

## Tele Health Services in Background of the ongoing COVID-19 Pandemic

By

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As of today 22<sup>nd</sup> March 2020, World Health Organisation (WHO) has declared COVID-19 a pandemic more than a week ago, death tolls have stabilised in China, yet climbing up in some parts of Europe. Quite a few badly affected countries are under lockdown with closure of borders.

Social distancing or more correctly put, physical distancing is encouraged throughout the world to slow the spread of COVID-19. Many older adults, especially those with chronic medical conditions, are encouraged to self-isolate and stay at home.

Economies are badly affected and industries like aviation and tourism are badly hit. Medical care is in much focus. Traditionally run hospitals, clinics and other healthcare services systems are being stressed due to the need to protect their staff and continue or even ramp up their services in this period.

Enforcement officers supporting the notices for quarantine, and in Singaporean case, in addition Stay Home Notice (SHN) and Leave of Absence (LOA) are increasingly facing large volume of work with the increasing number of individuals served under such instructions.

Hence, a recurrent theme throughout the globe is leveraging technologies to simplify or automate some of the requirements. This frees up additional healthcare manpower and most times, give some respite to many fatigued and burnout services.

As a frontline General Physician in the community, we are not appointment based and almost all the patient walks in randomly during clinic open hours. The Emergency department, which operates 24 hours a day, 365 day a year, have set up outdoor fever tents to manage fever or those with respiratory patients whom COVID-19 is a possibility differential diagnosis.

Hence, we are all in Personal Protective Equipment (PPE), which is uncomfortable for us healthcare workers. The supply of Personal Protective Devices can be limited as well, noted in certain countries. Patients waiting in a crowded, often air-conditioned, clinic are also at risk of being exposed to other infected patients. A recent BBC report on 21<sup>st</sup> March 2020 commented that “Frontline NHS staff risk cross infecting everybody because they are not getting the recommended protective equipment” <https://www.bbc.com/news/uk-51989700>

With Tele Health, for suitable non urgent consults, can lessen the use of PPE as there can be less face-to-face consult. The PPE can then be saved for the front liners, during consult with patients infected by COVID-19.

One public hospital here in Singapore has launched such a service to advise patients - <https://www.kkh.com.sg/upal>. This serves to partially triage patients and right site them to prevent congestion at the Emergency Department and present useful information for anxious parents on their child’s symptoms.

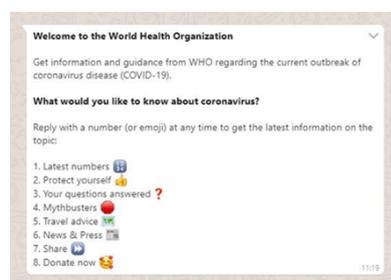


## Tele Health Services

Tele Health Services denote the provision of health care services and information through electronic means, via the internet or other telecommunication modalities. Such healthcare services can simply be divided into:

- Tele consultation, be it with a doctor, nurse, pharmacist or allied health professionals
- Tele Vital signs monitoring whereby patients in their homes are using monitoring devices such as blood pressure, pulse, pulse oximetry, temperature or weight etc and such parameters can be streamed to the care team remotely, in real time
- Tele Collaboration, for example nurse seeking advice from a physician or a doctor asking a pharmacist over the phone
- Tele Support which all of us has been very used to, examples include making an appointment, technical support on devices etc.

Many of such communication modalities are in the limelight in this period of COVID-19. Such communication platforms can be a video chat, a telephone call, an update on a messaging app, essentially negating the need for a face to face contact. In such times of crisis, good quality information disseminated quickly and efficiently, can be utmost importance in educating and calming the public. Many organisations have started such tele communication practices. WHO launched a global COVID-19 alert updates on WhatsApp to allow individuals to get fast and focused information.

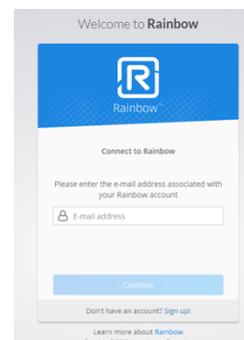


## Tele Consultation



Tele consultation services have seen a boom in their demands and many countries with strong technology focus has been launching their dedicated tele consultation services online for COVID-19 related queries. One example in China is free consultations from WeDoctor Global Consultation and Prevention Center - <https://promo.guahao.com/en/global/pneumonia/>

Doctors in Europe, for example, Spain, has also created such platforms with volunteering doctors helping the site. <https://www.medicosfrentealcovid.org/> is an example one such platform. There are many others traditionally not healthcare services, but they are providing Free usage of their platform which is certified to be secure and of medical grade for healthcare services to use. One such example is Alcatel Lucent Enterprise Rainbow™ Communication tool which has achieved HDS in France: <https://www.al-enterprise.com/en/company/news/certification-rainbow-hds>. They are providing the usage of their services in Asia for free. Some existing online services like <https://myclinic.com/>. My Clinic is also offering doctors use of their platform to conduct remote consultations.



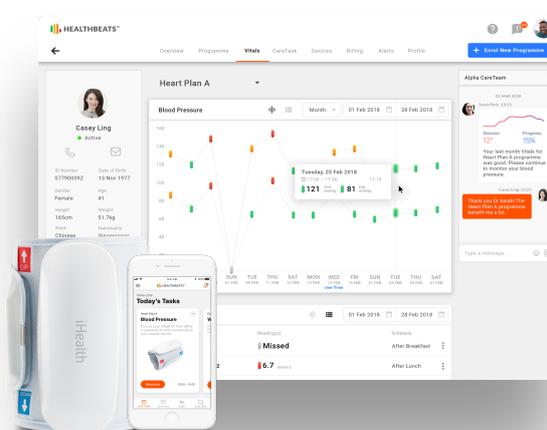
In America, Medicare extended telehealth benefits for COVID-19 fight to improve the efficiency and accessibility of healthcare services less than a week ago. Medicare beneficiaries will be able to receive care, including common office visits, mental health counselling and preventive health screenings via remote technology. This helps ensure they do not travel to clinics and hospitals where they could put themselves or others at risk of COVID-19.

### **Tele Vital Signs Monitoring**

With the advent of smart phones, high speed internet or 4G connectivity, many healthcare devices are now bluetooth enabled and able to connect to an accompanying phone application for seamless recording and transmission. One such example is HealthBeats global platform ([www.healthbeats.co](http://www.healthbeats.co)). HealthBeats provides simple-to-use remote vitals monitoring to both clinicians and patients for ease of adoption. Tele vital signs monitoring can be of much use to continue to monitor patient off site, when the care institution is overloaded or when monitoring of well individuals are needed to watch out for clinical deterioration.

Tele vital signs monitoring can include the following but not exclusively:

1. Blood Pressure monitoring
2. Heart Rate and Rhythm monitoring (point or continuous)
3. Oxygen Saturation monitoring
4. Temperature monitoring
5. Blood Capillary Glucose monitoring
6. Weight monitoring



We know that COVID-19 is an RNA virus affecting the respiratory tract in human. Common clinical symptoms are fever and cough, and in more severe cases, shortness of breath leading to respiratory failure needing ventilation. Many are under quarantine, some precautionary and some have the active disease which are mild and not requiring very much medical support apart from medications.

Due to limitations in hospital and healthcare institution capacity, not all actively infected cases are held quarantine and managed in tertiary hospitals. In fact, most of them might never need to be hospitalised. However, they should be monitored remotely for possible deterioration, and personal devices like tele monitoring equipment will be very handy.

For those well and on precautionary quarantine or stay home notices, with such systemised digital collection of temperature data, Officers in charge of such proceedings can have one less issue to worry.

For those who might be diagnosed with COVID-19 infection and are in quarantine, such personalised use of equipment can reduce the strain on Healthcare workers and can be remotely administered. The use of pulse oximetry can also be very useful, since mild post exertion desaturations can be a guide to worsening of the infection. Support can be given earlier as pulse oximetry can be a form of triage for more invasive services, especially in Older individuals with chronic diseases.

Apart from the practical usage of Tele Vital signs monitoring in the fight of COVID-19 War, it can also be used to reduce the strain on healthcare systems from its “Business as Usual” or BAU load. Healthcare systems are usually already quite loaded during “peacetime”, and with the ongoing COVID-19 Pandemic, many institutions are seeking to reduce their BAU load to better focus on the infection cases.



Most non-essential reviews, like updating their prescriptions for chronic diseases can be done remotely, which such Tele Vital signs services crucial in reassuring both the physician and patient that they remained well. Thus, review appointments dates can be much postponed and the physician can monitor patient with an ease of mind.

In the Singaporean System, 80% of chronic care loads are placed on public care facilities known as Polyclinics. Here, patients are seen for their chronic disease such as hypertension, diabetes mellitus, dyslipidemia, asthma, thyroid conditions and many others. Polyclinics provide subsidised care for Singaporean Citizens and are usually jammed packed daily. Most of the revisiting patients have well controlled chronic conditions thanks to the well-trained physicians and nurses. Tele Health and Tele vital sign monitoring can significantly reduce the bulk of healthcare resources, saving up PPEs and monitoring more closely the chronic conditions remotely.

Hospitalised patient for non-COVID issues can also be discharged earlier with continued monitoring at home from the hospital to reduce the load. Patient care can be passed onto a separate team doing community-based care and revert to the hospital for advices and consultations when needed.

Reducing BAU pressure on healthcare system using Tele Vital Sign monitoring is another element which technology can be utilised. The cost of such devices and platforms has nosedived in recent years and it will be common practice in future to empower both the patients and individuals requiring monitoring.

In America, due to the ongoing Pandemic, FDA has approved the use of vital signs monitors to enable remote care - <https://www.mobihealthnews.com/news/fda-expands-use-vital-sign-monitors-enable-remote-care-modifications-during-covid-19-emergency> This is both crucial in reducing BAU load and also exposure risk for those with already chronic condition to COVID-19.

In Singapore, the Ministry of Health provide physician with a convenient online course to better update and inform physicians the limitation and “red flags” in doing Tele Health Services. Adaptation of such technologies are not difficult for tech savvy doctors. On the clinical aspects, the comfort level for each individual doctor will differs and with experience, some may find it extreme useful as a supportive tool to supplement the face to face consultations.

The platform and the connectivity also play a part in the tele consultation process. On the platform part, platform security, like all Health data, is of outmost importance. The Tele Platform must ensure the privacy of the call and the transfer of data like vital signs etc is upheld. The secure platform must also protect data in transit and at rest and adheres to each countries’ various health data protection act if any. During the delivery of the data, there should be end-to-end encryption when data (e.g. video, audio, text, etc.) is moving through networks (e.g. cellular, Wi-Fi).

Wherever the data is stored, ensure that data is stored as per the countries' regulation. For example, in Singapore, the health data are to be store in servers located in Singapore only. The physician should be comfortable with the quality of the video call to make a reasonable assessment, diagnosis and provide treatment Lastly, consider platforms with adaptive bitrate streaming i.e. video resolution adapts to the bandwidth available. 4G/5G, broadband Wi-Fi are preferred to ensure good video and audio quality.

On the patient side, apart from the Tele consult, if Tele vital signs monitoring are utilised, training of the user on appropriate use of the medical devices would be crucial. There should be training done to equip the user with proper handling and usage of the monitoring devices. Compliance will be another potential issue, a compliance trial done in 2016 and published in Digital Health in 2018 concluded that "Remote monitoring will be more successful if the individual already is doing routine self-monitoring or has a life-threatening health-related event. Technical support is also important to help retrain the person in using the devices and for troubleshooting."  
<http://www.digitmedicine.com/article.asp?issn=2226-8561;year=2018;volume=4;issue=3;spage=122;epage=126;aulast=Tan>

### **Tele Collaboration**

Tele Collaboration is nothing new. It has been done in hospitals when specialists from a big tertiary centre give instructions and advice to doctors and nurses in another hospital who may not have adequate expertise in certain conditions. Tele Geriatrics is another form of Tele Collaboration whereby Geriatricians from the hospital can advise nurses and doctors in the step-down care e.g. nursing homes on Geriatrics Care.



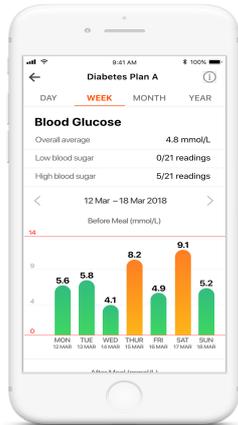
Tele Geriatrics care has been the mainstay of some services, and with some of the Nursing Homes in lockdown due to fear over COVID-19, Tele Geriatrics services are now in very much more demand. With trained Geriatrics nurses being supported and guided by Geriatricians from the Tertiary Hospitals, exposure risk for all the nursing home patients and staff are kept to the minimal.

Tele Collaborations between long term care physicians and home nursing services can be very useful in times of COVID-19. This service can immediately boost the clinical capability of the home nurses and decrease the risk of admission or exposure to COVID-19 of frail older adults in Healthcare Institutions. One such example is Lotus Eldercare, a boutique long term home care company in Singapore, offering her services to home nursing teams visiting frail dependent older adults at home.

### **Conclusion**

How can any services add Tele Health Capability to supplement their existing offerings? It is relatively simple and inexpensive in today's market. More importantly, the service must understand the limitations of Tele health and draft a list of conditions whereby they will be able to see and consult comfortably, without fear of missing any red flags.

More can be done when the patients are doing home monitoring and “live” vital signs can be made available to the clinician for a better-informed management plan. For example, when I am treating my patient with chest infection, I am very comfortable when patient’s caregiver can give me the blood pressure, heart rate, oxygen saturation, temperature and blood capillary glucose levels. I will start treatment and give the family a set of “danger” vital sign levels reading to watch out and perhaps transfer to the hospital if home treatment fails. I can monitor patient’s clinical progress remotely and escalate the medications or management plans swiftly.



With the physician leading the way and the use of video communication tools coupled with remote vital signs monitoring, and patients and their family’s involvement, managing patients can be more cost effective yet more holistic. Workflow will be as simple as empowering patient with the devices and using a secure tele communication platform.

Such workflow will be useful in the current COVID-19 climate by letting the patient and their caregivers playing a more important part in their care.

## Summary

Many countries are now expanding the use of Tele Healthcare services for obvious advantage during the Pandemic. The use of such services are not new but is now more in demand due to its advantage of not requiring Personal Protective Equipment on the healthcare side, and more convenient and accessible for patients while reducing their risk of COVID-10 exposure by getting consultation in their own homes. The delivery of such healthcare services will continue to evolve, be evaluated during this difficult period from the increase usage and adopted for long-term use.

## The Author



Dr Tan Jit Seng is a practicing Long-term Home Care Physician leveraging on the use of technology to support his patients since 2009 in Singapore. He was part of the hospital staffing during the 2003 SARS Epidemic, running Nursing Care Facilities during the 2009 H1N1 Pandemic and now in community care service including frontline GP clinic and home care services during this 2019 COVID-19 Pandemic.

Dr Tan has been involved in Healthcare services for public, charity, military, social enterprise and private systems for the past 18 years. In his stint in the Military, Captain Dr Tan has been awarded with “Best Safety Award” by Republic of Singapore Airforce and “Letter of Commendation” by the Air Force Medical Service.

He has been involved in health technology development since 2010, supporting

1. Government research organisations like A\*STAR 's I2R on fall detection research using audio and vibration signatures; MOHH on looking at Nursing home EMR systems in NHELP project; SgEnable on Enabling Village Tech-Able initiatives
2. MNCs like National Computer Systems on Vital Signs Monitoring projects, Innosparks on wheelchair ramps, ST Engineering on their Tech Factor Challenge events;
3. Start-ups on innovating and development of cloud platforms, devices, robotics and A.I. medical technology, with companies like Pastel Health, HealthBeats, Nucleus Dynamics, SoundEye, Numen Care and Pillpresso to name a few.

Dr Tan is currently the Vice President of Asia Pacific Assistive Robotics Association, championing the use of technology use in the field of healthcare. He has founded [www.LocumSg.com](http://www.LocumSg.com) in 2010 as well, a job referral portal to linking directly healthcare institutions with a huge pool of locum doctors in Singapore.

Dr Tan's latest health tech involvement includes the Medical Advisor for TUV SUD - Smart Elderly Care @ Home Centre. The centre acts as a "sandbox" for companies to pilot innovative smart healthcare devices for patients' home use; and using Telepresence Robotics by Ohmnibots for healthcare uses. In 2018, Dr Tan Co-founded Wellderly, world's first blockchain solution for senior care – [www.wellderly.network](http://www.wellderly.network). In 2019, Dr Tan was working on smart clothing for health monitoring and trialling on Vivago, the medical grade activity monitor for seniors. His paper on "Televital signs monitoring compliance trial in Singapore" was published in "Digital Medicine" in 2018.