Digital Health

Virtual Management of Chronic Diseases
Role of Clinical Telemedicine Systems vs Video Consultations

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Abstract

The author shares his experience of designing and deploying Clinical Telemedicine Systems for Virtual Disease Management in this article, taking the readers through the anatomy and functioning of such way of remote care.

Telemedicine is a growing and important field in the medical industry. It allows doctors to consult with patients remotely, using video conferencing, phone calls, and other digital tools. This means patients can get the necessary care without travelling to see a doctor. Telemedicine can be used for various purposes, but disease management is one of the most important. The author believes that Virtualisation of the Clinical Work Flow is needed to make efficient Remote Disease Management, whether it's Tele-homecare or Outpatient consultations.

Virtual Disease Management

Chronic disease is the highest healthcare cost in the United States, accounting for $1 of every $5 spent. The top three costliest chronic conditions include Cardiovascular disease, Respiratory conditions and Diabetes. Virtual disease management (VDM) is a new method of treating patients that is more personalised and patient-centred than traditional disease management programs.

What is Virtual Disease Management ?

Traditional disease management programs are focused on single conditions and are often cookie-cutter approaches that don't consider individual patients' unique needs.

Virtual disease management, on the other hand, is a personalised approach that uses technology to tailor care to each patient's unique needs. This type of care is more patient-centred and includes more education and counselling. Virtual disease management programs can treat a wide range of chronic conditions, including Diabetes, heart disease, hypertension, obesity and more.

How does virtual disease management work?

Virtual disease management programs use technology, such as patient portals, secure messaging and video conferencing, to connect patients with their care team. This type of care is more patient-centred and includes more education and counselling.

Literature reference: a systematic review of the evidence

Disease management is a multidisciplinary healthcare strategy for improving health outcomes for patients with chronic conditions. This review aimed to evaluate the evidence for the efficacy of disease management programmes delivered via digital technology. A systematic search was conducted to identify studies that evaluated disease management programmes delivered via digital technology.

Studies were included if they measured any patient health outcomes, such as clinical indicators or health-related quality of life, or healthcare process-related outcomes, such as medication adherence or healthcare resource utilisation. Data were extracted and quality assessed independently by two review authors. Forty-six studies were included in the review.

Digital disease management programmes were associated with significant improvements in clinical outcomes, including blood pressure (mean difference: -3. Digital disease management programmes are associated with substantial improvements in clinical outcomes.

However, the evidence base is still relatively small, and further research is required to determine the most effective digital disease management strategies. Copyright ©2019 The Authors. Published by Elsevier Ltd. All rights reserved.

Telemedicine Assisted Virtual Disease Management

Live Video Communication between a patient and care-provider has been evolving over the last two decades, with rapid advancements getting introduced since the Covid pandemic due to necessitated learning in the face of a new challenge. Let's look at how a Video Consultation differs from a Clinical Telemedicine System.

Medical Video Consultations

Medical video consultations are when a doctor and a patient meet online to discuss the patient's health. This can be done through a computer, tablet, or smartphone. The doctor can ask patients questions, check their symptoms, and prescribe medication.

Medical video consultations are usually over a computer or smart phone and serve to be a great way to get medical advice without having to leave your house. This can be useful if the patient is in a different location than the doctor or if the patient needs to see the doctor but can't physically go to the doctor's office.

Limitations of Video Consultations without a Clinical Decision Support System

The doctor-patient meeting is not the only process that takes place during the course of clinical care and disease management. The physical or visual examination (in case of video meeting) is important along with history taking, though mere video consultations do not meet several workflow elements.

The third-party video platforms are not designed for medical consultations as their purpose usually is to connect two people at a distance via live online video. The such platform being third-party portals, often show less than the required sensitivity to Data Protection which is integral for patient safety.

The legislative requirements in several countries also pose barriers to specific video platforms, such as Skype is banned in certain Gulf States.

Patient Satisfaction is also an issue where a doctor-patient interaction gets limited to a Video Conversation. The patients often regard such consultation as a Video Meeting rather than a Medical Consultation and show discontent on the care provider's management decision, requesting an in-person visit as, to them, a Zoom meeting is like talking to a contact whom you cannot meet in person due to distance limitations.

Clinical Telemedicine System to serve Virtual Disease Management

Clinical Telemedicine System is a seamless blend of "Telemedicine Software with an embedded Clinical Decision Support System and interoperable smart and standard medical devices, purposed embedded to assist in Virtual Disease Management, including Tele-home-care and Tele-outpatient services.

The following components are pillars of the Clinical Telemedicine System, with all of them working as one machine rather than independent units.

Video Consultations as the core technology

- High Definition, two-way relay with latency less than 0.5 sec
- HIPAA Compliant video signal
- Electronic Patient Waiting Room with two-way messaging
- Live Tele-consultation Room with Toolkit for the Doctor
- Multi-Video Channel capability for involving other participants such as a medical colleague, a patient's relative, an interpreter, a trainee.

Practice Management System

- Appointment Management System
- Clinics Management System
- Practice Assistant Portal
- Online Payment System Integration ready
- SMS Reminder and Notifications ready
- Email Notifications and Reminders with Customisation option

Electronic Medical Record Tool-kit

- Uploading of Medical Records related documents into relevant folders
- Uploading of Video Clips
- Capturing of Patient Findings related images

Clinical Decision Support System

- Symptoms Data Collection Forms (Dynamic and Static)
- Medical Guidelines
- Healthcare Audit Portal
- Clinical Governance Portal
- Disease Surveillance Tool Kit

Tele-consultation Summary System

- Auto-summary of the Clinician's actions in exportable document form
- Speech to Text Transcription facility
- Editable Templated Clinics Notes Call-up Facility
- Private Notes page
- Voice-to-MP3 summary with auto-emailable feature
- Image-attachment feature for multi-media Documentation
- Clinical Governance Portal

Doctor's Actions Toolkit and Auto-dispatch of Requests

- Prescription Writing
- Auto-completion of Referral Letter
- Direct Dispatch of Prescriptions and Investigations Request
- Direct Link to Pharmacies and Labs for fast processing

Interoperability with Other Hospitals' EMR

- Dynamic API Real Time Linkage
- Static Screen Link to other EMR systems

Seamless Embedding with Medical Devices

- Active API Real-Time Connection with Smart Devices
- Device Independent Inter-operability Kit to link any Medical Device
- Multi-channel capability to connect the video camera and device simultaneously
- Eliminating Resolution Mismatch and Optimising Video Latency

Main Features

Company branded Software with options to Customize
Mobile Responsive Website – Android/Apple Apps

Video Consultations
- High Definition
- HIPPA Compliant
- Seamlessly merged

Tele-consultation Summary
- One-click Auto creation
- Doctor's deliberation added
- Images Incorporated
- PDF format for easy export

Clinical Decision Support System
- Medical Guidelines
- Healthcare Audits
- Dynamic Data Forms
- Clinical Governance

Multi-Channel Capability
- Doctor & 2nd Specialist
- Patient & Patient's relative
- Nurse – Physio – Assistant
- Interpreter – Admin

Electronic Medical Records (EMR)
Documents – Images,
Audios – Videos

Auto-dispatch of requests
- Partner Pharmacies
- Radiology Centers
- Path Labs

Main Features

Company branded Software with options to Customize
Mobile Responsive Website – Android/Apple Apps

Appointment Bookings
- By Schedule
- Instant
- Via Assistant
- Auto-reminders

Practice Assistants
- Clinic's Manager
- Doctor's Coordinator
- Data Controller

Patient Education
- Show Images
- Play Videos
- Send to patient

Electronic Waiting Room
- Patient's Waiting Room
- Digital Engagement
- Text Messaging

Online Transcription
- Type Clinic Notes
- Voice Record to MP3
- Voice to Text Dictation

Diverse Interoperability
- Hospital Data and EMRs
- Smart Medical Devices
- Standard Ultrasound Machines

Patient Education System

- Images based portal
- Video-based portal
- Patient Engagement Monitoring

Significance of a Clinical Telemedicine System

A Clinical Telemedicine System is an immersive environment rather than a one-off Video Meeting portal between doctor and patient. It's the Virtualisation of the Clinician's existing workflow so that they do not change how they deal with the patient's disease protocols and management rituals.

An effective Clinical Telemedicine System will empower the Clinician to manage chronic diseases with more confidence and better outcome while requiring less cost, thus lowering the Disease Burden of society.

The cost-to-serve ratio of setting up a new brick-and-mortar facility as compared to a Clinical Telemedicine empowered outpatient clinic shows a saving of 87%, not to mention the ease and speed it provides to get going.

Summary of the Clinical Telemedicine System vs Video Consultations systems

Clinical Telemedicine vs Video Consultations

1. Appointment Management System
2. Practice Management System
3. Patient Electronic Medical Records
4. Manual Entry of Vital Signs readings
5. Integration with existing Hospital Records
6. Live consultation in HD, Low Latency Video
7. Electronic Waiting Room for Patients
8. Clinical Decision Support Tools
9. Clinical Guidelines for Disease Management
10. Symptoms Forms for history taking
11. Patient Education Module
12. Onward Referral Service to various fields
13. Integrated Pharmacy and Radiology Referrals
14. e-Prescription generation and dispatch
15. Auto-summary Document of Teleconsultation
16. Interoperability with Telemedicine Cameras
17. Multiple Clinicians can join simultaneously
18. The Patient's guest can join remotely
19. Interpreters can join remotely
20. Integration with iHealth Smart Gadgets
21. Patient Identification Registration System
22. Patient Consent Taking Portal
23. Audio Teleconsultation Dictation Portal
24. Instant Operating Manual Recall
25. Performance Audit Dashboards for the Admin
26. Practice Management by the Clinical Assistant
27. Open to any Payment Module Integration
28. Open to any SMS Platform Integration
29. Website to be fully responsive on Smartphones
30. Android and iOS Apps available if needed
31. Enhanced Data & Domain Security
32. HIPAA Compliant Video Meeting
33. GDPR Guidelines based on Data protection
34. Data Protection Firewall of Military Grade

User Case Scenario of a Clinical Telemedicine System

A Clinical Telemedicine System empowers several models of Outpatient and Remote Care for Chronic Diseases. Some of them are summed up below:

Virtual Clinics

- Gps
- Specialists
- Care Assistants

Specialist Tele-OPD

- Tele-cardiology
- Tele-dermatology
- Tele-psychiatry
- More …

Instant Tele-consultations

- Primary Care Hotline
- Specialist Care Hotline
- Pandemic Hotline
- In-flight or In-Sea Telecare

Home Tele-care Management

- Continuous Monitoring
- Intermittent Monitoring
- Early Warning Score System

Field Tele-clinics

- School Health kiosk
- Workplace Tele-kiosk
- Shopping Mall kiosk

Mobile GP or Specialist Clinics

- Tele-OPD Van
- Tele-bike Domiciliary Service

User Case Scenarios

Company branded Software with options to Customize

Virtual Clinics
* GPs
* Specialists
* Care Assistants

Instant Tele-consultations
* Primary Care Hotline
* Specialist Care Hotline
* Pandemic Hotline
* In-flight or In-Sea Telecare

Clinical Telemedicine
* Tele-cardiology
* Tele-dermatology
* More....

Home Tele-care Management
* Continuous Monitoring
* Intermittent Monitoring
* Early Warning Score System

Field Tele-clinics
* School Health kiosk
* Workplace Tele-kiosk
* Shopping Mall kiosk

Mobile GP or Specialist Clinics
Tele-OPD Van
Tele-bike Domiciliary Service

Conclusions

Chronic diseases suitable for Telemedicine can help lower the disease burden, as better outcomes are achieved when patients receive treatment remotely.

Common Chronic diseases suitable for Virtual Disease Management through a fully deployed Clinical Telemedicine System include Cardiovascular diseases, Diabetes, Chronic Respiratory diseases, Cancer, and Mental health disorders.

There are several ways the tool kit within Clinical Telemedicine system can be used to treat and manage chronic conditions, such as follow-up appointments to see how a patient is doing on a new diet, medications, or other modifications. Telebehavioral care and therapy are other examples of remote care with some more mentioned below:

* Chronic Pulmonary patients who require to send back peak flow meter readings
* Patients with neurological or rheumatological conditions who fill out online forms indicating their progress or worsening
* Sending chronic wound pictures, X-rays taken locally
* Patients sharing their diet plans and results using standard weighing machines for progressive BMI assessment

Remote Vital Signs Monitoring via Clinical Telemedicine System
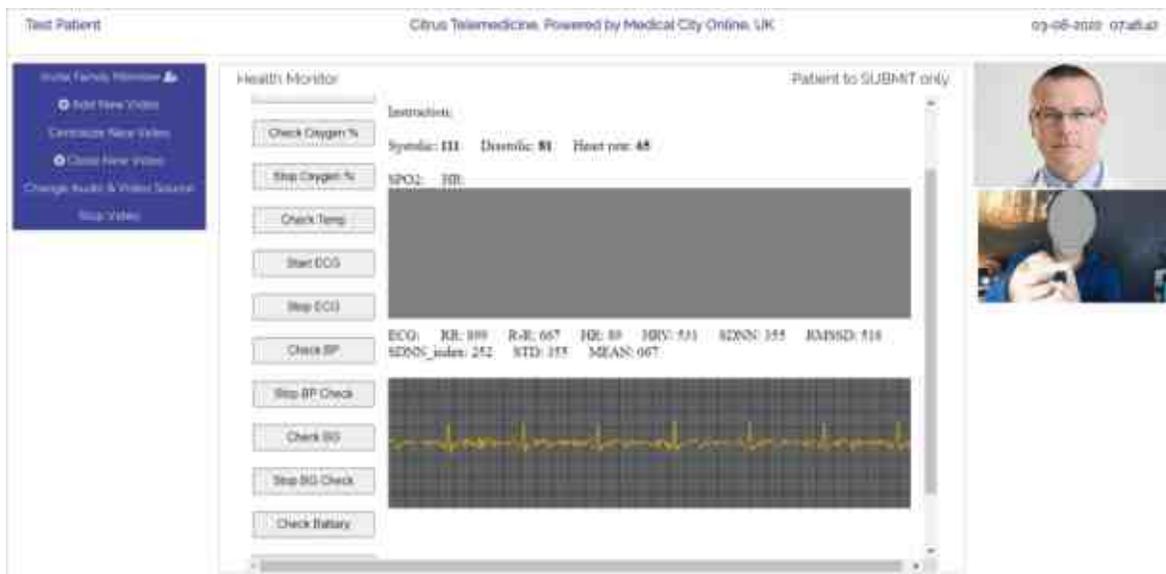
Virtual Diet and Nutrition Management via Clinical Telemedicine System

Tele-Orthopaedics management via Clinical Telemedicine Software

Live Shoulder Examination for a Rotator Cuff Tear via Standard Ultrasound Machine over Clinical Telemedicine System using an Inter-operability Kit