Hz/60Hz
Input Current = 0.9-0.4A

Internal Li-ion Battery Pack:
Rated voltage = 14.8V
Rated capacity = 2500/5000mAh (1.5/2.5 hours continuous printing, 300/450 ECG reports)
Necessary Charge time: 3/6 hours

Recording
Recorder: Thermal dot-matrix recorder
Printing Density:
8 dots per mm / 200 dots per inch (amplitude axes)
40 dots per mm / 1000 dots per inch (time axes, @ 25 mm/s)
Recorder Paper:
Folded thermal paper: 210mm×295mm x 100pages
Folded thermal paper: 215mm×280mm ×100pages (Optional)
Rolled thermal paper: 210mm× 30m (Optional)
Paper Speed: 5mm/s, 6.25mm/s, 10mm/s, 12.5mm/s, 25mm/s, 50mm/s
External Printer:
HP1010/1510, HP M401, HP 1020/1020PLUS/1106,
HP 2010/1050/2000, HP 2015/2035, HP 1525

Security
- FDA-cleared and HIPAA-compliant

Integration / interoperability
- Patient identification through HL7 patient data query messages or using the DICOM worklist to retrieve the list of patients with scheduled appointments.
- ECG report exportation to a file system using common file transfer protocols or to a PACS using DICOM storage modalities
- ECG data transfer using HL7 or other known standards.

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)
- Yes

Electrocardiogram

HR Recognition
HR Range: 30 BPM ~300 BPM
Accuracy: ±1 BPM

ECG Unit
Leads: 12 standard leads
Acquisition Mode: simultaneously 12 leads
A/D Converter: 24 bits
Resolution: 2.52uV/LSB
Time Constant: ≥3.2s
Frequency Response: 0.01Hz ~ 300Hz (-3dB)
Gain: 1.25, 2.5, 5, 10, 20, 10/5 mm/mV, AGC
Input Impedance: ≥100MΩ (10Hz)
Input Circuit Current: ≤0.01μA
Input Voltage Range: ≤±5 mVpp
Calibration Voltage: 1mV±2%
CMRR: ≥140dB (AC on)
≥123dB (AC off)
Sampling Frequency 16000 Hz

Pacemaker
Amplitude: ±750μV to ±700 mV
Width: 50μs to 2.0 ms

Filter
AC Filter: 50/60Hz
DFT Filter: 0.01Hz/0.05Hz/0.15Hz/0.25Hz/0.32Hz/0.5Hz/0.67Hz
EMG Filter: Off/25Hz/35Hz/45Hz
LOWPASS Filter: 300Hz/270Hz/150Hz/100Hz/75Hz

Data Transmission
Report Format: PDF, XML, DICOM, FDA-SCP
Data Transmission: Wi-Fi, Ethernet, RS232
Data Management System: SE-1515 Data Management System, bi-directional communication
HIS connection: DICOM Worklist/DICOM Storage/HL7/GDT

WiFi
Transmitting Frequency: 2400-2497MHz
Frequency Band: 2400-2497MHz
Modulation Type: DSSS, CCK, OFDM
Transmitting Power: 6 - 17dBm
Effective Radiated Power: 6 - 17dBm

Safety
Specifications
Comply with:
IEC 60601-1:2005/A1:2012
EN 60601-1:2006/A1:2013
IEC 60601-1-2:2007
EN 60601-1-2:2007/AC:2010
IEC/EN 60601-2-25

Anti-electric-shock type: Class | with internal power supply
Anti-electric-shock degree: CF type with defibrillation-proof
Patient Leakage Current:
NC <10μA (AC) / <10μA (DC)
SFC <50μA (AC) / <50μA (DC)
Patient Auxiliary Current:
NC <10μA (AC) / <10μA (DC)
SFC <50μA (AC) / <50μA (DC)

Environment Specifications
Temperature:
Transport & Storage: -20oC (-4oF) ~ +55oC (+131oF)
Working: +5oC (+41oF) ~ +40oC (+104oF)

Relative Humidity:
Transport & Storage: 25%~93% Non-Condensing
Working: 25%~80% Non-Condensing

Atmospheric Pressure:
Transport & Storage: 70kPa ~106kPa
Working: 86kPa ~106kPa

Digital Stethoscope

Digital Stethoscope with removable earpiece, wireless charging pad, USB charging cable

Wireless listening Bluetooth

Compatible with IOS and Android products, .WAV and .PDF file formats

Rechargeable lithium-ion battery with 10-hour life or higher

If a subscription is required, it must be included.

Audio
4 audio filters: diaphragm, bellmode, midrange and extended

Ambient noise reduction with 60x audio amplification

Super-bass driver delivers high-quality audio

Compatible with high-quality traditional headphones

Security

- FDA-cleared and HIPAA-compliant

Integration / interoperability

- Patient identification through HL7 patient data query messages. If not possible, it should ensure a secure method for patient record association
- Media exportation using HL7 or other known standards

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)

- No

Fetal monitor

Separate maternal pulse measurement

Continuous monitoring during transport in healthcare facilities

Integrated monitoring of maternal pulse rate and blood pressure (optional)

External monitoring of multiple fetal heart rates, uterine activity, and fetal movement

Extensive set of internal fetal parameters, such as direct fetal heart rate and intrauterine pressure

Security

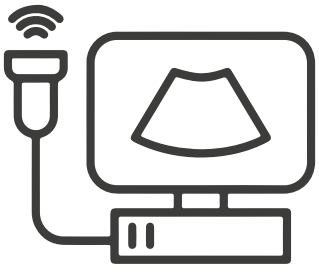
- FDA-cleared and HIPAA-compliant

Integration / interoperability

- Patient identification through HL7 patient data query messages. If not possible, it should ensure a secure method for patient record association
- Report exportation to a file system using common file transfer protocols or to a PACS using DICOM storage modalities
- Data transfer using HL7 or other known standards.

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)

- Yes



Ultrasound

M6 Main Unit
15-inch LCD monitor
B/M/Color/Color M/Power/Directional Power Doppler Flow Imaging
Pulse Wave Doppler (includes High Pulse Repetition Frequency)
PSHTM (Phase Shift Harmonic Imaging)
iBeamTM (Spatial Compounding Imaging)
iClearTM (Speckle Suppression Imaging)
HR Flow
iTouchTM (Auto Image Optimization)
iZoomTM (Full Screen View)
Abdomen/General Software Package
iScanhelper
1TB Hard Disk & iStationTM Patient Information Management
S-Video Output and USB 2.0 Ports
AC Adapter and Lithium-ion Battery Pack
Traveling Case

Software

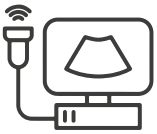
110-004393-00 Auto IMT Package (Automatic measurement for Intima-Media Thickness, Vascular Package should be configured at the same time)
110-004400-00 Free Xros MTM (Anatomical M-mode)
110-004401-00 Free Xros CMTM (Curved Anatomical M-Mode, TDI should be configured at the same time)
110-004402-00 TDI (Tissue Doppler Imaging, includes TVI, TEI, TVD and TVM)
110-004403-00 TDI Quantification Analysis Software (TDI should be configured at the same time)
110-004408-00 iNeedleTM (Needle Visualization Enhancement, available on L14-6Ns, L14-6s, 7L4s

Security

- FDA-cleared and HIPAA-compliant

Integration / interoperability

- Patient identification through HL7 patient data query messages. If not possible, it should ensure a secure method for patient record association
- Media exportation using HL7 or other known standards.
- DICOM 3.0
- Importing the work list through the Worklist Information Model mode
- Export of ultrasound images (US modality) and obstetrics-gynecology, echocardiography and vascular ultrasound reports through the Performed Procedure Step (MPPS) modality and Storage Commitment push model.
- It also allows the export of results on DVD, CD and USB and the printing of images.
- List of modalities
  - Verification AE (as SCU and SCP)
  - Storage AE (as SCU and SCP)
  - Storage Commitment AE SCU
  - Print AE (as SCU)
  - Worklist AE (as SCU)
  - MPPS AE (as SCU)
  - Query/Retrieve AE (as SCU)



Ultrasound

DICOM Options
110-004379-00 DICOM Basic
110-004380-00 DICOM Worklist

Application
Shared Service Package (includes Abdomen/General, Obstetrics, Gynecology, Cardiac, Small Parts, Urology, Vascular, Pediatrics, Emergency Medicine and Nerve packages)

Transducers
PR1E-30-90867 Convex array transducer, 3C5s
PP3A-30-90859 Phased array transducer, 2P2s

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)

- Yes

Scale (Medical grade)

Capacity
200 kg
Div (g): 100 g

Battery
Dimensions (AxAxP):
433 x 47 x 373 mm

Net weight:
2,9 kg

Functions:
automatic disconnection, Tip on (automatic connection function by touch), switching kg/lbs/sts, Auto-HOLD

Security

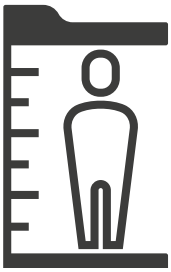
- FDA-cleared and HIPAA-compliant

Integration / interoperability

- Patient identification through HL7 patient data query messages. If not possible, it should ensure a secure method for patient record association
- Data exportation using HL7 or other known standards.

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)

- No



Stadiometer

Adult
Measuring range: 8 – 81″ / 20 – 205 cm

- Graduation: 1/8″ / 1 mm
- Dimensions, stadiometer (WxHxD): 13.3 x 83.9 x 23.2″ / 337 x 2,130 x 590 mm
- Dimensions, for transport (WxHxD): 13.3 x 7 x 24.6″ / 337 x 177 x 624 mm
- Device weight: 5.3 lbs / 2.4 kg
- Optional: carrying case seca 412

Pediatric
Measuring range:
10–99 cm, 10–99 cm / 4–39″

- DiGraduation: 5 mm, 5 mm / 1/4″
- Dimensions (WxHxD): 1,250 x 140 x 300 mm / 49.2 x 5.5 x 11.8″
- Dimensions, rolled up (WxHxD): 120 x 140 x 300 mm / 4.7 x 5.5 x 11.8″
- Weight: 575 g / 1.3 lbs
- With wall-mountable storage

Security

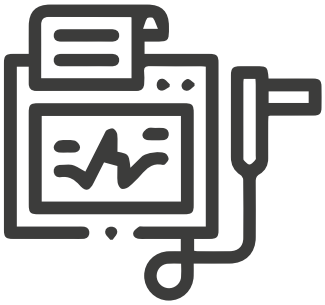
- FDA-cleared and HIPAA-compliant

Integration / interoperability

- Patient identification through HL7 patient data query messages. If not possible, it should ensure a secure method for patient record association
- Data exportation using HL7 or other known standards.

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)

- No



Spirometer

Measures: Peak Flow and FEV1

USB and/or Bluetooth connection

FVC, VC&IVC, MVV, PRE and POST BD & Bronchial Challenge tests

Real-time Flow/Volume loop and Volume/ Time Curve with PRE/POST comparison

Embedded temperature sensor for BTPS conversion

Automatic Spirometry interpretation with alert messages

Calibration free: uses a factory-calibrated disposable mouthpiece/turbine

Cross contamination free: prevents exposure to patient inspired or expired air

ATS compliant and supports NHANES III standard

Multi-language interface

Suitable for all ages

Security

- FDA-cleared and HIPAA-compliant

Integration / interoperability

- Patient identification through HL7 patient data query messages. If not possible, it should ensure a secure method for patient record association
- Spirometer report exportation to a file system using common file transfer protocols or to a PACS using DICOM storage modalities
- Spirometer data transfer using HL7 or other known standards.

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)

- No

Portable X Ray Machine

Portable: Recommended for permanently assigned care spaces with sufficient infrastructure (mainly electrical service) in hospital facilities or primary care centers.

Ultra portable: Recommended for field health teams, hospital facilities or primary care centers without permanently assigned physical space. It is also recommended for those centers that, although they have assigned physical space, do not have the necessary infrastructure (especially electrical installation and security).

Output power 4 kW

X-ray tube (Focus) 0.6 / 1.6 mm

mAs (Adjustable) 1 to 190 mAs

Tube voltage (Adjustable) 40 to 110 kV

Nominal power 100 kV, 40 mA, 0.1 s, 4 kW

mA (Adjustable) 36 to 60 mA

Power supply 220 V ± 22V;
50 to 60 Hz ± 1Hz

Anode heat capacity

(X-ray tube) 76 kHU

Machine frame size Highest: 1060 × 790 × 2210 mm

Lowest: 1060 × 790 × 1240 mm

Size 290 × 260 × 230 mm

Weight up to 20 kg

Flat panel digital detector (optional) of 17 × 17 inch

Simulation and digital double loop control

Preset anatomy memory choices

High quality X-ray (minimizes excess radiation)

Failure alert for self-protection

Security

- FDA-cleared and HIPAA-compliant

Integration / interoperability

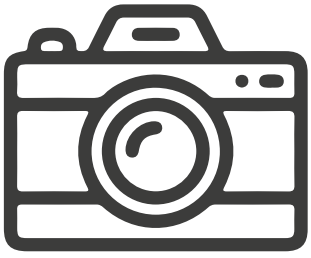
- Patient identification through HL7 patient data query messages. If not possible, it should ensure a secure method for patient record association
- Media exportation using HL7 or other known standards.
- DICOM 3.0
- Importing the work list through the Worklist Information Model mode
- Export of images (US modality) reports through the Performed Procedure Step (MPPS) modality and Storage
  Commitment push model.
- Allows the export of results on DVD, CD and USB and the printing of images.

Portable X Ray Machine

- List of modalities
  - Verification AE (as SCU and SCP)
  - Storage AE (as SCU and SCP)
  - Storage Commitment AE SCU
  - Print AE (as SCU)
  - Worklist AE (as SCU)
  - MPPS AE (as SCU)
  - Query/Retrieve AE (as SCU)

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)

- Yes



Manual Digital Camera

Scope: eye fundus, dermascope, otoscope and general exam.
40/25 Degree Field of View
Macular Pigment Density (MPOD) 3D Map
Lightweight, Handheld
Quick Data Transfer. Must transfer the images to a laptop, PC, or mobile device.
Wi-Fi and/or Bluetooth compatible. Micro SD card and AV output.
3.5" Full Color LCD or higher
Photo and Video Capture
Outstanding Illumination
Dual Screen Mode
2M Pixels HD Resolution or higher, brightness and focus control

Security

- FDA-cleared and HIPAA-compliant

Integration / interoperability

- Patient identification through a known standard. If not possible, it should ensure a secure method for patient record association
- Image transfer using DICOM storage modalities or other common file transfer protocols

Evaluated and approved by the Department of control and assurance of the ops quality (imt/qr)

- No

4. Main considerations

4.1 Potential Risks and security (anti-theft/vandalism)

Due to the implementation in several countries, some considerations must be taken into account, regarding some specific infrastructure and particular considerations.

Some integration process, or adaptations could be necessary depending on the existing infrastructure in each country.

Particular integration process with health systems already implemented into the country could required some extra analysis and requirements.

Physical security (anti-theft/vandalism): there is no description about that in most providers so it should be specifically requested.

Supply chain: possible delivery delays.

4.2 Energy special requirements

Due the project will be implemented in several countries; providers must adapt the products to energy requirements specifics for each country or provide adapters.

Information about electricity requirement could be find in:

- Wikipedia. https://en.wikipedia.org/wiki/Mains_electricity_by_country
- Configurations, Inc. International Wiring Devices. https://internationalconfig.com/

4.3 Implementation, installation and integration support

Consider the possibility of budgeting support time for implementation, installation tasks or integration processes that countries may require.

4.4 Additional licenses

Evaluate the relevance or need to acquire complementary licenses according to the requirements of the countries, for example: proprietary licenses for the integration of equipment.

4.5 Software licenses

The equipment must meet interoperability requirements to be able to be integrated into existing information systems. They should not provide proprietary integration software or extra licensing for the integration processes.

4.6 Storage and transfer solutions

Whether all devices are delivered together or in separate groups, the necessary storage and transportation solutions should be considered to guarantee the use of the equipment in the contexts and scopes required by the countries.

The program provides suitcases or backpacks for ultra-portable cases.

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Americas Region

www.paho.org