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What is Telemedicine

Telemedicine is the exchange of medical information from one location to another by using electronic communication. (Evisit,) Telemedicine can be a portal for patients to send and receive emails from nurses and doctors, meaning that patients do not have to travel to clinics to receive a medical consultation. The patients can also have virtual appointments, where they directly consult doctors or nurses via Zoom or phone calls. (WebMD, 2020).The patient can use telemedicine to consult minor injuries, and short-term illnesses, such as abrasions or the common cold, which do not require face-to-face consultation.

How COVID-19 has affected Telemedicine

The Covid-19 situation has greatly affected the healthcare industry. Resources for the healthcare industry have been stretched, and general practitioner clinics had been facing a severe shortage of manpower and doctors were able to work in only three clinics based on the guidelines issued by MOH. (RSM International, 2020) Telemedicine is expected to be one of the lasting changes to lifestyles as a result of the Covid-19 pandemic.(Chew, R. and Lim W. H. 2020)

Advantages of Telemedicine

Advantages for Doctors	Advantages for Patients	Advantages for Society
Advantage 1 : Healthcare providers would have less exposure to illnesses and infections,preventing spreading of disease (Evisit, 10 pros and cons of telemedicine,)	Advantage 1: Patient care is more convenient and accessible, including specialists	Advantage 1: It facilitates teaching and medical school educations
Advantage 2: Telemedicine can be used to reach patients in rural areas and outside the normal care delivery systems. (Ortholive, 17 September 2020)	Advantage 2: There is better patient care quality (Evisit, 10 pros and cons of telemedicine,)	Advantage 2: It trains better doctors and healthcare practitioners for future patients
Advantage 3 : Telehealth can increase clinical workflow	Advantage 3: There would be cost effectiveness and	Advantage 3: It prevents diseases being spread, so

efficiency. It can serve as the conduit for quicker prioritization of care delivery, triaging each case and improving communication by capturing, storing, and using patient data for better medical decision-making. (Ortholive, 17 September 2020)	savings,(Evisit, 10 pros and cons of telemedicine,)and reduces overhead expenses (Villines,Z. April 20 2020)	people with weak immune systems or underlying conditions(Villines,Z. April 20 2020)

Disadvantages of Telemedicine

Disadvantages for Doctors	Disadvantages for Patients	Disadvantages for Society
Disadvantage 1: Healthcare providers would require technical training and equipment to set up the telemedicine system (Evisit, 10 pros and cons of telemedicine,)	Disadvantage 1: Patients who use on-demand telemedicine services would connect with a random healthcare provider and suffer from reduced care continuity Evisit, 10 pros and cons of telemedicine,)	Disadvantage 1: Patients cannot be treated accurately, can increase total costs of healthcare treatment
Disadvantage 2: There might be technological concerns such as privacy issues and connection issues (Evisit, 10 pros and cons of telemedicine,)	Disadvantage 2: Protection of medical data might be hard, and personal information (etc. NRIC) might be revealed to people who go in uninvited (Villines, Z. April 20 2020)	Disadvantage 2: The patients will not trust the telemedicine platforms, and will not use telemedicine
Disadvantage 3: There is an inability to examine patients as telemedicine occurs virtually. (Villines,Z. April 20 2020)	Disadvantage 3: There might be care delays (Villines,Z. April 20 2020)	Disadvantage 3: There will be more and more people who need treatment

Growth of Telemedicine

As of March 2020, the number of daily active users of the telemedicine app Doctor Anywhere in Singapore, the leader in the market, increased by 156 percent compared to the previous year's average. (Nurhayati-Wolff, H. 2021). This positive growth signified the acceptance of telemedicine among the population in the country. This implies that people are becoming more acquainted and comfortable with the technology.

In comparison, in the US, in April 2020, overall telehealth utilisation for office visits and outpatient care was 78 times higher than in February 2020 and has since stabilised at about 38 times than before the pandemic. (Bestsennyy, O. , July 9, 2021)

This suggests that there is potential for greater uptake and usage of telemedicine in Singapore.

Other data points also suggest increased propensity for people to continue using telemedicine for the next couple of years, as we transition into a new normal. For countries with service disruptions for prevention and treatment services for non-communicable diseases, 58% globally have switched to telemedicine. For low income countries, the ratio was 42%. (WHO, 2020) Mercer's CEO said that about 50% of China's medical care moved online. (On,P. A. 2020). A survey was conducted by Mercer and 78% of respondents in Asia stated they were ready to use telemedicine. (IPsos, 2020).

Our Hypothesis

Our hypothesis is that the usage of telemedicine can be further promoted to increase its use, even after the pandemic.

Research Questions

How often is telemedicine used in Singapore? How will the rise in use of telemedicine continue to be sustained after the pandemic?

Hypothesis About Problems with Telemedicine

Problems with Telemedicine	When it Happens	What it Causes
Problem 1: Misdiagnosis	Often happens in in-person healthcare, but the risks increase with telemedicine as it occurs through a screen, and doctors are unable to have an in-person examination of the patient's	It might lead to wrong prescriptions and treatment of patients, possibly ending up increasing costs for the patients if they have to go back to see a doctor in person to confirm the

	body.	diagnosis or treatment.
Problem 2: Reduced care continuity.	When a patient receives telemedicine from a service provider, but chooses another provider for his next e-visit, the second physician might not have all the information that he/she needs to diagnose the patient's problems.	It might interrupt continuity of care.
Problem 3: Patient's lack of technical skills	When patients do not know how to use telemedicine platforms or services.	It can reduce utilization and hamper accessibility

Objective of our Project

The objective of our project is to explore what can be done to increase use of telemedicine as a way to provide necessary care to patients while minimising the transmission risk of viruses to medical personnel. We also want to find out telemedicine's place in the post-pandemic world.

Target Audience

Our target audience is patients and doctors who do not use telemedicine.

Plan

Our plan is to survey the usage of telemedicine amongst patients and doctors who may or may not have used telemedicine before, by creating google forms and asking them questions such as whether they use telemedicine, how often they use it, and how good has their experience with telemedicine been so far and what can be done to improve it. We plan to attract the patients and doctors who do not use telemedicine with benefits that make telemedicine a better experience, and get more people to use telemedicine in the near future.

Challenges Telemedicine Faces (Based on Our Surveys and Research)

Challenge 1: Users mostly in younger age group, increases difficulty to use telemedicine to cater to growing elderly population

Based on our survey with 95 users, it appears that take-up rates for use of telemedicine are fairly low (<20%) and users are mostly in the younger age group (31-40). This suggests that the elderly are more resistant to using telemedicine, which may make it more difficult to generate a longer-term shift to community care for a growing elderly population in Singapore.

A report by advisory firm Solidance pointed out that nearly a quarter of Singapore's population will be elderly by 2030, making it the highest ratio of seniors in Southeast Asia. Over 80,000 of these seniors are also expected to be living alone. In terms of the healthcare delivery model, whilst nursing homes have been the traditional choice for many in the country, the government is now working on a shift in the care model to deal with the high numbers. (Consultancy asia, August 20, 2020)

It is therefore crucial to educate them as soon as possible as they may become harder to convince as they grow up. A survey by the Singapore Eye Research Institute during the circuit breaker last year found that 55% of 520 people aged 60 and above were unlikely to use digital medical services if the COVID-19 pandemic continues.

Therefore, it appears that more needs to be done to engage and allay the fears, concerns and scepticism about digital health services and there is a need to empathise with the senior population more in order to get them on board. (Begum, S., July 4 2021)

Challenge 2: Patients are unable to stick to a regular doctor, therefore impacts on quality of care and therefore the take-up of telemedicine

Telemedicine apps do not always pair a patient to the doctor they were paired with previously, so the patients are unable to stick to a regular doctor. (Salleh, F.Sep 30,2020) Doctors may be unable to properly treat a patient as they may be uncertain of their illnesses and current treatment status. Both of these factors affect the quality of care the patients receive. This causes both patients and doctors to be more reluctant to use telemedicine. (Startup SG, 23 Apr 2021)

In our own survey of 95 users and 53 doctors:
- 38 users said that they had not tried it before as they would like to stick with a regular doctor
- 36 users said that being able to choose the same doctor each time would make them try telemedicine

- 20 doctors said that they had not tried telemedicine before as they believed that patients should be seen by a regular doctor for accountability

According to a 2018 Future Health Index report, healthcare professionals in Singapore are amongst the least collaborative. One aspect that may be holding them back is that as the industry uses different technology, the data being collected, and the systems being used, may differ too. (Lai, I. Jun 10 2019) Three steps to wider telehealth adoption in Singapore

Challenge 3: Patients and doctors are uncertain about its effectiveness, which discourages use of telemedicine.

Particular challenges which impact on effectiveness is the difficulty of accurately diagnosing a person remotely, particularly for an elderly person, given the higher risk of complications compared to a young patient. Some doctors may accept only younger patients on telemedicine apps, as the likelihood of them having an underlying condition that doctors might miss is lower.

Doctors are also wary about patients pretending to have illnesses in order to get medication or medical leave. (Bill Siwicki 3 April 2020)

In our own survey, 32 users and 20 doctors believed that telemedicine was ineffective and thus had not tried it before.

There may be technological advances going forward which may help to address such issues. Clinicians and scientists at SingHealth have also started using consumer-grade wearables as a tool for biomedical research. Researchers are excited by the vast amount of data that can be collected for analysis through these small, unobtrusive devices, some of which can now even perform electrocardiograms (ECG). (Startup SG, 23 April 2021)

Challenge 4: Patients are having trouble claiming the costs from their employers or insurance companies, and therefore reluctant to use telemedicine

Insurance companies might not be ready to cover telemedicine as it is something new to them, whilst companies will also likely have to move away from traditional methods of healthcare coverage. If patients cannot claim from companies or insurance, they would be less likely to use telemedicine as a primary or alternative means of healthcare.
(Cheng,G 8 May 2020),

In our own survey, more than 10 patient users highlighted this as a reason why they had not used telemedicine before. There were also close to 10 doctors who highlighted more support from both employers as well as insurance companies as factors which would encourage take-up of telemedicine. Another interesting observation from our survey was that companies were a surprising source of introduction to telemedicine to users, which was not one of the choices in our survey questions.

Health Advances, a healthcare focused strategy consulting firm, looked into how COVID-19 is accelerating telemedicine adoption in Asia Pacific. Australia, China and Singapore are seen as the early and more advanced adopters of telemedicine. There are a few factors why these countries are early adopters, but amongst them is the involvement of companies and insurers. Private companies developed solutions to pay the way for telemedicine. Australian telemedicine platforms in particular, are being supported by large insurance groups like Bupa and Medibank.

In Singapore, we are beginning to see some of these initiatives. Ernst & Young was one of the first companies to partner Fullerton Health to integrate telemedicine services with existing health care offerings. AXA Insurance is another company which partnered with Fullerton Health to offer members unlimited complimentary teleconsultants and waiver of delivery fee for medication in 2020. (Fullerton health)

Challenge 5: Ministry of Health has not endorsed nor provided a clear regulation of the use of telemedicine, which impacts on take-up by doctors

Doctors are reluctant to use telemedicine as they are worried about getting in trouble with the Ministry of Health as there are no clear rules governing the usage of telemedicine. (Sharanya Pillai, 27 Oct 2020)

In our own survey, almost half the doctors wanted clear and strong approval or licensing from the Ministry of Health before they would use telemedicine. Doctors worry about, for example, whether they have sufficient information about the patients so that they diagnose and prescribe medicines accurately. Otherwise they could face medical liabilities.

In the same piece by Health Advances, which studied the factors behind the adoption of telemedicine, early adopters' governments demonstrated national support recognising telemedicine services and establishing regulatory and reimbursement for these services. In China, policies such as "Promoting Internet + Medical Insurance to Prevent and Control COVID-19" among others have served to limit price points, increase reimbursement, and broaden telemedicine's use beyond follow-up services. Australia has also demonstrated

dramatic commitments to telemedicine since the outbreak, expanding public reimbursement of such services. (Cheng,G 8 May 2020),

Singapore's Ministry of Health is also planning to licence telemedicine in mid 2022 as part of the Healthcare Services Act. As an interim measure, MOH introduced in Feb 2021 a voluntary listing of telemedicine providers that have agreed to comply with certain measures e.g. complete the ministry's telemedicine e-training. (International Trade Administration, 26 April 2021),

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Underlying Problem

Given that the majority of patients and doctors who do not use telemedicine do not believe in the effectiveness of telemedicine, how might we encourage non-users of telemedicine to understand more about the importance of telemedicine so they can use it for years to come?

Solutions for Underlying Problem

Solution	Explanation
Solution 1: Telemedicine push initiatives - Increased marketing / advertising + subsidies (1) - Digital readiness workshops for potential users to encourage those who are less IT savvy (1) - Kiosks in public areas e.g. void decks for potential users to try (1) - Provide option for patient to choose regular doctor (2) - Provide common repository of information for doctors on same platform (2) - Work with insurance companies and employers to recognise telemedicine (3)	- Address user concerns about telemedicine effectiveness - Some of these are pre-conceptions that may be gotten around with education and if users give it a go (1) - Also address key concerns about continuity of care (2) - Employers are efficient tool to leverage as messaging can be more effectively broadcast (3)
Solution 2: Hospital / clinic push initiatives - Live demos in hospitals / clinics to encourage potential users to try - Also helps to convince some doctors of effectiveness	- Experience will help potential users and doctors familiarise themselves with such a tool
Solution 3: MOH push initiatives - Clear regulation of telemedicine (1) - Fund nationwide roll-out of wearables to help with improve diagnosis by doctors (2) - Nationwide common data repository (2) - Form alliance between telemedicine platforms and hospitals to provide effective, connected care (3)	- Address primary concern why doctors reluctant to try (1) - Addresses issue of ineffective or inaccurate diagnosis and treatment due to lack of information; also deals with continuity of care (2) - Recognition by MOH of telemedicine's effectiveness will encourage potential users (3)

Criteria for Solutions and Reasons

Criteria	Explanation
Criteria 1: Reliability	Some problems may be around as telemedicine evolves. We want a solution that will be able to counter these problems, and be sustained for a long period of time, with consistent measurement procedures.
Criteria 2: Versatility	As telemedicine evolves, its problems might evolve as well. With a versatile solution, it is able to adapt to different circumstances in telemedicine.
Criteria 3: Speed	The best solution has to be implemented in the shortest time possible to encourage more people to use telemedicine.
Criteria 4: Ease of use	We want the best solution to be easy to understand and be used by non-users of telemedicine.
Criteria 5: Safety	We want patients to have trust in the doctors and the telemedicine platforms and make sure that personal information shown will be kept confidential.

Best Solution / Conclusion

We put the solutions in a decision matrix. The solution that fits the criteria the most gets the most points. Solution 1, which is to work with telemedicine platforms on a variety of initiatives, is the best solution as it has the most points.

From the table below, Solution 1 has the most advantages:

- It is the most versatile as the telemedicine platforms' solutions are most easily adapted as opposed to government solutions which take a long time to implement.
- It is also the fastest of all of the solutions as telemedicine platforms are likely to be most nimble in terms of coming out with and executing initiatives.
- It is also the easiest to use as telemedicine platforms' solutions are likely to be the most easily understood by potential users.

Solutions	Reliability	Versatility	Speed	Ease of use	Safety	∑
Solution 1: Telemedicine platform push initiatives	2	3	3	3	2	13
Solution 2 : Hospitals / clinics push initiatives	1	2	2	2	1	8
Solution 3: MOH push initiatives	3	1	1	1	3	9
Reasons	Clear govt regulation and recognition likely to have most lasting effect	Telemedicine platform solutions are most easily adapted, compared with govt regulations which take a long time to change	Telemedicine platforms likely to be most nimble in terms of coming out with and executing initiatives	Telemedicine solutions likely to be most easily understood by potential users	Nationwide common data depository would like be most secure and consistent in terms of patient data	

However, for telemedicine to be used more widely in a post pandemic world will require a multi-stakeholder approach. Telemedicine platforms acting on their own, via initiatives identified in Solution 1, may achieve some progress but will not be able to achieve the same outcome compared with if other stakeholders such as the Ministry of Health, hospitals / clinics, employers and insurance companies are involved.

References

RSM International. (2020, April 8). Impact of COVID-19 on Singapore's healthcare industry.
https://www.rsm.global/singapore/insights/our-expert-insights/impact-covid-19

Rebecca Chew and Lim Wee Hann. (2020 June). Telemedicine , before, during, and after Covid 19: Key Considerations and Issues
https://eoasis.rajahtann.com/eoasis/gn/at.asp?pdf=../lu/pdf/2020-06-Telemedicine_before_during_and_after_COVID-19.pdf&module=LU&topic=LU0012986&sec=b

Hanadian Nurhayati-Wolff. (2021, February 23). Year-on-year (YOY) change in daily active users of telemedicine apps in Singapore as of March 2020, by company.
https://www.statista.com/statistics/1179875/singapore-yoy-change-telemedicine-app-users-by-company/#:~:text=As%20of%20March%202020%2C%20the,the%20population%20in%20th%20country

Oleg Bestsennyy (2021,July 9), Telehealth: A quarter-trillion-dollar post-COVID-19 reality?,
https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality#

WHO. (2020, June 1). COVID-19 significantly impacts health services for noncommunicable diseases.
https://www.who.int/news/item/01-06-2020-covid-19-significantly-impacts-health-services-for-noncommunicable-diseases

Pamela Ariel On. (2020, July 23). Telehealth gets a boost from COVID-19 pandemic. CNA.
https://www.channelnewsasia.com/news/business/telehealth-gets-a-boost-from-covid-19-pandemic-12945990

IPsos. (2020, June 26). Report: Digital Doctor 2020.
https://www.ipsos.com/en-sg/report-digital-doctor-2020

Consultancy asia, (20 August 2020), Telemedicine and digital health an opportunity for Singapore,
https://www.consultancy.asia/news/3508/telemedicine-and-digital-health-an-opportunity-for-singapore

Shabana Begum, (JUL 4, 2021), Seniors less receptive to telemedicine and uncomfortable with AI interpreting medical results: S'pore survey
https://www.straitstimes.com/singapore/health/seniors-less-receptive-to-telemedicine-and-uncomfortable-with-ai-interpreting

Fariza Salleh (Sep 30 2020) Singapore telemedicine startup Doctor Anywhere thrives as virtual healthcare becomes the new normal,

https://www.businessinsider.com/singapore-telemedicine-startup-doctor-anywhere-thrives-in-new-normal-2020-9

Startup SG, (23 Apr 2021), 5 APAC digital health trends to watch in 2021 and beyond
https://www.startupsg.gov.sg/news/14878/5-apac-digital-health-trends-to-watch-in-2021-and-beyond

Ivy Lai, (10 Jun 2019), Three steps to wider telehealth adoption in Singapore
https://www.philips.com.sg/a-w/about/news/archive/future-health-index/articles/20190610-three-steps-to-wider-telehealth-use-in-singapore.html

Bill Siwicki, (3April 2020) Survey: Americans' perceptions of telehealth in the COVID-19 era
https://www.healthcareitnews.com/news/survey-americans-perceptions-telehealth-covid-19-era

Gary Cheng, (8 May 2020), Telemedicine Adoption in Asia Pacific
https://healthadvancesblog.com/2020/05/08/how-covid-19-is-accelerating-telemedicine-adoption-in-asia-pacific/

Fullerton health, The Challenges In Delivering A Successful Telemedicine Service
https://www.fullertonhealth.com/the-challenges-in-delivering-a-successful-telemedicine-service/

Sharanya Pillai, (27 Oct 2020) The doctor is online: why telemedicine apps need to tread with caution
https://www.businesstimes.com.sg/brunch/the-doctor-is-online-why-telemedicine-apps-need-to-tread-with-caution

International Trade Administration, (26 April 2021), Singapore Licensing of Telemedicine
https://www.trade.gov/market-intelligence/singapore-licensing-telemedicine

Evisit. Telemedicine Definition. https://evisit.com/resources/telemedicine-definition/

WebMD. (2020, March 27). How Does Telemedicine Work?
https://www.webmd.com/lung/how-does-telemedicine-work

Evisit. 10 pros and cons of telemedicine.
https://evisit.com/resources/10-pros-and-cons-of-telemedicine/

Zawn Villines. (2020, April 20). Telemedicine benefits: for patients and professionals.
https://www.medicalnewstoday.com/articles/telemedicine-benefits#what-is-it

Ortholive (17 September 2020) Top 10 Benefits of Telehealth for Patients and Doctors
https://www.ortholive.com/blog/top-10-benefits-of-telehealth-for-patients-and-doctors/

Andrew Dean, (August 20 2015) 5 ways hospital administrators can prevent misdiagnosis,
https://blog.capterra.com/the-top"5 Ways Hospital Administrators Can Prevent Misdiagnosis"

Singaporelegaladvice.com, (July 17, 2020),
https://singaporelegaladvice.com/law-articles/telemedicine-singapore-doctor-duties-protecting-patients/

Rahul Varshneya, (October 11 2018)
https://telemedicine.arizona.edu/blog/7-telemedicine-concerns-and-how-overcome-them