

Summer Training Report

on

IMPACT OF COVID-19 ON DISTANCE HEALING IN INDIA

by

AMITOJ KAUR

Under the guidance of

Dr. Alok Mathur

MBA Hospital and Health Management

2019-21



ACKNOWLEDGEMENT

Learning is a never ending process . Our quest to learn more and more by grabbing every possible opportunity that comes our way, proves to be the reason behind our success one day .

I would like to thank the management for providing me with this learning opportunity, which has enhanced my knowledge related to telemedicine, impact of COVID-19 pandemic on telemedicine, and how has telemedicine evolved itself by becoming one of the most safe and comfortable treatment option for the patients in such odd situations. Working on this report has made it possible for me to explore the topic in all possible dimensions to extract best out of all the data available and turn this opportunity into a beautiful learning experience.

My sincere thanks to my mentor **Dr.Alok Mathur** who has been a constant support and has guided me in the correct direction throughout my learning process.

My heartfelt gratitude and appreciation are also extended towards **Dr.Abhinav Mohanty** (Alumni-IIHMR University) for his useful advice and constant support in the completion of my project report.

Lastly, I also thank my loving parents and almighty for giving me patience and strength to overcome the difficulties, which crossed my way in accomplishment at this endeavour.

TABLE OF CONTENTS

<u>SL NO</u>	<u>CONTENT</u>	<u>PAGE NO</u>
1	Acronyms/ Abbreviations	4
2	Project Report	5
2.1	Definition and history of telemedicine	5
2.2	Types of telemedicine	6
2.3	Pros &Cons of telemedicine	7
2.4	Market drivers & restraints	8
2.5	Role of TMS in previous epidemics	8
2.6	Telemedicine in india	10
2.7	Latest guidelines by MOHFW	12
2.8	Rationale	13
2.9	Research Question	13
3.0	Objectives	13
3.1	Methodology	13
3.2	Literature Review	13
3.3	Findings	17
3.4	Conclusion	21
3.5	Recommendations	22
3.6	References	23

ACRONYMS/ABBREVIATIONS

1. TMS - TELEMEDICINE SYSTEM
2. COVID-19 - CORONAVIRUS DISEASE 2019
3. WHO-WORLD HEALTH ORGANISATION
4. ICT- INFORMATION AND COMMUNICATION TECHNOLOGY
5. ECG-ELECTROCARDIOGRAM
6. GP-GENERAL PRACTITIONER
7. RMP-REGISTERED MEDICAL PRACTITIONER
8. ISRO-INDIAN SPACE RESEARCH ORGANISATION
9. MOHFW-MINISTRY OF HEALTH AND FAMILY WELFARE
10. SAARC-SOUTH ASIAN ASSOCIATION FOR REGIONAL CO-OPERATION
11. EHR-ELECTRONIC HEALTH RECORD
12. VOIP- VOICE OVER INTERNET PROTOCOL

IMPACT OF COVID-19 ON DISTANCE HEALING IN INDIA

WHAT IS TELEMEDICINE?

WHO refers to TMS as “healing from a distance”. TMS or e-medicine, is the interactive provision of health care, including assessments and evaluations, through the telecommunications network. It utilizes electronic technology and computer networks to offer online clinical facilities to patients. Nowadays, people no longer need to go for an in-person appointment with a doctor for treatment. The usage of safe video and audio links allows it easier for physicians to manage patients who live in inaccessible areas.

WHO defines TMS “The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities”.

The four elements applicable to TMS are:

- 1.The aim is to dispense therapeutic assistance.
- 2.It is made to resolve spatial obstacles, linking users that are not in the same physical area.
3. This requires the usage of many forms of ICT (information and communication technology)
4. The aim is to enhance impact on health of people.

HISTORY OF TELEMEDICINE-

Historically, TMS can be dated back to the late 19th century when information of electrocardiographs were sent by wires of telephone.

TMS, in its current form, was introduced in 1960s, mainly by the military and technology industries, as well as by a few individuals using available industrial equipment. Examples of early technological advances in TMS include the use of television to facilitate meetings between clinical specialists and general practitioners in the state mental hospital and the provision of qualified medical advice from the main teaching hospital to the airport medical centre.

Recent breakthroughs and growing availability and usage of ICT by the general public have been the main drivers of TMS over the last decade, generating increasingly new opportunities for health care delivery provider.

This applied to developing countries and to underserved industrialized countries. The replacement of analog means of communication with digital ones, added with a dramatic decline in ICT charges, has led to a great deal of interest in the use of TMS among healthcare professionals and has allowed health care organization to devise and introduce further more and more efficient ways of delivering treatment.

ICT advances have also evolved with the emergence and popularization of Internet, extending the reach of TMS to include webbased applications such as Email, teleconsultation and online conferences) and digital app

oaches. Such advances have contributed to the rich development of TMS apps that the world is starting to discover.

TYPES OF TMS [1]

Four specific types of TMS applications can be categorized as-

1. As per the communication method -

- Video (TMS facility, Apps, Chat Platform Video, Skype / Face Time etc.)
- Text Based: a) TMS based on chat apps (specialized TMS phone applications, Websites, other internet-based systems etc.) b) General texting/ platforms for chat (Google Hangouts, Whatsapp, Facebook Messenger etc.) c) Asynchronous (Fax/email etc.)
- Audio (Phone, VOIP, Apps, etc.)

2. As per the time of information transferred-

Text interaction/Real time video/audio	Asynchronous exchange of relevant information
Transfer of useful information for diagnosis, medication, health education and counselling via Video/text interaction/audio.	Transfer of a condensed form of supplementary data and complaints of the patients such as laboratory reports, images and/or radiological reports between stakeholders. This kind of data can be shared with various parties anytime and later accessed per need/convenience.

3. As per the purpose of the consultation-

For cases with no emergency:

First time consultation with any RMP for diagnosis/treatment/health education/ counselling	Follow-up consultation with the same doctor
Patients can have consultation with RMP for the diagnosis and treatment of their problem, Also, for health-education and counselling.	Patients can use this service for follow up consultation on their current treatment with the same doctor who prescribed the treatment earlier in-person consultation.

In cases of emergency for first aid /immediate assistance etc.

♣ In cases where any other form of care is absent, the only way to provide on time care may be teleconsultation. TMS should however be avoided in case of emergency care if in-person care is available, and telemedicine consult should be restricted to life-saving measure, first aid, counselling and advice if referred.

♣ In any emergency, the patient should be advised for in-person visit to the doctor as soon as possible.

4 As per the individuals involved –

Patient to RMP	Caregiver to RMP
TMS services may connect the patient to RMP.	Under certain conditions, TMS can connect care givers to RMP.

RMP to RMP	A health worker to RMP
With the use of TMS services RMP can discuss care issues of 1/more patients or disseminate knowledge with other RMPs .	A Health Worker may help in consultation session for a patient with the doctor. In such scenarios, the former can help take patient's history, examination of the patient and send the conclusion to the RMP.

PROS AND CONS OF TELEMEDICINE-

The primary goal of TMS and remote consulting is to provide reliable healthcare services. Various pros and cons are-

Pros-TMS is useful in most situations. It has the potential to tackle regional barriers to serve health treatment by providing safe and accessible treatment to the ones in need. For example, disabled citizens. This helps reduce health care costs and save the patients and caregiver's money. A person can consult the physician or specialist, regardless of where they live by using their own personal technology. Also, there are no travel /time expenses, no exposure to other potentially contagious patients, fewer missed or cancelled appointments.

Cons-The virtual nature of TMS has some downsides. Infrastructure and technical training are required. It can reduce patients' direct interaction with doctors since online interactions are impersonal and physical examination is necessary in order to achieve a full diagnosis. The medical curriculum does not yet include telemedicine. There is no clearness regarding telemedicine-related medico-legal problems. There are currently no TMS factors in India for health insurance.

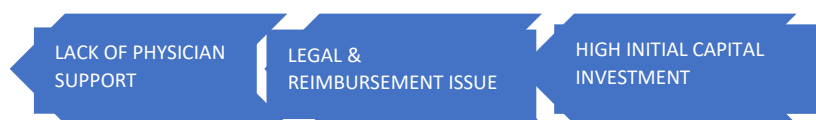
MARKET DRIVERS AND RESTRAINTS-

MARKET DRIVERS INCLUDE-



Market drivers includes increased remote patient monitoring that provides tools for monitoring of disease and patient and provider communications in order to decrease the patients risk of infection , providers and communities and increasing technological innovations along with an increase in burden of chronic diseases each year.

MARKET RESTRAINTS INCLUDE-



Market restraints include high initial capital investments ,lack of physician support and legal &reimbursement issues.

ROLE OF TELEMEDICINE IN PREVIOUS EPIDEMICS -

TMS has been used previously in outbreaks in the following ways-

1)Teleconsultation-For individuals with no symptoms, usually care based in home but are staying in areas affected with epidemic. For example- In 2014 Ebola outbreak,Health Ministry in guinea had established national Ebola hotline inorder to help the concerns of public health and ease out the referral of the casEs which are suspected to the nearby hospital. The same was followed by Liberia and sierra leone.

In west Africa, an app was used for people to share symptoms via text messages to doctors, which were then matched with cases by doctors located in Indonesia and Nigeria and if need be, they were referred to the hospital.

From October 2014 to May 2015, approx. 6063 chats took place via teleconsultation in west Africa.

2) Telemonitoring- Monitoring of symptomatic contacts.

Telemonitoring is managed by autoadministred/heteroadministred/questionnaire based on mobile system.

Medical data is collected from contacts and sent to contact tracing centre which is monitored by epidemiologist throughout follow up duration.

For example in 2014,Western Australia , [telemonitoring](#) helped in developing SMS-based mobile application known as “Ebola Tracks” in order to monitor individuals coming back from Ebola-affected countries in Africa. Those people who were potentially exposed to virus were then monitored through text messaging two times in a day so as to identify the status of health of the patients such as their temperature. It was found that for follow up of cases, 1108 messages were delivered to 22 people to get symptom information and 91% return rate was reported.

3)Teleconsultation of symptomatic cases who need to be isolated-This decrease the contact between healthcare worker and the patient. Thus, spread of infections will also reduce. Fore example-In Taiwan,teleconsultations were used during the [Severe Acute Respiratory Syndrome](#) (SARS) epidemic in 2003 to a SARS affected patient quarantined in hospital and also during 2009 in the [H1N1 influenza](#) pandemic for patients who were quarantined at home.

4)Tele expertise-Used when local medical resources are technically expert to diagnose and treat and help is required from specialist. Tele-expertise is mostly used in primary and secondary healthcare settings.

5) Telemedicine is used to take care of patients who cannot enter the hospital in a healthcare system under partial or full quarantine. In June 2015, telephone prescriptions were released in the Samsung Health Center of Seoul (South Korea) under quarantine due to coronavirus (MERS) epidemic.[3]

TELEMEDICINE IN INDIA-

India is a large country with more than 135 crore population. And 1.1 million allopathis doctors are registered with the board of governors /state medical councils in December 201,as per national healthprofile,2019.India's public health expenditure is just 1.28% of its GDP,with the per capita public health expenditure being ₹1,657 in 2017-18.The rising cost of treatment has lead to inequities in access.

The Indian Space Research Organisation (ISRO) hadstarted a small TMSproject in India in 2001 connecting t he Apollo hospital in the village of Aragone in the district of Chittoor, Andhra Pradesh, with the Apollo Rural H ospital. This initiative taken by the ISRO, Ministry of External Affairs, DIT, State government and MOHFW has helped TMS grow in India.

TMS services in India are handled by combined jurisdiction of Department of Information Technology and MOHFW. The Ministry of Health in the GOI has taken up projects such as Integrated Disease Surveillance Project (IDSP), National Cancer Network (ONCONET), National Rural TMS Network, the Digital Medical Library Network and National Medical College Network in order to bind the available public health data and ease of access.

Government had also set up Standardized TMS guidelines (as given by department of IT in Govt of India). In 2005, a special task force called national TMS task force by Health ministry was also introduced. External Affairs ministry took the initiative of International projects such as the Pan-African e Network Project and the SAARC telemedicine network project.

Examples of successful use of TMS are-

- Mammography service at Sir Ganga Ram hospital
- Surgical services in Sanjay Gandhi Postgraduate Institute of Medical Sciences
- Oncology at Regional cancer centre, Trivandrum
- During Maha Kumbha melas, The Government of Uttar Pradesh practices telemedicine.

Currently the major Indian private sector players in TMS work with the central and state governments. Organisations such as ISRO guide them with the latest technology. These private players are Narayana Hrudayalaya, Apollo TMS Enterprises, Aravind Eye Care, Escorts Heart Institute, Asia Heart Foundation and Amrita Institute of Medical Sciences

ISRO'S TELEMEDICINE NETWORK

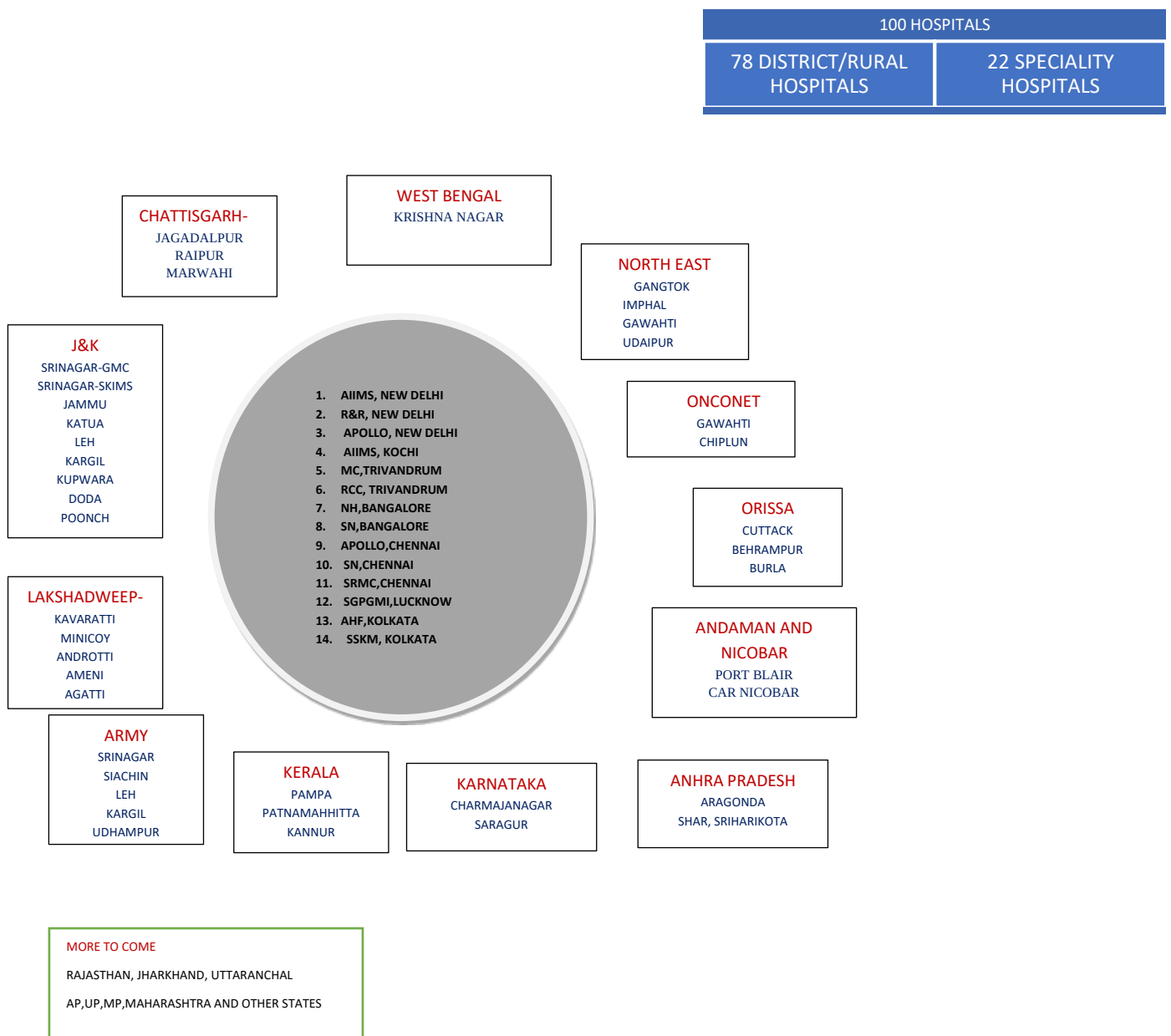


Figure-ISRO's TMS network in India [2]

In the past three years, ISRO's TMS network has connected 78 remote/rural hospitals and 22 super specialty hospitals. The remote nodes of rural areas such as the islands of Andaman and Nicobar and Lakshadweep, Medical College hospitals in Orissa. the hilly regions of Jammu and Kashmir and some of the rural/district hospitals in other states are now connected by super specialty hospitals.

To ensure safe data transmission during TMS practices, MoHFW has developed a set of Electronic Health Records (EHR) standards in 2013 and a revised version of the same in 2016. TMS guidelines were designed in MARCH 2020 to help the practitioners in making good use of TMS.

RATIONALE-

The current coronavirus outbreak (COVID-19) is the third documented outbreak in humans of an animal coronavirus that has triggered a significant epidemic in the past two decades. Spread of COVID-19 pandemic has called out for implementation of social distancing and nationwide lockdown, which means that people will not be able to comply with routine clinic visits. It is due to this COVID-19

pandemic that our old friend, TMS has come into new avatar and is playing a major role. The purpose of this research is to study the impact of COVID-19 pandemic on distance healing.

RESEARCH QUESTION-

What is the impact of COVID-19 on telemedicine in India?

OBJECTIVES-

- To understand the role of TMS during COVID 19 outbreak.
- To understand the impact of COVID-19 on TMS in India.

METHODOLOGY -The report is based on the descriptive secondary research data. Previous articles regarding, TMS and impact of COVID-19 on TMS were reviewed and data was collected from them. Articles pertaining to efficiency of TMS were also reviewed to understand their importance in improving healthcare system.

LITERATURE REVIEW-

JOURNAL & YEAR	TITLE	AUTHORS AND LINKS	KEY FACTS
<i>J Emerg Trauma Shock. 2020.</i>	"Novel Coronavirus (COVID-19): Leveraging telemedicine to Optimize Care While Minimizing Exposures and Viral Transmission"	Chauhan.V et al https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7161346/	-TMS has become a critical need for people under home quarantine. - One of the Israel's medical centres have reported the use of TMS to effectively care for the 12 Israeli COVID-19 patients received from the cruise ship that was quarantined in Japan for several weeks. -Using tailored approaches, TMS providers can remotely identify patients who may require further escalation of care. Thus, TMS can help triage patients to ensure appropriate use of hospitals, emergency departments (EDs), and clinics. -Overall TMS should be adopted and promoted to safeguard healthcare workers and high-risk patient population.

<i>Clin Exp Dermatol.</i> 03 April 2020	“WhatsApp messenger as a tele dermatology tool during coronavirus disease (COVID-19): from bedside to phone-side”	Jakhar.D et al https://onlinelibrary.wiley.com/doi/full/10.1111/ced.14227	-WhatsApp is being used effectively for tele dermatology consultations during COVID-19 outbreak. -Use of WhatsApp video calls and sending of images make diagnosis easier for dermatology assessment. -Privacy and ethical issues pose a disadvantage for TMS -COVID-19 provides us with an opportunity to learn and implement tele dermatology in clinical practice so as to be prepared for future.
<i>Indian Heart J.</i> 2020 Mar-Apr	“Digital healthcare: The only solution for better healthcare during COVID-19 pandemic?”	Kapoor.A et al https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7151273/	-TMS is being used for screening of COVID-19 cases and management of non COVID-19 cases. -TMS has drastically reduced visitors load to the hospital. — Healthcare technologies have assisted with the advancement of digital health approaches such as integrated monitoring networks, tele-health, innovative diagnosis and therapeutic decision-making techniques, wider wearable devices penetration to monitor physiological parameters and the creation of open chat platforms for the public dissemination of knowledge on COVID-19.
<i>J Diabetes Sci Technol.</i> 2020 July	“Teleconsultation and Diabetes Care Amid COVID-19 Pandemic in India: Scopes and Challenges”	Banerjee.M et al https://journals.sagepub.com/doi/full/10.1177/1932296820929391	-Due to lockdown, care of diabetes patients is being compromised as they can no more visit the doctor. -TMS is a boon to patients with DM as patients can self-monitor their SMBG level and then consult the doctor for fine tuning of their antidiabetic medication. -Use of TMS has proven to be associated with a decline in mean Glycated haemoglobin of about -0.44% as compared to usual care. -Teleconsultation ensures continuous diabetes education and drug compliance

			along with educating them about their high risk to COVID-19. -However, certain challenges like acceptance of patients, internet issues and patients not willing to do SMBG at home are present. -In all, with proper telecommunication between patients and physicians overall good diabetes care while ensuring social distancing and minimizing viral exposure can be achieved.
<i>Indian Dermatol online J.2020</i>	“Tele dermatology in the wake of COVID-19 scenario: An Indian perspective”	Ashique .K, Kaliyadan.F http://www.idoj.in/article.asp?issn=2229-5178;year=2020;volume=11;issue=3;spage=301;epage=306;aulast=Ashique	-Dermatologist: Population ratio in India is 1:130,000 population as the speciality practice is urban centric. Hence, it's difficult to reach rural population to provide the service. -TMS works best for periodic follow up, bed ridden, pregnant, and debilitated patients who cannot be brought to doctor too often. -Critical care dermatology, like a severe cutaneous drug reaction [E.g. SJS/TEN], angioedema or acute urticaria, with anaphylaxis, severe vasculitic conditions, or exacerbation of bullous disorders, are best not taken up for teledermatology. - An ideal format for tele dermatology would be a hybrid of the store and forward (SAF) and real-time consults (RTC), where the images and basic patient data/history is sent to the dermatologists, who then gives an appointment for a real time consult. -Major issue in India is the technology illiteracy of the masses and appropriate devices in spite of having access to high speed internet. This calls for adequate training, dedicated TMS units in peripheral hospitals or even a TMS van.

<i>Indian J Community Med</i> 2008	"Telemedicine: A new horizon in public health in India"	Dasgupta.A, Soumya Deb.S http://www.ijcm.org.in/article.asp?issn=0970-0218;year=2008;volume=33;issue=1;spage=3;epage=8;aulast=Dasgupta	-TMS has both advantages such as access to remote areas, decreased time and cost of patient transportation, disease surveillance and program tracking and disadvantages like perspective of medical practitioners, patients fear and anxiety, literacy rate etc. - Proposes that there should be an intelligent compromise between complete machine dependency and the use of human intelligence. It can make the difference to save someone 's life to strike that balance.
<i>Indian J Ophthalmol.</i> 25-May-2020	"Telemedicine: The unsung corona warrior"	Biswas.P, Batra.S http://www.ijo.in/article.asp?issn=0301-4738;year=2020;volume=68;issue=6;spage=1012;epage=1013;aulast=Biswas	-The scope of TMS in the field of ophthalmology is particularly interesting since it is considered to be one of the "visually intensive" specialities, along with pathology, dermatology and radiology. -The diagnosis and treatment protocols are mainly based on pictorial evidences from 2-D or 3-D images, which makes TMS all the more relevant to ophthalmology. -TMS can act as forward triage in disaster management policies. -The legal barrier in TMS have been uplifted to some extent by MOHFW guidelines. However, regulations regarding license to practice and e-prescribe also need to be redrawn in order to prevent cross practice across the borders. -Other issues include technological barriers (access to internet), financial barriers (econsultation charges), ethical barriers (breaching of privacy) and scientific accuracy for the examination. - In order to fully utilise benefits and overcome the challenges of TMS, one needs to be trained, prepared and aware.
<i>Indian J Anaesth</i> 2020.	"TMS for chronic pain management	Ghai.B et al	-Treatment for managing pain such as health education and psychologically

	during COVID-19 pandemic”	http://www.ijaweb.org/article.asp?issn=0019-5049;year=2020;volume=64;issue=6;spage=456;epage=462;aulast=Ghai	oriented self-management can be easily given through TMS. -After COVID-19 pandemic, redesigning of healthcare will include TMS as an option for pain management.
<i>J Family Med Prim Care.</i> 2019 Jun.	“Telemedicine in India: Where do we stand?”	Chellaiyan.V et al https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6618173/	-Doctor:Population ratio in India is currently 0.62:1000 whereas WHO recommends 1:1000. Training of doctors is time consuming hence this ratio can be expected to remain low till a long time. -TMS can be an answer to a lot of problems such as unavailability of healthcare professionals, lack of transportation, -With the help of TMS distance is no point to worry in getting good quality healthcare. -Acceptance and lack of awareness are the main reasons why TMS is not growing. -Government is taking steps like Neha and Arogyasree to help TMS grow and it is growing but at a slow and steady pace.
<i>CSI Communications.</i> June 2012.	“Telemedicine in India: A Case Study on Tele Electrocardiograph”	Dwivedi.A et al http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1014.449&rep=rep1&type=pdf	-Depicts the use of telecardiology in rural areas by the study of ICT implementation on the medicine sector with particular reference to the Medical Science and Research Life Care Institute of TMS project Express ECG in Gujarat Remote Area, which is spread across 12 districts in Gujarat , India. -A central room is created that has various facilities such as roaming broadband services, ECG machine,printer, 24 hours availability of the technicians and phone lines. They are connected to remote area GP. -Whenever a patient in need of ECG reaches the GP, the GP gets in touch with the technician who does the ECG and send it to a specialist. The specialist then, based on the ECG tells the further line of

			treatment. Thus, the hassle of shifting patient for diagnosing stops. -The trained manpower, cost and geographical area which is covered by the single central room is a setback to the process.
<i>Public Money & Management.</i> 2020.	“New development: ‘Healing at a distance’—telemedicine and COVID-19”	Leite.H et al https://www.tandfonline.com/doi/full/10.1080/09540962.2020.1748855	- In the COVID-19 pandemic, TMS is useful for residents, patients, medical practitioners, and health care organisations. -Also, policy-makers should use TMS experiences reported to further escalate the use of e-medicine.
<i>J Family Med Prim Care.</i> Oct-Dec 2016.	“Evaluation of patient and doctor perception toward the use of telemedicine in Apollo Tele Health Services, India”	Acharya .R , Rai.J https://pubmed.ncbi.nlm.nih.gov/28348994/	-A cross-sectional study of the quality of service, cost efficiency, and health problems in Apollo Tele Health Services, Hyderabad, Telangana, India was carried out among 122 people (71 patients and 51 physicians). -Most of the respondents found TMS to be satisfying and cost-effective. -A few flaws were noted in the system like technical issues, timings of doctors while some patients were not comfortable to face camera, and few had operational issues with the software.
<i>Journal of Clinical and Diagnostic Research.</i> 3 March 2016.	“Awareness, Knowledge, Attitude and Skills of TMS 36+among Health Professional Faculty Working in Teaching Hospitals”	Zayapragassarazan . Z et al https://pubmed.ncbi.nlm.nih.gov/27134899/	-120 teachers and practitioners in & around Pondicherry union territory were taken up for the Awareness, knowledge, attitude and skills about TMS study. Raw scores were calculated and converted to percentages. Study revealed that although the respondents experience and knowledge are limited in TMS technology a fair number of them have positive attitude towards telemedicine. It is the need of the hour to educate and train the teaching faculty, practicing physicians, residents, medical students and other health professionals about TMS and issues related to its use.

Telehealth and Medicine Toda. (TMT) Apr 30, 2020.	"Role of telemedicine in healthcare during COVID-19 pandemic in developing countries"	Kadir.M et al https://telehealthandmedicinetoday.com/index.php/journal/article/view/187/264	-Due to the spread of covid-19 telemedicine can be used for various purposes such as minimising the spread of virus,treating mental health issues and using the time of healthcare professionals effectively. -Developing countries should also consider the use of telemedicine in order to enhance their healthcare system.
--	---	--	--

FINDINGS-

1)ROLE OF TMS DURING COVID-19 OUTBREAK-

Telemedicine has also been recognised by the World Health Organisation (WHO) as an important step towards improving the response to COVID-19 in the health sector. As one of the alternative models of enhanced clinical results, WHO has further proposed telemedicine as a tool for decision taking in order to maximize services.

As per NITI AYOG report, "Some of the COVID-19 telemedicine patient use cases include self-isolated/quarantined patients at remote locations (self-monitoring and remote monitoring), patients with mild cases (remote monitoring and treatment), post-discharge patients (for follow-ups)..Health workers, paramedics, and doctors with mild symptoms can continue to work with patients, retired clinicians, give second opinion for severe cases, cross-border experience sharing, teleradiology, and online training for health workers remotely. Telemedicine can be also be used as an instrument to support the mental health of patients and health workers."

Dr. Amitabh Kant , CEO Niti Ayog, said "90 million people have downloaded Arogya setu app which has features of telemedicine. The app helps user identify if they are at risk of COVID 19 infection.It also provides people with important information about symptoms and ways to avoid COVID 19 infection."

Use of Aarogya Setu app shall be mandatory for all employees, both private and public. It shall be the responsibility of the Head of the respective organizations to ensure 100% coverage of the app among the employees" — MHA order number 1-29/2020-PP dated May 1, 2020.

Dr Alexander Kuruvilla, Chief Healthcare Strategy Officer, Practo, said, "Telemedicine is making a very positive contribution to healthcare during the pandemic, and is being used by the people not just for coronavirus related queries but also for other medical conditions. This helps them receive proper medical care from their homes without having to visit hospitals and thereby minimizing their risk of contracting the virus. Telemedicine ensures that doctors are available 24*7 for people so that they receive timely medical attention. We are helping more and more doctors to help consult their patients online, also ensuring there is no disruption in access to quality healthcare for patients."

Dr. Vanita Vaishnav, Obstetrician and Gynaecologist, Bangalore, said, "Telemedicine allows people to reach out to the doctors whenever they are in need of medical opinion or advice while maintaining social distancing.

We have been receiving a lot of queries online in the last few days owing to increased awareness on telemedicine amidst the Covid-19 crisis and lockdown. Digital platforms like Practo provide a great opportunity for people, especially women to seek medical assistance from specialized doctors by empowering them with the right information, and easy access to quality healthcare. In difficult times like these, Digital healthcare has played a significant role in improving the overall experience of the patients in terms of accessibility, quality, convenience, and especially trust.”

“Telemedicine is a great way to respond to parents who have questions around issues like feeding, vaccinations, minor issues or their child’s behavior—issues that really matter to parents but, because of lockdown, may have had to wait to be addressed if not for telemedicine. If their kids are due for vaccinations, they should as a first step consult a doctor online and check with them on the best possible ways to get it done on time. To avoid the delay, home vaccination is being offered. But parents should be very cautious before opting for it as reaction to vaccines can become serious and it will be difficult to treat such emergencies during home administration. More importantly, it is vital that parents are well-informed in order to take the right decision for their infants, because every vaccine contributes to their overall healthy well-being,” says Dr Prashanth S Urs, HOD, Sr Consultant Neonatologist and Pediatrician, Department of Neonatology, Apollo Hospital, Bangalore.

AIIMS-Delhi is running the “COVID-19 National Teleconsultation Centre” (CoNTeC) on behalf of the MoHFW, Govt. It is catering to doctors, from anywhere in the country, who want to consult our faculty for the management of COVID-19 patients, as well as to the public in general. The calls from doctors are received by the Patient Care Managers on duty 24×7 at the CoNTeC in AIIMS Guest House, who then connect them to the Faculty members who are also on duty 24×7 to provide doctor-to-doctor consultations.

The Centre for Development of Advanced Computing (CDAC) and later launched by Government Of India, e-sanjeevani OPD app, a National teleconsultation service, which has been adopted by many state governments as mandatory for health-care providers. More than 30 doctors currently handle calls for consultations, says Divya S, State Nodal Officer, Training, and now in-charge, eSanjeevani. The services will move to the districts in about a month’s time with specific spokes being established. More doctors would need to be roped in then.

2)IMPACT OF COVID-19 ON TMS IN INDIA -

Covid-19 outbreak has urged the MoHFW to approve the Guidelines. Thus, Indian Government has come up with TMS Practice Guidelines on 25 March, 2020. The guidelines issued by MoHFW in collaboration with NITI Aayog and Board of Governors (BoG) Medical Council of India (MCI). The salient features of the guidelines are-

- Any person, enrolled in the State Medical Register or Indian Medical Register (RMP) under the Indian Medical Council Act, 1956 (Act) is qualified to practice telemedicine under the guidelines issued.
- All registered medical practitioners (RMP) have to undergo a compulsory course designed by MCI within 3 years of the release of the guidelines.

- The registered medical practitioners (RMP) can use text, audio-enabled or video solutions for consulting the patients.
- Both patient and doctor should know each other's identity, it cannot be anonymous.
- The doctor should verify the patient's identity such as name, age, address, email ID, phone number, registered ID or any other identification.
- The doctor should be sure of the patient's age before prescribing any medication. In case of any doubt, the doctor can ask for age proof from the patient.
- The consent is implied if the patient is initiating the consultation.
- If a physical examination is important for consultation, the doctor should not proceed till physical examination is done.
- There are restrictions based on the type of consultations, the type of medications that can be prescribed. For example, over-the-counter drugs and medicines are under List O and can be prescribed through any mode of consultation. The medications under "List B" can only be prescribed after a follow-up or in-person consultation.
- The government has also listed out Schedule X of Drugs and Cosmetics Act and Rules, and any Narcotics and psychotropic substance listed in the Narcotics Drugs and Psychotropic Substances Act of 1985 under drugs that cannot be prescribed through telemedicine.

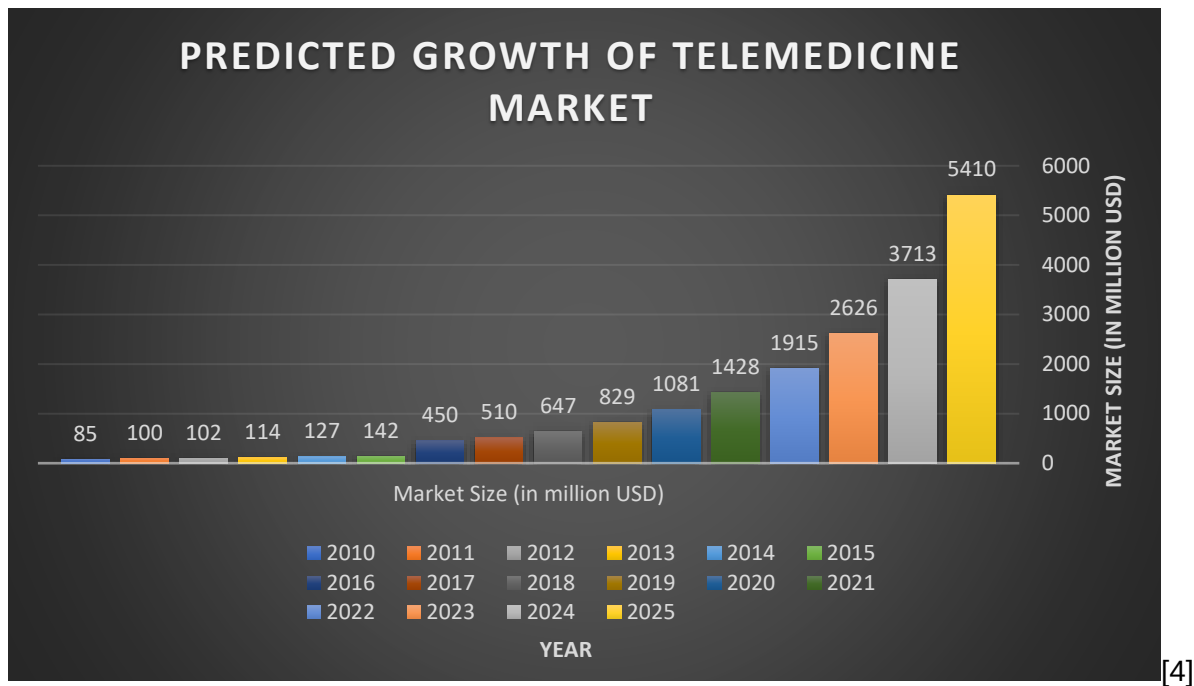
Dr H S Chhabra, Chief Coordinator and Editor, [ElearnSCI.org](https://www.elearnsci.org) and Principal Investigator of ISCoS Database Project (IDAP) has revealed that their telerehabilitation services initiated in December 2015, teleconsultations in February 2017 and telenursing in December 2019. So far, they have had 2000, 815 and 22 clients in telerehabilitation, teleconsultations and telenursing, respectively. But the real thrust to teleconsultations has come only after the ongoing SARS-CoV-2 pandemic.

As per the latest reports of Practo, overall TMS calls increased by 500 per cent since March, first week wherein More than 50 per cent of all GP eConsults were related to Coronavirus. Most of the queries are from people in the age group of 25 – 40. Close to 40 per cent of all tele consults on the Practo platform are happening from Tier-2/3 cities. 30-35 per cent of the consultations are from women. Doctors are getting a greater number of consult requests at 2-3 am in the morning, to as late as 10-11 pm at night. Top cities from where most of the queries are coming from are Bangalore, Delhi NCR, Hyderabad, Mumbai, Pune, and Chennai. T2+ cities from where most of the queries are coming from – Ahmedabad, Jaipur, Lucknow, Bhubaneswar, and Indore. More than 20 per cent of GP consults on the Practo platform are happening from Tier-2/3 cities. While 35-40 per cent of overall consults are also from Tier 2 cities.

Online queries for Pediatrics on Practo's eConsult platform witnessed a growth of 350% since March 1st. Pediatrics is the fastest growing speciality on Practo's telemedicine platform. Top queries discussed were Cough and cold in babies, impact of delayed vaccination, fever and headache in toddlers and motion problems during summer.

As per *Data Labs*, the TMS market in India is expected to reach a market value of \$5.4 Bn by 2025 with a CAGR of 31% from the current year. With the likes of Practo, Lybrate and DocsApp, it won't be incorrect to say that start-ups introduced TMS to urban India. The ease of consulting a doctor from your home and getting

medicines delivered has become second nature to many Indians in cities, and the norm in the aftermath of COVID-19.[4]



Rajat Garg, CEO and Co-Founder of myUpchar, an online health services start-up and an Indian language health information platform that delivers medicines to every corner of India and provides teleconsultations with specialists in fields from gynaecology to psychology admitted that TMS has been existing in the background for a long period, but the Corona pandemic has brought the facility to the forefront. The comfort of getting doctor consultation and medicine delivery without stepping out of the house can be addictive and relieving.

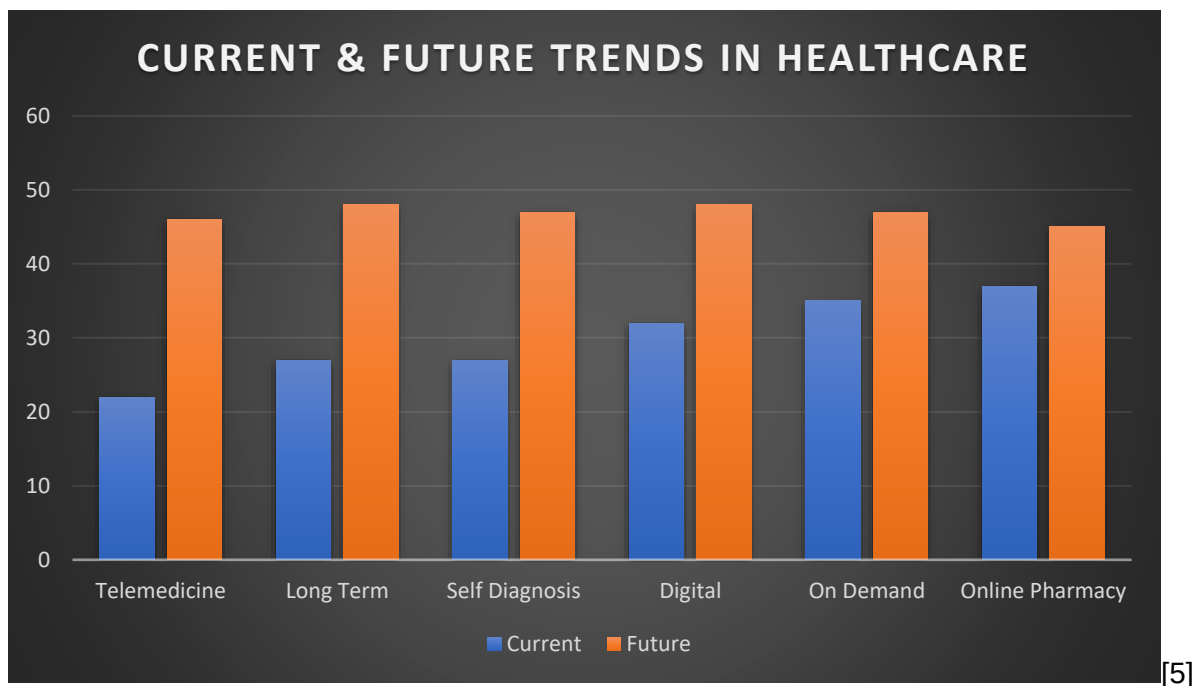
Docsapp has attained an average of 60 per cent increase in online consultations across various departments and is expecting higher returns in the coming days. In May, the company raised a series B funding of \$9.5 million (Rs 72.5 cr) from Bessemer Venture Partners India, Fusian Capital, Rebright Partners and Milliways Fund LLC, and recently had a merger with MediBuddy. We have seen an increase in people opting for online doctor consultations, with an average of 60 per cent increase in consultations across various departments. At this point, MediBuddy DocsApp caters to the healthcare needs of three crore Indians, attending to the needs of over 25,000 Indians daily across the length and breadth of the country. Moreover, during COVID-19-19, DocsApp has partnered with PhonePe, Shemaroo Entertainment, Lokal Hypermarket, Seniority and many others to provide a free consultation says Satish Kannan, Co-Founder and CEO, MediBuddy DocsApp.

Harsimarbir Singh, Co-Founder, Pristyn Care clarified that the e-queries for gynaecology have recorded a four-fold hike since the lockdown started and gynaecology related queries make up about 22% of our overall e-consults.

Mfine startup has witnessed eight times increase in demand for online consultation in the last four months, mostly from the top 10 cities including metros and tier-1 towns. The platform also saw new user signups and consultations from users in states such as West Bengal, Uttar Pradesh, Bihar, and Jharkhand, where the doctor-patient ratio is the lowest in the country.

Doctor consultations around gynaecology have seen over 80% increase on Lybrate, while there has been a 40% spike in paediatric-related consultations on the platform. Saurabh Arora, Founder & CEO, Lybrate said, “As it is dawning upon people how unsafe it is to step out, pregnant women are opting to consult doctors online, resulting in a significant rise in virtual doctor visits on Lybrate.”

Dr Gurushankar, Chairman, (MMHRC Consult) has stated that “Telemedicine is a fast-emerging sector in India. As of Financial Year, 2016, it was valued at \$15 million and is expected to rise at a compound annual growth rate (CAGR) of 20 per cent during Financial Year 2016-20, reaching up to \$32 million by 2020. So, the graph is definitely on an upward swing. Hospitals in rural India now have good primary healthcare centres. Telemedicine services are being offered for more than a decade now, through nine of our outreach centres in rural Tamil Nadu.”



Bain has come up with its report for Asia-Pacific (n=1823), claiming a surge in use of digital health services in the next five years. In Bains survey, nearly 50% of patients said that they expect to use digital health tools in the next five years. And 91% of consumers said they would use digital health services if the costs were covered by an employer or insurance provider [see Figure 5].

CONCLUSION –

With smartphone and internet penetration growing, rural India is getting tech savvy with every passing day and are adopting new technologies that can improve their lifestyle. The first usage of TMS dates back to a couple of decades ago, it's really only in the last few weeks that India has truly experienced its full potential. Telemedicine sector continued to function in the grey area due to the lack of proper practice guidelines. Previously, telemedicine services were governed by the Information Technology Act, 2000 however, there were no clear guidelines regarding privacy, security, confidentiality of the patient data and misappropriation of electronic data records related to the healthcare industry. Seeing the grave impact of Coronavirus in China, the centre's decision on setting the Telemedicine practice guidelines brought the much need

confidence in doctors on trying the virtual consultation. TMS has helped people use virtual platforms for their healthcare needs as stated wide lockdown was imposed as a virus containing measure. TMS helped patients who are not comfortable and refraining from going to the hospitals, scared that they may contract some infection there or infect others if they are in home quarantine. Also, the burden on healthcare system is decreased as the resources are being utilised for the ones in need. Rural areas can be best handled by the use of TMS due to non-availability of doctors. It also helped in eliminating the transportation expenses. Back in 2019, the Indian telemedicine market was predicted to reach \$32 million by 2020. However, in the light of the extended lockdown and quarantine regulations, telemedicine apps have seen a growth. Almost all TMS providers such as practo, 1mg, myupchaar etc. have experienced a demand tsunami as there is surge in their demand up to 500%. Telemedicine is a proven asset post COVID-19 also for follow up cases, routine monitoring and various therapies such as counselling sessions. For the telemedicine industry, the COVID-19 crisis has brought about a lot more clarity and impetus just like the fintech sector got in India soon after demonetisation in 2016. Thus, TMS can best be described as a global pilot in a real-time situation.

SUGGESTIONS-

In future, I hope we build a world where no location is too remote for healthcare which is possible by use of telemedicine service to its full potential. Certain work that needs to be done includes-

Role of TMS during COVID 19-

- 1) Increasing the awareness about platforms such as e-sanjeevani and the benefits of telemedicine to the people via media.
- 2) Training sessions /digital literacy of practitioners to be started as early as possible so they can handle as telemedicine expands.
- 3) The government should comprehensively and verifiably address the chinks exposed so that it enables trust around Arogya setu app and doesn't curtail adoption of it as mandated by the government.
- 4) User-friendly solutions in local languages so, it is easy to understand for people.

Impact of COVID-19 on TMS-

- 1) The latest guidelines by MOHFW are silent on the aspects of data privacy of the patients and the cases where the patients are not based in India. A clarity on these aspects should be looked into, given the professional ethical conduct of the doctors.
- 2) Medico-legal laws have to be changed to protect doctors' rights as the margin of error would definitely increase.
- 3) Accreditation standards for telemedicine (for home isolation and stand-alone facilities) maintaining the quality of the healthcare services should be given.
- 4) Telemedicine guidelines to be established for naturopathy or yoga.
- 5) Creating enabling infrastructural and regulatory environments with clearly defined roles, responsibilities, benefits and risks for all stakeholders, including financial reimbursement mechanisms for remote care delivery, would be critical to overcoming the structural challenges to widespread deployment of telemedicine.

REFERENCES-

- 1) <https://www.mohfw.gov.in/pdf/Telemedicine.pdf>
- 2) <https://www.e-smartsolution.co.uk/blog/106-isros-telemedicine-network-in-india/>
- 3) <https://www.mohfw.gov.in/pdf/Telemedicine.pdf>
- 4) <https://inc42.com/datalab/telemedicine-market-opportunity-in-indian-healthtech/>
- 5) <https://www.bain.com/insights/COVID-19-19-accelerates-the-adoption-of-telemedicine-in-asia-pacific-countries/>
- 6) Chauhan. V. (2020). Novel Coronavirus (COVID-19): Leveraging Telemedicine to Optimize Care While Minimizing Exposures and Viral Transmission. *J Emerg Trauma Shock*.
- 7) Jakhar.D. (2020). WhatsApp messenger as a teledermatology tool during coronavirus disease (COVID-19): from Bedside to Phone-side. *Clin Exp Dermatol*.
- 8) Kapoor.A. (2020). Digital healthcare: The only solution for better healthcare during COVID-19 pandemic? *Indian Heart J*.
- 9) Banerjee. M.(2020).Teleconsultation and Diabetes Care Amid COVID-19 Pandemic in India: Scopes and Challenges. *Journal of Diabetes Science and Technology*.
- 10) Ashique.K.(2020).Teledermatology in the wake of COVID-19 scenario:An Indian perspective.*Indian Dermatol online J*.
- 11) Dasgupta.A.(2008).Telemedicine:A new horizon in public health in India.*Indian J Community Med*.
- 12) Biswas P, Batra S.(2020). Commentary: Telemedicine: The unsung corona warrior. *Indian J Ophthalmol*.
- 13) Ghai B,Malhotra N. (2020).Telemedicine for chronic pain management during COVID-19 pandemic.*Indian J Anaesth*
- 14) Chellaiyan V,Nirupama A.(2019). Taneja N. Telemedicine in India: where do we stand? *J Family MedPrimCare*.
- 15) Dwivedi A.(2012).Telemedicine in India:A Case Study on TeleElectroCardiograph.
- 16) Leite.H.(2020). New development: 'Healing at a distance'—telemedicine and COVID-19. *Public Money Manag* 40(6):483–485.
- 17) Acharya RV, Rai JJ.(2016). Evaluation of patient and doctor perception toward the use of telemedicine in Apollo Tele Health Services. India. *J Family Med Prim Care*.
- 18) Zayapragassarazan Z.,Kumar S. (2016). Awareness, Knowledge, Attitude and Skills of Telemedicine among Health Professional Faculty Working in Teaching Hospitals. *Journal of clinical and diagnostic research : JCDR*.
- 19) Kadir, M. A. (2020). *Role of telemedicine in healthcare during COVID-19 pandemic in developing countries* . Bangladesh.

E-HEALTH - MORE THAN JUST AN ELECTRONIC RECORD

BY THE UNIVERSITY OF SYDNEY

COURSE DESCRIPTION - The course teaches us about the basics of eHealth and its future. How will we transform the healthcare in future with the health data we are collecting. It also throws some light on how emerging technologies contribute to participation of health consumers taking care of their own health. We learn how ehealth can enhance healthcare management and performance and what the barriers to ehealth use may be.

OBJECTIVES-

- What Is E-Health?
- Visualise an eHealth model which illustrates how key eHealth domains intersect to impact on health care.
- Appreciate the current and future challenges of eHealth for both health consumers and health practitioners.
- Understand the potential of mobile technology to support the shift from “healthcare” to “health”.
- Consider strategies for including mobile health apps in your professional practice.
- Be aware of issues around the design and evidence for effective health apps.
- Evaluate the advantages of technology based eHealth services in improving access and communication in healthcare.
- Reviewed a variety of case based examples of eHealth in professional practice.

CONTENTS-

WEEK	MODULE NAME	CONTENTS
1	What is e-health?	An introduction to e-health What does experts say? Introductory learning activities
2	Health in our hands	Health in your hands Collecting your own data Apps, social media and health online Designing and evaluating eHealth solutions
3	Data and the "Quantified Self"	Introduction Electronic health records Predictive and precision medicine Patient reported data Privacy and security Using data to improve performance

4	Interacting with Health Professionals using New Technologies	Improving access to healthcare Innovations in healthcare Supporting health professionals
5	eHealth in Professional Practice	Course review eHealth case study examples

LEARNING METHODOLOGY-

- ✓ Video lectures which included interviews with different health professionals
- ✓ Included case studies and reading material.
- ✓ Assignments given which were peer graded.
- ✓ A Certificate of Completion is provided after completing all 5 modules.

LEARNINGS-

WEEK1-

WHAT IS E-HEALTH-Many people have traditionally considered e-health to be electrical records and equipment, usually in the acute sector. However this definitely isn't the entire picture. Use of e-health is increasing with increased use of technology. Also, in the context of rural practice, e-health has reduced travel time for both professionals and consumers of healthcare. It is being used increasingly in a wide range of health contexts, including the use of applications, websites, social media and wearable devices.

Dr. Teresa Anderson, Chief Executive , local health district, Sydeny says eHealth is exciting because it enables us to provide the very best care to our patients by enabling all members of the care team to have access to patient information wherever they are and at whatever time.

Prof. Stephen Simpson, academic director, Charles Perkins University stated eHealth is pervasive nowadays in various health researches and their implementation.

Prof. Ravel F. Cavo, professor, The University of Sydney mentions that e-health is when we bring technology to support human health in general.

E-HEALTH MODEL-There are three overlapping domains-

- 1)Health in the hands of the consumers-Constitutes apps ,wearable devices and social media to monitor and report on health and/or wellness.
- 2)The impact of emerging technology on how HCW's communicate with patients, as well as how they communicate with other HCW's. Traditionally this has been referred to as Telehealth but is much more than simply video conferencing for rural patients. It also includes emerging areas such as health coaching and maintenance of fitness.

3)Data records in the quantified self- Includes storage of data in traditional medical records to storage of data associated with apps and devices. This is the ring that binds them all.E-health has maximum impact in the sweet spot where all these domains intersect.

Challenges-The implementation of these great ideas is challenging. Health system is not used to dealing with explosive technology change and disruption of digital world. E- Health is a potent catalyst for changing healthcare delivery. We need faster Internet, we need greater reach of the Internet through satellite and multimedia as well. Not just one service of text based technology or one service of visual technologies, but many different technologies and applications. And we need better education. We need a greater span of education on how health can be controlled by the individual, controlled by your health care provider, and controlled by Allied Health teams. And if we bring those three together we're going to see a revolution in the way healthcare is actually delivered and maintained.

Future - Consumer-driven health care and having e-tools as per the needs of a patient is going to really revolutionize what healthcare means. And from the patients perspective, it will be about access, delivery, recording our own health information. So, many different tools that will be available to support healthcare consumers. Telemedicine, telehealth is bringing things to people in their homes. And so, it's going to require quite a change in the way in which we think about healthcare delivery and it's going to be a big paradigm shift for our healthcare services.

Today because of data driven care, we can have specific data about a particular patient which allows personalized and precision medicine.One of the burdens for a healthcare provider is the administrative burden. Healthcare providers spend an enormous amount of time having to gather information from a variety of sources, of having to compile and collate all of that information to improve their care. So the technology and the ability to give the information and to have that information compiled in one place or dash boarded or the relationship of databases, so that things are put together into a holistic picture free up a HCW to be there with the consumer to sketch the treatment strategy and to hence , improve their care. The most successful health businesses and services moving forward are the ones that effectively harness that intersection between personalization and automation.

E-Health has changed significantly in the last 20 years. It had started as static website but today it has morphed into an array of various technologies. It really means as an individual, one can almost self-prescribe,choose which hospital when. And the fact that the doctors themselves, are much more guided by the information that you have and be more directed in terms of the types of drugs, the types of tests, the types of care provided.

WEEK 2 –

Health in our Hands-Apps, wearable devices, on-line health info and social media are all being employed to encourage healthy behaviours and monitor existing conditions. All around us, devices are being employed by people to trace their performance, diet, sleeping patterns, and virtually each conceivable health metric. And the use of these devices is increasing at a rapid pace. Wearable devices and associated apps can be used for a good vary of functions like capturing and displaying personal health information, plotting information to observe and track progress, delivering info in several formats and providing

opportunities for communication with health care professionals and patients and providing links to social networks.

Health not healthcare-People use applications that help them to monitor their own health and then keep records of their own information. They also share it on social media and interact with other people experiencing the same problem. In prevention end, its consumers being the owner of their health. For example- patient who was actually starting to have a heart attack, and the monitoring device alerted them to the situation. Made sure that they got to a healthcare facility as quickly as possible. Nowadays, people share their information on social media where they get information from other people who may have experienced similar sorts of conditions or diseases. And so in the prevention end, it's consumers handling their health where devices just support them in doing that. Development of mobile technologies like Fitbits, Apple watches, the quantified self, patients or humans depict that people love to have data about what they're doing. So that they know what they want to do with their information, be able to feed it and control who reads it and who responds to it. They love the control and track to be in their hands. Health professionals have a role more as a coach supporting them rather than a health professional dictating them what they need to do.

Wearables: Collecting your own data-People are very excited about wearable devices they are using. For example-running app to track kilometers and speed, and then competing with friends. Fitbit to track gym sessions. Devices are available wherein a person can share this data with my family or colleagues, or other doctors or can analyze it themselves. For eg-ECG sensors are available with which people can record their data and also share it with their practitioners.

Clinical use of personal health data-Usage of devices not only gives a baseline data but also can be correlated with the future data on further use. For example - MisFit is one of the devices used in clinical practice. It's a very simple device, it's just based on kind of a button style format. It can be worn around the wrist or can be put in pocket. It can also be worn on like a clip/like a magnetic clip, and it tracks daily movement, sleep, sleep quality, and tracks kind of energy use as well. Without any prescription, baseline data for 1 week can be taken and thereafter more data can be collected which can be correlated with baseline data.

Mobile apps for health-The use of apps, mobile devices, sensors etc is commonly referred to as mHealth or Mobile Health. We're increasingly seeing examples of mHealth in education and awareness using it as a helpline to provide assessment, and treatment support for remote monitoring, and data collection. It can also be used for disease and epidemic outbreak tracking. From the individual's point of view, Mobile Health is very convenient. It puts health and healthcare into their own hands. It helps them to self-monitor and take control of their circumstances, which for people with chronic conditions, such as diabetes means that they can monitor their health in the comfort of their own home, which may reduce the need for unnecessary admissions to hospital. From the healthcare professional's perspective, it can help to make informed decisions faster in order to improve outcomes for the person by shifting some of the responsibility and control to the consumer. It may also reduce the increasing demands on resource stretch systems. Approximately 70% people use mobile applications daily in order to track information related to their health. People can access it with a tap and it provides a clear overview of health whether it be measuring blood sugar, heart rate, cholesterol, calories burned, oxygen saturation. In another application, an emergency card can be

created with important information about health. For example current allergies ,blood group and emergency contact details. All of this can be made available from the locked screen of smartphone so anyone can access this emergency data, if needed. Some people share their health related data across their social networks in order to connect and also give and receive encouragement from others. Tracking data using devices, sensors and apps can greatly aid people with specific conditions to be properly monitored and to promote a healthy habit of seeing a health professional when necessary. This can be both life changing and life saving.

[SOCIAL MEDIA](#)- Social media are quite diverse and they encompass a broad range of platforms that are constantly changing and evolving. The social media platform ranges from social networking sites (Facebook and Twitter), blogs (WordPress) , content communities (YouTube),collaborative projects (Wikipedia), virtual game world and virtual social worlds (Second Life). Nowadays, social media is also being utilised by the government to collect health data and promote health services. It also assists conversations either in patients, or by patients and HCW's. It can also be used to collect data about experience of patients and their suggestions. It can provide health surveillance of public and it has a strong tendency to significantly influence the health policies. Nurses, healthcare professionals are using the social media space to share information.

[Health information online](#)-We live in the age of information. And more and more consumers are turning to the internet for information that can assist them in self diagnosing , knowing their condition and help them in taking decision. As nowadays, people are more inclined towards health in their hands, health professionals are only playing the role of prescribing or collaborating or coaching or facilitating the consumers in their health journey. Information is available in various forms ranging from apps to blogs to virtual games(for management of type 1 diabetes).

[Co-design of eHealth solution](#)-E-health relies entirely on the effectiveness of interface that each of the user sees,interface is very important for effective use and delight of customers.Building an interface and then constantly changing it as per the feedback is an important step.The design and development of technology to support psychological well being and human flourishing is called positive computing. Positive computing builds around different factors as psychologists know support psychological well being such as autonomy, compassion, competence, connectedness. For example -An app called asthma Australia deals with Young people with asthma need to remember to take preventer inhalers that reduce the likelihood of them having an asthmatic attack. Now, we can design the apps in different ways. We can design it, for example, using GPS trackers to make sure how much activity they have done. Or in the case of the inhaler, put sensors that show that they have taken or not taken the inhaler. And if they don't, we set up a trigger, an alarm, that sends an SMS to the mother, for example, or the doctor, so in that the person has not taken the inhaler in past 24 hours. This can feel very limiting. This design does not support, in fact hinders autonomy but we can also design it in a different way. You can design it so it's based around things that are intrinsically important to the person. We can design the app so for example, there's a photograph of something significant to the person, to the user. A photograph of the soccer team. So when the person does not take the inhaler for a period of time, he or she is shown a photograph that reminds her of the link between her actions and the impact on her health and her well being. And these designs have a very different impact on one of these factors ,particularly on autonomy, sense of urgency. And therefore, it will have a different impact on personal development, and

the long term well being. So this is what we call positive computing ,that is,the design And development of technologies to support well-being and human potential.

Evaluating health apps-Evaluation of health apps is really crucial as there are so many apps being made each day. A panel of experts from the Young and Well Cooperative Research Centre, an International Research Centre in Australia, which explores the role of tech in young lives, categorized current applications quality evaluation criteria and they used it to develop a new mobile app rating scale to measure outcome of mental health related applications in age group 12-24 years old. Sub-scales, objects, definitions and anchors were created and called the MARS. Five specific categories and standards, including four objective quality scales, have been established. Built and developed into the MARS-tool of 23 objects. Esthetics, Engagement, information quality and functionality, and 1 subjective quality scale. Their results show the exquisite internal consistency of the MARS, which is how well the same constructor or definition was tested in the test item and also excellent reliability among the raters. And these results also show that the MARS tool is simple, accurate and objective. So it can be used as a method to identify and evaluate the quality of mHealth applications. This can also be used to build and grow new , high-quality health applications.

WEEK 3

Digitizing paper records is very important as it allows-

- A patient's medical history to be tracked over time.
- To alert patients for routine or follow up consultations.
- To monitor patients' vital signs.
- Overall improve the quality of care.

In addition, aggregate medical records can be used to provide regular downstream information on individual team or organization performance and to link with quality improvement programs. In spite of the obvious potential for medical records to improve care, creation of digital jurisdiction has presented a lot of challenges. In short the ability to use digital information to transform healthcare is yet to be achieved.

EHR can be described as real time, patient centered, efficient, whenever and wherever.

Impact of e-health is both dramatic (information is available at fingertips) and in quite some ways disruptive (confidentiality of information can be questioned). In future, we will have statewise and nationwide archiving system. So that no matter where the patient goes, history follows.

Devil lies in the detail in implementation of EHR. Australian government has developed a tool called PCEHR, the Personally Controlled Electronic Health Record. It's now being renamed to the MyHealthRecord wherein they have created standards/format how each information will be recorded (format for discharge summary, format for medications etc) and it is completely owned by the patient and the patient decides whom he wants to share it with. All these enabling technologies are tied to national strategy , maybe eventually to international strategy. These tools are first step towards Standardisation of Communication Methodology.

CASE STUDY—

An old lady is brought to the hospital by her husband. Patient is old, clammy, short of breath and unable to speak therefore only her husband can provide husband level of information. Since they came in a hurry to hospital husband forgot to pick up the bag of medications. As the GP is new to the hospital he doesn't know the patient's history. The value of EHR is that they can go to a nearby computer and get all her data what medication she is on, how many times has she taken, what all diseases she has, how many times she has been to the hospital and why. After seeing her past admissions which are a mixture of chest pain that is acute CORONARY syndrome, COPD and diabetes. This information is useful for the practitioner since GP and the nurse are not very sure of the line of treatment, So they ring up the intensivist at a nearby tertiary care clinic. The intensivist looks at the EHR reports previous x-rays, discharge summary x-ray reports and discusses with the GP. They decide to offer comfort care as curative care is unlikely to help. GP tells the patient's family about it and patient passed away quietly.

Benefits- We can make better choices so as to transport the patient or not.

-Can start advanced treatment early.

Fundamentals of health lie at the interface between the of an individual and their environment, their lifestyle (steps taken, calories eaten).

Predicting in a more personalized /stratified/precise way, the way we deliver Healthcare is called Precision medicine.

Human body → 20,000 genes → Different products in different states → Build our metabolism



Fundamental interface between our genes&environment.

Human body is also a host. 90% cells in our body which are not human live in our gut and interface with our diet and metabolism. What we eat, enables us to function and build our environment.

The [main challenge of e-health](#) is to help us manage the relationship between our biology and our environment. We need to do that to collect new sources of data about ourselves. About what we're eating, our levels of activity, and our sleep and we need to be able to distill that down. For example, prediction of a person's health given their biology and their lifestyle. In terms of new bio markers for example, that can help prevent health problems, or provide opportunities for early treatment of those health problems. So that, in combination, is the challenge for eHealth into the coming decades.

[Owning your own data](#)-Patient is the only common unit that travels across healthcare systems. Patients own their data. Patients are the data themselves. It helps doctor to diagnose the problem well. For eg-If somebody has a pathology report with himself there is no need to undergo another pathology test. It thus improves the care provided.

[Patient reported data in practice](#)-Patient reported outcomes which only a patient can tell (example- patient is distressed or anxious) are as important as other health data. Using e-health to collect patient related

outcomes can be done in various ways like providing a patient with a tablet when sitting in waiting room in order to fill the questionnaire. Secondly, e-health can be used to score the data with the help of stored algorithms in the system. Thirdly, immediate feedback can be provided to the patient after seeing his/her score, thus reducing consultation time.

Privacy and security-We are seeing a drop in the level of privacy of peoples life. People now readily post on Instagram Facebook etc which they never did earlier. This doesn't apply for people's personal health as that will stay personal till eternity. When considering genomic data and privacy there are specific issues like -Huge volume of data every patient has a genome that equates to about 750 megabytes and after sequencing it magnifies greatly therefore its very difficult to store data so sending it to cloud is considered for this purpose

Therefore main problems are –Storage— Is easy as you can encrypt the data send it to someone and make sure you get it back at the end of The day. No trust in The 3rd party. Actual processing- A number of algorithms and software pipelines that need to be used. Trust is involved as it has to be sent to a 3rd party

Solutions include—

Homo morphic encryption-Allows calculations. Example-people can send data analytics to study there data and calculation is done on the data that is encrypted therefore data is not visible only results can be seen this make sure data is held only by the people websites.

Privacy preserving record linkage ability to use 2 databases with 2 list of names and link the data with common names without revealing who they are. Also many more modern techniques are available in machine learning and data analytics that allow to take care of privacy

Using data to improve performance-In most of the facilities, there's a strong negative attitude towards medical records. This is due to a perception that the data contained within the record is not useful to conditions beyond direct patient care. A patient in our health system is surrounded by three domains of data-

(a)Currently available data-Is largely restricted to pathological data, imaging, history, and some information on how patients are responding to treatment.

(b)Emerging data-It includes genomic data and items like patient reported outcome measures.

(c)New data- Includes the massive link data that surrounds us all such as data that can be collected from fitness centers or diet apps as well as information on what we purchase, where we travel, and almost every other aspect of our lives.

If you combine the data from all the patients a team treats, you can see that we will shortly have a comprehensive picture of the care a team delivers.

WEEK 4

Health providers should think of ways to automate and make more their services efficient while still providing a really personalized and tailored service to the patient. In spite of latest technology, we haven't yet, nether we should ever substitute the need for health professional and patient to communicate. In the early days, ehealth was just about static websites and information but today it ranges from assistive technologies,

from biometric devices, apps to gaming.its about using tools to produce healthcare ,i.e. faster,better,safer and more patient cenric .

One of the biggest benefits is the ability to access a broader patient group than we would otherwise be able to access in our traditional face to face clinics. The second thing is all the advance treatments can be started early. Also, health professionals can now have the flexibility to work from a cafe or on a tropical holiday and still be able to continue their caseload with no burden to health system and time saving for both doctor and patient.

In online consultations, they're finding that actually patients self-treat themselves more often in the online space, because they're given the tools to use themselves. They've got the exercises and the retest mechanisms to gauge how they're going themselves, and finally outcomes are shown to be the same if not better then a face to face consultation.At earlier times ,laptops were used to carry patients medical record but laptops are heavy .thus,emr are used now.The patients can give all the information and their GP can access it. Teleconference with all the team members can be done swiftly.

[Use of online communication via social media](#) can provide opportunities to communicate in ways that face-to-face conversations can't. It gives the user time to think, gives them time to compose their responses, and they can do so in a manner that suits them. Also,social media is part of everyday interaction for so many people these days, it's more than likely that young people use social media before they needed to see the doctor so life after an injury should also be the same. So it makes sense that using social media may be part of their goals for communication and regaining independence and function in everyday life.Also social media provides a platform to interact with other health professionals,

[Benefits of apps](#) when the patients go see the doctor they can actually see the whole history in a digital, not just in numbers but in charts and in trends. And not just about the last few months but their whole entire history. Another advantage of an app is that as you put in your data it can do error checking for you and it would also send alerts if something is not right. And as soon as the patient inserts data, it is pushed to a secure cloud server which can be then accessed by care staff.

[Ehealth can also help in professional development](#) in the following ways-

Professional learning-when a radiologist looks at a mammogram, it's actually an exceedingly difficult task. It's a black and white image and the cancer is not highly visible. Plus you add to that the fact that only 1 in 200 images will actually have the cancer. Getting an accurate diagnosis is crucial to the patient, but the radiologist who looks at that image needs ongoing training and continual professional development. there's a lot of technology involved in this strategy. First of all, when radiologists look at mammograms they need specific high end monitors, five megapixels to 5 million pixels, and high end workstations to be able to show those large images. Also, on the collection of the data from the radiologist we use a web platform. This web platform was developed in house and has been spun out into a company that works internationally called Ziltron. So it captures the decisions of the radiologists and at the end it gives them highly visual feedback, showing them where they clicked, what they decided, and demonstrating to them what the actual truth of the case was. It gives them an overall dashboard of their own performance. At the back end, it allows the

purchaser of the system, for example the Royal Australian New Zealand College of Radiologists, to see their performance, the individual performance, in relation to everybody else.

Can help in improving communication skills-Certain softwares give the practitioner the benefit of learning communication skills.

The [most crucial point in eHealth](#) right now is bringing the health communities together and to understand that this is a unified vision, and that there's a benefit to every single discipline in health. The collaboration has to be done with not just health, but technologists, engineers, scientists but in all those discussions, we need to engage the community more. We teach young people about the basics of literacy and writing, but we should also be teaching them about more to do about with how to control their health. And their rights and responsibilities to have a happy, healthy life. And if they can do that early on through simple health education programs, they're going to inform the scientists, inform the practitioners of what they need and want, which better focuses our development of that technology in the future.

WEEK 5 -CASE STUDIES

[MY PHYSIO APP](#)-John is a 45 year old male. He presented to the clinic with a history of low back pain, which has been gradually worsening for the last eight weeks. He presented with back pain on the right side which traveled down into his right leg. And this was following changing a car tyre at work. When examined, he was unable to bend forward without feeling sharp pain down his right leg. And he was quite concerned that this was going to limit his ability to return to work as he was a full time car mechanic. He had come to his hometown for holiday when he came to the clinic and would be going back for work from which he will return after 2 months. He was demonstrated my phsio app. told how to use. Simple exercises with the number of times to be done, video demonstrations also available on the app. Also, a reminder everyday 6 pm was put so that the patient doesn't forget it. Hence, the patient improved and was happy with the results.

[ELECTRONIC RECORDS SUPPORTING REMOTE CARE](#)-Patient living in small country town. She lives with a husband and they have a district hospital run by a general practitioner who also works in the hospital. She's brought into that hospital by her husband, incredibly short of breath. She is gray and clammy, and really struggling, and she can't even get out of the car. So the hospital team get her out of the car. Bring her into the hospital, do some basic observations. Her blood pressure is within normal ranges, her heart rate is very high. So the first challenge facing the team out there is that the patient can't speak. So she's too busy breathing, so the husband can provide some husband level information. But this time the husband was so concerned about his loved one that he didn't even bother to pick up the bag of medications. And her wallet's at home as well, so he doesn't have the list of medications. So the GP, who is a locum, who turned up a week ago, doesn't know anything about this lady's history. Doesn't know what meds she's on. What's previously been done to her. Anything. So the value of the electronic health record or electronic medical record is that they can go to one of the nearby computers and find out all the care that has been given to that patient in that facility and possibly beyond. This lady is very sick and they're worried about her. And they really don't know the best way forward. So they ring for help at their nearby tertiary referral center. And they get an intensivist on the phone who is able to look at the electronic record of this patient, so they might see the results of all

the previous reports and then offered the treatment. They then conclude to offer comfort care because curative care is unlikely to offer any benefit, this is not a curable disease. And they conducted that conversation with the family and the lady passed away peacefully.

[PHYSIOS ONLINE](#)-a Dutch man who was working in Nigeria with an oil company. He had an office-based role there. He was 42 years old and was having some problem around his hip area, an increasing pain that wasn't settling down. His main issues were when he was running and playing soccer, so kicking a ball around. He had tried a number of treatments on himself like stretching and massage, but it look, it just wasn't getting any better. So he simply Googled, was trying to find information online and found our service. So to start that consultation process, this man went to our website and filled out a subjective assessment form, relevant to the body part that he had injury on. He completed out tick box questions, along answers to really describe his injury to us. Once he's completed that form, he sends it through and I receive that as his physiotherapist. I'm able to quickly read through that form and work out what further questions I have to work at his diagnoses. nd that's exactly what I did. So in his location he didn't have the bandwidth available to him to do a video consult. So we ascertained his whole injury history through web forms, email and digital imaging. Then he was referred for investigations which revealed tear in cartilage. So he went for sureery and later completed his rehab physio via myphysioapp.

[THE 'MY HOME DIALYSIS' PROGRAM](#)-An app my home dialysis is ddsigned for renal patients who have dialysis machine at home to record the health data. And this has been designed together with both the patient's needs and also the needs of the clinical healthcare staff. There are 4 main functions .1)Home screen-shows results of previous dialysis 2)medication-all the medications to be taken.3)history-all the treatments done before,caan also be viewed in graphical representation.4)fistula.An option of generate report also present to share it with doctor.The data is stored in cloud from where nurses can access it.Patient satisfaction is measured on a parameter from happy to sad face. When a patient denotes that he is sad,his history of dialysis is opened and that patient is handled first.

['SYNERGY' ONLINE HUB FOR MENTAL HEALTH & WELLBEING](#)-Synergy is funded by the Department of Health and it's a backend solution that brings together many of the products that have come out of the research and development created by the Young and Well Cooperative Research Center. Basic fundamental is co-creation and co-design. There are 3 mega or meta apps that user sees.1)Happiness central-Happiness Central is about well being. It brings together about 80 apps that have been rated on quality and allows people to shape their goals so that they can set goals and use the apps to help them do that.For eg-App called recharge helps people to understand their sleep,mood and activity.2)Next step-A lot of people don't know where to go to get the correct care at correct time. So next step is based on a person's thoughts, feelings, and behaviors, and what type of help they want to get. So based on their feedback into that next step, which is about help seeking, it drives the user to what type of resource would be appropriate for them. So if they have body image issues or an eating disorder, it takes them to Butterfly.3)Clinic-uses smart staging, clinical staging, to ensure that a person can be either treated online, through the virtual clinic, the e-mental health clinic or if they need to be, if they're very unwell, showing signs of suicidal ideation, or needing more support, they're immediately sent to a face-to-face service.

SUPPORTING WELLNESS AFTER CANCER TREATMENT-Steve, 42 year old man was referred by his medical oncologist on a new type of treatment for melanoma. Immune therapies are very popular for melanoma patients, and he was treated for fatigue and some joint pain, as we see, from these immunotherapies. As these patients are normally working, they have very little time for supportive care. In order to provide supportive care to such patients, alternatives are being used. In this case, Steve, wanted to be more active so he can play with his kids. So online consultations were done, in order to save his travel time. Also, he had downloaded an exercise prescription app to deliver exercise program. Lots of patients are now being given sensors too to get an objective baseline of their activity levels, how much walking are they doing? How much activity are they doing throughout the week. Also, measuring their sleep. The other thing that is also being used is a patient portal. A website that allows data to be shared between health professionals and the patient. So health professionals can view their history and their trends over the last three or six months, and so we can tell the patients. And when we're doing video consultation that data can be used to have a bit of comparison and coach them through some issues they might be having or give them encouragement if they're doing really well.