

Summer Training Report

By

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ACRONYMS / ABBREVIATIONS

EHR- ELECTRONIC HEALTH RECORD

EMR-ELECTRONIC MEDICAL RECORD

M-HEALTH- MOBILE HEALTH

MARS- AN EVALUATION SCALE FOR MOBILE HEALTH APPS

HIT-HEALTH INFORMATION TECHNOLOGY

SARS- SEVERE ACUTE RESPIRATORY SYNDROME

MERS- MIDDLE EAST RESPIRATORY SYNDROME

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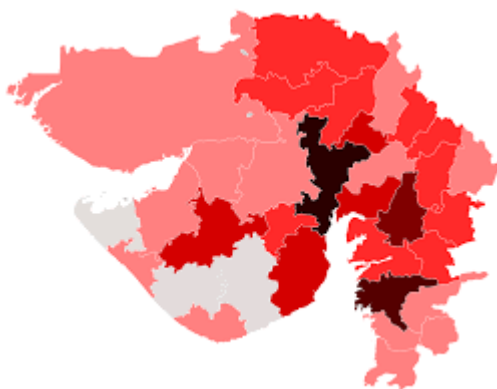
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PART- A

Research Project

Title

COVID -19 – THE EMINENT THREAT IN GUJARAT



Objective

To understand current situation of COVID 19 in Gujarat with respect to India and Global level till 16th July 2020.

Abstract

There is a new public health Crisis threatening the world with emergence and spread of 2019 novel coronavirus also known as the severe acute respiratory syndrome (SARS-COV-2). The corona virus was first originated in Wuhan china in bats and was transmitted to humans through unknown intermediate animals in Wuhan. As of 16th July, virus is spread to 213 countries and territories. An observational study was conducted for the state of Gujarat by collecting data from various secondary sources like journals, websites and newspapers to know the mortality, morbidity and recovery indicators in total tested positive individuals. This study also determines age-sex composition of COVID-19 patients in Gujarat and the total number of districts affected by this disease in the state. During the course of study, it was also found that there is an acute shortage of Hospitals and ventilators in the country to deal with the estimated number of COVID-19 cases in the next few months. The total number of hospital beds are 64,862 among them 20,172 beds in public hospitals 44,690 beds in private hospitals and total number of ICU beds are 3,243 in both sectors- 1,009 beds in public and 2,234 in private sector. Ventilators 1,622 (Both Public and private sector) 504 available ventilators in public and 1,117 in private sector.

Introduction

The history of human coronavirus began in 1965 When two Physicians & Virologist Tyrrell and Bynoe found that they could passage a virus named B814(HCov-229E). It was found in human embryonic tracheal organ cultures obtained from the respiratory tract of an adult with a common cold. Tyrrell was leading a group of virologists working with the human strains and a number of animal viruses. The new group of viruses was named coronavirus (*corona* denoting the crown-like appearance of the surface projections). Coronavirus disease belong to a large family of viruses that usually cause mild to moderate upper respiratory tract infection which is like common cold. There are hundreds of coronaviruses most of them are circulated through animals such as pigs, bats, camels and cats. The SARS-COV- 2 is very much similar to SARS-COV was identified in 2003 as cause of outbreak of SARS that began in china in 2002. The SARS-CoV-2 is a beta-coronavirus belonging to the family of Coronaviridae. After the first outbreak in 1965, two more outbreaks recorded SARS severe acute respiratory syndrome (2003) & MERS Middle east respiratory syndrome (2012).

The disease was first identified in December 2019 Wuhan, the capital China's Hubei province resulting into ongoing 2019-20 coronavirus pandemic. The reported symptoms include Fever, dry cough, tiredness, Sore throat, Diarrhoea, loss of taste and smell, Pneumonia and shortness of breath. Preventive measures such as wear mask, hand hygiene practices, avoid public gathering and maintain social distance, contact tracing and quarantine are recommended to reduce the transmission of disease.

The first case of coronavirus in India (Kerala) which originated from china was reported on 30th January 2020. Currently, India has the largest number of confirmed cases in Asia and third highest cases in World after United States and Brazil. Out of all reported cases half of the cases are accounted in six cities in the country – Ahmedabad, Mumbai, Delhi, Pune, Chennai & Kolkata. In Gujarat, the first two cases reported on 19th march a 32, year man who returned from Saudi Arabia and 21-year women who returned from UK were tested positive. Gujarat has highest mortality rate at 6.2% double than the global mortality rate.

Literature review

Journal & Date	Title	Authors and link	Main question	Key facts
CDDEP 20 APR 2020	COVID-19 in India : State-wise estimates of current hospital beds, intensive care unit (ICU) beds and ventilators	Geetanjali Kapoor, Aditi Sriram, Jyoti Joshi, Arindam Nandi, Ramanan Laxminarayan https://cddep.org/wp-content/uploads/2020/04/	What are the Statewise estimates of current hospital beds, intensive care unit (ICU) beds and ventilators in India?	->Most of the beds and ventilators in India are concentrated in seven States - Uttar Pradesh (14.8%), Karnataka (13.8%), Maharashtra (12.2%), Tamil Nadu (8.1%), West Bengal (5.9%), Telangana (5.2%) and Kerala (5.2%). The total number of hospital beds are <u>64,862</u> among them <u>20,172</u> beds in public hospitals <u>44,690</u> beds in private hospitals. The total number of ICU beds are <u>3,243</u> in both sectors- <u>1,009</u> beds in public and <u>2,234</u> in private sector. Ventilators - <u>1,622</u> (Both Public and private sector) <u>504</u> available ventilators in public and <u>1,117</u> in private sector.
THE LANCET 16 JULY 2020	A vulnerability index for the management of and response to COVID-19 epidemic in India: An ecological study	Rajib Acharya, PhD https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30300-4/fulltext	Which Indian states are more vulnerable to COVID-19 crises in the country?	A number of districts in nine large states—Bihar, Madhya Pradesh, Telangana, Jharkhand, Uttar Pradesh, Maharashtra, West Bengal, Odisha, and Gujarat—located in every region of the country except the northeast, were found to have high overall vulnerability (index value more than 0.75).
The Indian Journal Of Paediatrics, IJP 13MAR2020	A Review of Corona Virus Disease -2019 (COVID-19)	Tanu Singhal https://link.springer.com/article/10.1007/s12098-020-03263-6	Challenges faced by the outbreak	Healthcare professionals should take travel history of all patients suffering from respiratory symptoms and any international travel. People should stop spreading myth and false information about the disease. Efforts should be made to prevent future outbreaks of zoonotic origin

Methodology

1) Research Question?

What is the current status of covid -19 in Gujarat with respect to India and Global level till 16th July 2020?

2) Study objective

- To know the Mortality, Morbidity and recovery indicators among total tested positive Covid-19 individual in Gujarat
- To know the total number of districts affected by covid-19 in Gujarat
- To find out the Availability of Hospital beds and Ventilators in Gujarat with respect to other states of India.
- To enlist the positive steps taken by the Gujarat Government to control the spread of covid 19 in India.

3) Type of Research: - Quantitative Research

4) Type of Research Design – Observational

5) Data Collection: - Data is collected through various Research paper, Articles from newspaper, Journals, Website.

Sources of Data

1 - WHO

Globally, there are 13,378,853 confirmed cases of Covid-19, 580,045 deaths.

REGIONS	CONFIRMED CASES	DEATHS
Western pacific Region	249786	7833
European Region	2987256	205006
Southeast Asia Region	1268923	31297
Eastern Mediterranean	1331893	32776
Region of the Americas	7016851	294301
African Region	523403	8819

According to situation report 24 – India (July 12th 2020)

Active Cases- 292,258

Cured/Discharged- 534,629

Migrated -1

Deaths- 22,674

2- MOFHW (Ministry of Health and Family Welfare)

<https://www.mohfw.gov.in/>

India		Gujarat	
Active Cases	3,42,473	Active Cases	11,289
Cured/Discharged	6,35,756	Cured/Discharged	32,103
Migrated	1	Migrated	
Deaths	25,602	Deaths	2089

3- India Covid-19 Tracker 16th July 2020

www.covid19india.org

India		Gujarat	
Confirmed cases	10,16,325	Confirmed cases	45,567
Active Cases	3,46,572	Active Cases	11,303
Cured/Discharged	6,43,587	Cured/Discharged	32,174
Deaths	25,776	Deaths	2,090

671 out of every 1 million people in Gujarat have tested positive for the virus. Recovery rate (70.61%) For every 100 confirmed cases, 71 have recovered from the virus. The active cases are 24.81% For every 100 confirmed cases, 25 are currently infected. Mortality rate - 4.59% For every 100 confirmed cases, 5 have unfortunately passed away from the virus.

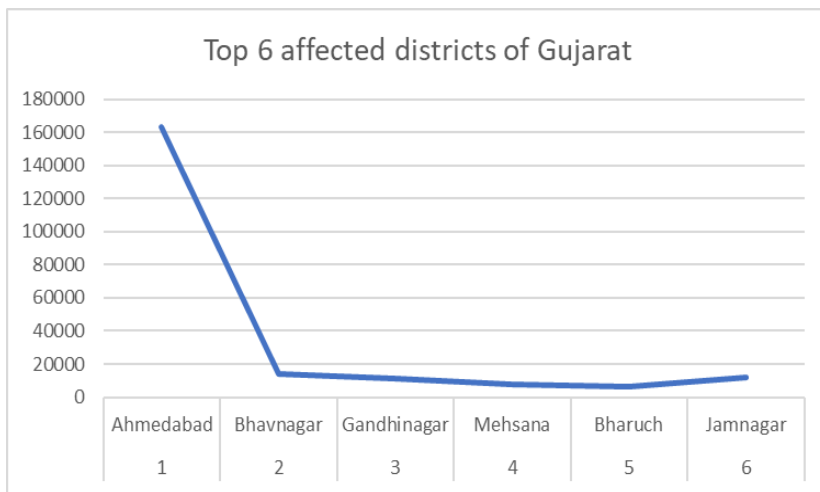
District Wise Report (<https://gujcovid19.gujarat.gov.in/>)

Sr No	District Name	Active Positive Cases	Cases Tested for COVID19	Patients Recovered	People Under Quarantine	Total Deaths
1	Ahmedabad	3621	163398	18627	195992	1532
2	Amreli	98	7608	93	20222	9
3	Anand	26	7856	295	5560	13
4	Aravalli	19	5723	219	1256	24
5	Banas kantha	74	12389	304	1414	16
6	Bharuch	203	6494	287	18018	11
7	Bhavnagar	546	13768	237	2422	15
8	Botad	45	3919	87	286	3
9	Chhota Udaipur	33	7700	56	1396	2
10	Dahod	136	8891	61	1070	2
11	Dang	3	1846	4	298	0
12	Devbhoomi Dwarka	3	5123	23	246	3
13	Gandhinagar	277	11119	689	21968	35

14	Gir Somnath	100	6413	54	5534	1
15	Jamnagar	192	12216	204	2031	9
16	Junagadh	169	17831	290	4482	6
17	Kutch	114	10034	163	1117	7
18	Kheda	138	8417	234	2992	15
19	Mahisagar	61	6783	134	3545	2
20	Mehsana	265	7519	222	241	15
21	Morbi	57	5703	58	657	4
22	Narmada	25	4804	96	911	0
23	Navsari	134	6520	162	23351	2
24	Panchmahal	45	8530	209	2057	15
25	Patan	58	6177	236	58	19
26	Porbandar	6	4159	22	2041	2
27	Rajkot	530	13337	270	1771	18
28	Sabarkantha	91	8105	184	6927	8
29	Surat	3046	64143	5627	16299	234
30	Surendranagar	246	9666	144	9588	10
31	Tapi	14	5282	39	80	0
32	Vadodara	695	30043	2606	1552	52
33	Valsad	219	7189	167	760	5

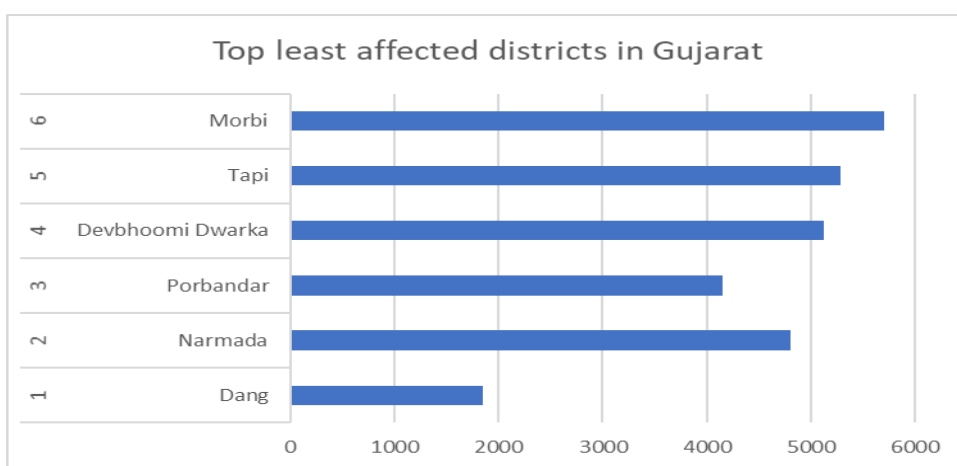
Top most affected districts of Gujarat

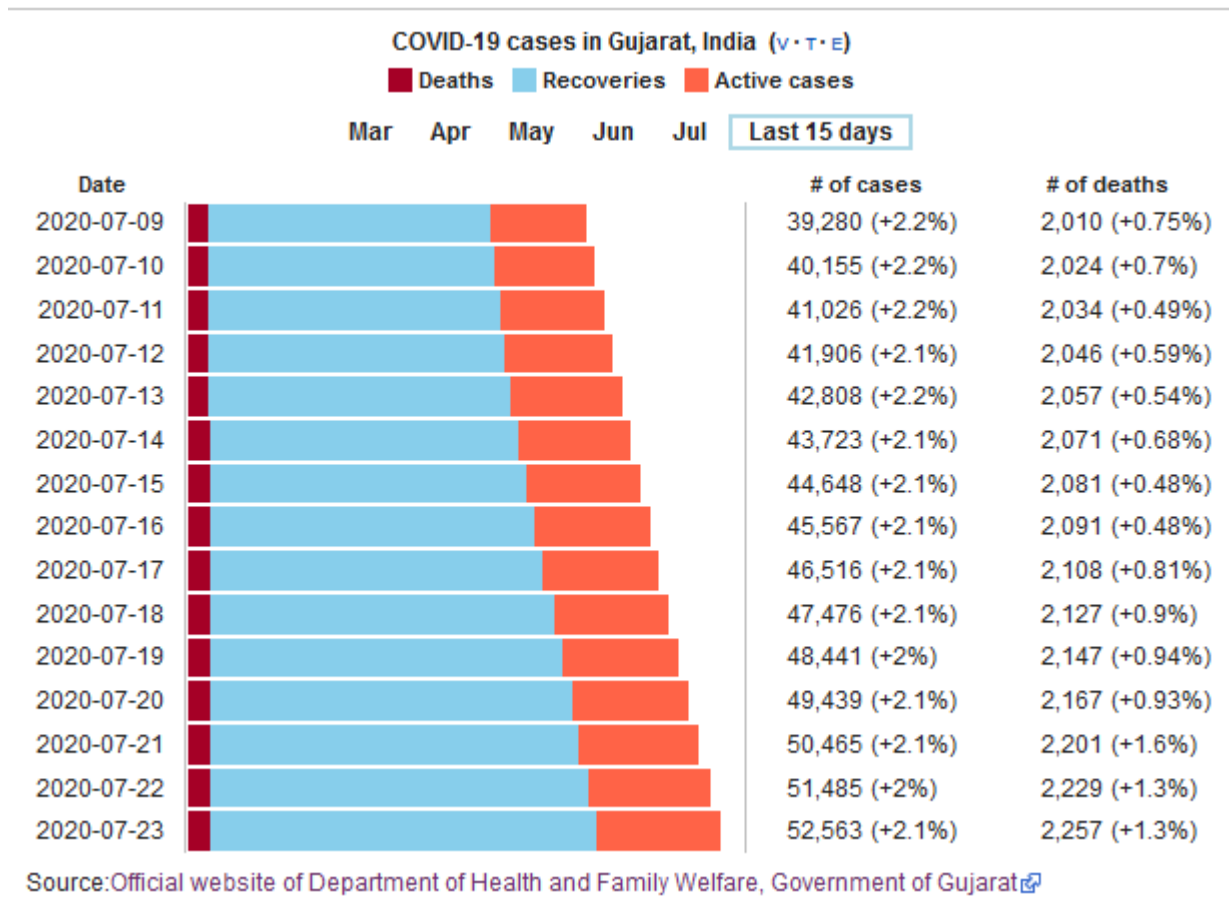
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1	Ahmedabad	3621	163398	18627	195992	1532
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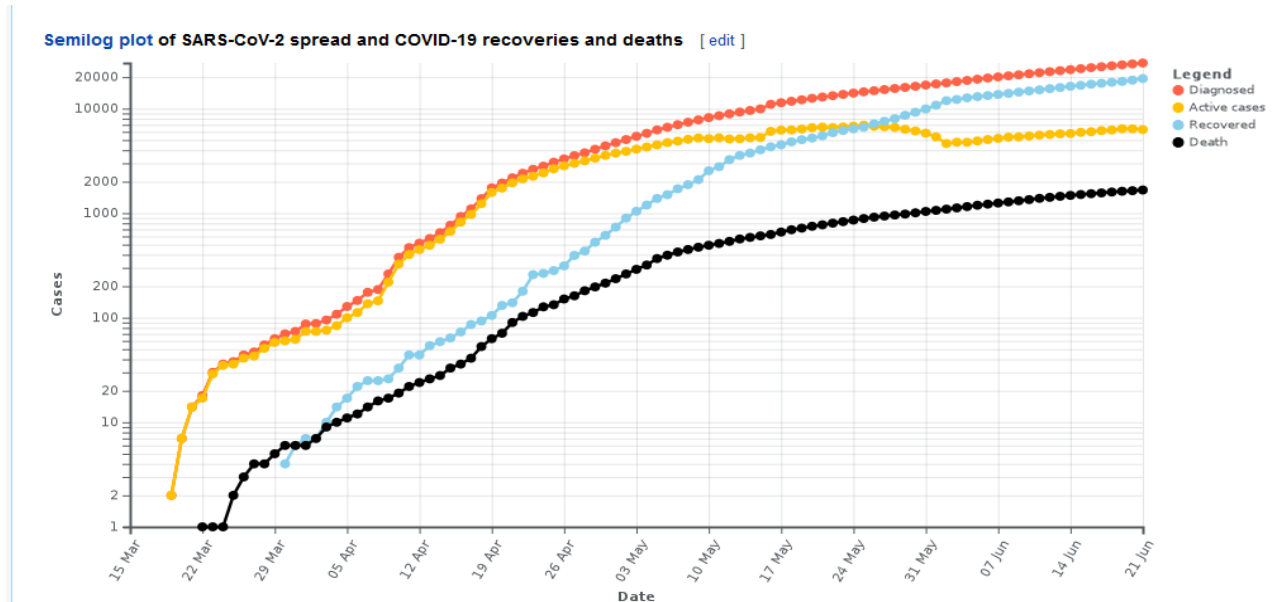
Top Least affected Districts of Gujarat

Sr No	District Name	Active Positive Cases	Cases Tested for COVID19	Patients Recovered	People Under Quarantine	Total Deaths
1	Dang	3	1846	4	298	0
2	Narmada	25	4804	96	911	0
3	Porbandar	6	4159	22	2041	2
4	Devbhoomi Dwarka	3	5123	23	246	3
5	Tapi	14	5282	39	80	0
6	Morbi	57	5703	58	657	4





Timeline of Covid cases in Gujarat



On 17th march statue of unity closed for tourists for the preventive measures of Covid-19 in Gujarat

On 18th march the director of Sabarmati Ashram decided to Close the ashram to control the spread of Covid-19 in Gujarat.

Gujarat Reports the first two Positive cases of Covid on 19th March.

As Janta Curfew was announced by PM, Narendra Modi CM of Gujarat, Vijay rupani announced to close all state buses on 22 March followed by the decision of PM.

24th March PM Narendra Modi announced complete Lockdown in entire country for 21 days.

As on 5th April cases crossed up to 50-mark CM announced the shortage of ventilators and within 10 days as local industrialist have successfully made ventilators.

Ahmedabad, Surat, Bhavnagar and Vadodara Covid Hotspots in state till 6 th April.

On 16th May no of cases crossed 10,000 mark and Gujarat has highest mortality rate as compare to the other states in India.

On 16th July the cases crossed to 45,000 mark and recoveries in Gujarat crossed 32,000 mark.

Testing Statistics of Covid 19 in Gujarat

Summary of test results	
Samples tested	5,92,123
Positive	52,563
Positive %	8.88%

Expected outcomes

According to the tool created by Gabriel goh a machine learner researcher, the epidemic calculator it all depends on flattening the curve, bringing down R0 the rate at which infections spread and at what stage the lockdown was enforced and ordered. This calculator implements a classical infectious disease model -- SEIR (Susceptible > Exposed > Infected > Removed) -- an idealized model of spread still used in frontlines of research.

Prediction

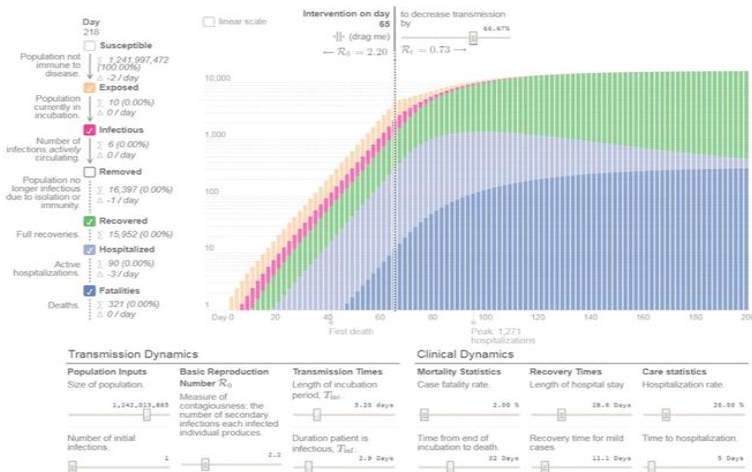
With default data: - The infection rate R0 of 2.2 it means a coronavirus patient is likely to infect at least two more people the coronavirus Epidemic Calculator indicates that in a year the disease will infect a little over 1 million people in India.

If the lockdown or intervention has brought Ro lower 50 days after the first case was reported, the total number of cases will be significantly less and number of fatalities exponentially lower.

COVID 19 BEST SCENARIO: - If everything works well in India, if government mounts a good response, and death rate is not above 2 per cent, health care system holds up, quarantine is effective, then covid-19 may end up infecting a little above 15,000 people and deaths to around 300.

COVID 19 WORST CASE: - If nothing works well, the case fatality rate can go up to 4 per cent which is more than Italy and Spain. Population of India is little over 1.3 billion, we may end up seeing around 180 million infected in the country this year and little over 5 million dead.

Epidemic Calculator



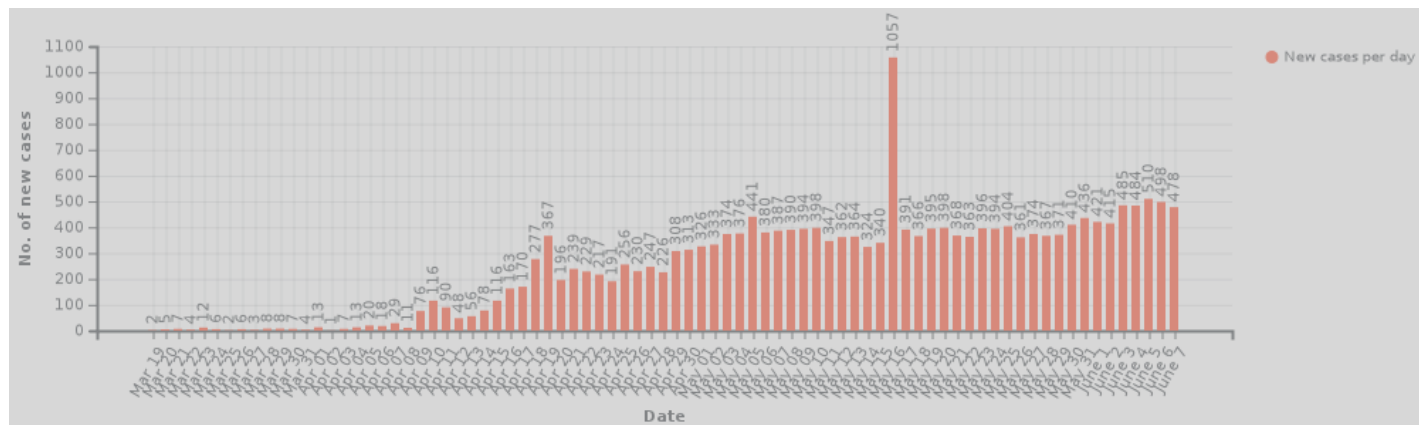
If we look at china then they took almost 3 whole months to get situation under control. But china has better healthcare system and they aggressively followed their lockdown which is not being done in India. If more test conducted by the government the projection might change.

Growth Factor of Daily new cases

Growth factor is generally defined as the factor by which a quantity multiplies or grows by itself over a period of time. The formula used is Total Number of **Every day's new cases** / Total Number of **new cases on the previous day**.

The value of growth factor **above 1 indicates an increase**, whereas the value which remains **between 0 and 1 it is a sign of decline**, with the quantity eventually becoming zero, whereas a growth factor continuously above 1 depicts exponential growth.

Currently the growth factor in India is constantly above 1 signalling exponential growth in India.



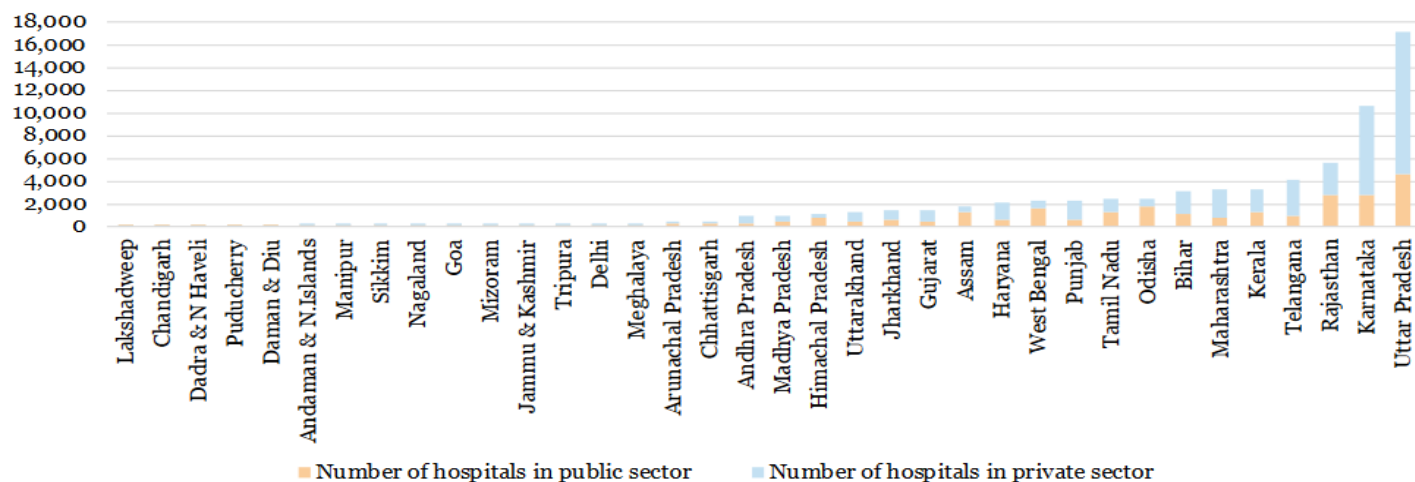
Positive Steps taken by government of India and Gujarat: -

- Pm of India call for janta curfew is a unique proposal for voluntary lock down & after that 21 days completely lock down, a preventive action for safety and social distancing
- Government (MoHFW) has issued a notification declaring coronavirus as an epidemic disease under the Indian Epidemic Act, 1897.
- The government suspended all existing visas, except for limited categories.
- The Gujarat state government also banned conferences, seminars and workshops till March 31, and appealed to the public to avoid large gathering and postpone any such events till March 31.
- As per the regulations, district administration has been empowered to seal the geographical area from where coronavirus has been reported, bar entry and exit of the population in that area, close schools, offices, ban vehicular movement, isolate suspected cases in hospital, among others.
- A man with history of coming in contact with suspected or confirmed cases, or having travelled in countries or areas where coronavirus has been reported, is required to isolate himself at home for 14 days, and report to the nearest government hospital.
- All government and private hospitals to have flu corners for the screening of suspected cases of coronavirus.
- The government has stocked enough triple-layer masks, and sanitisers, and created 572 isolation beds and 204 ventilators to deal with the coronavirus threat
- 38 quarantine facilities have been created with 1,117 beds.

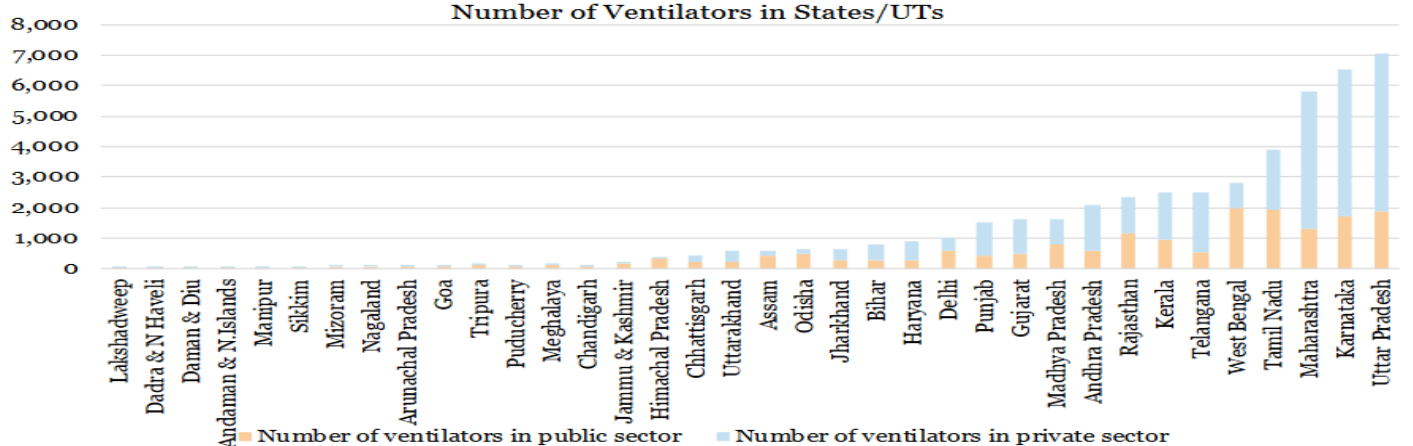
Availability of ICU beds and Ventilators: -

- India has **7,13,986** government hospitals beds available which amounts to 0.55 beds per 1000 population. The total number of beds in public and private hospitals are **18,99,228**.
- The total number of ICU beds in public and private sector **94,961** among them **35,699** beds in public sector, **59,262** beds in private sector.
- Ventilators – **47,481** available number of ventilators in both public and private sector. **17,850** in public sector and **29,631** Private sectors.

Number of Hospitals in States/UTs



Number of Ventilators in States/UTs



Gujarat-

- The total number of hospital beds are **64,862** among them **20,172** beds in public hospitals **44,690** beds in private hospitals.
- The total number of ICU beds are **3,243** in both sectors- **1,009** beds in public and **2,234** in private sector.
- Ventilators - **1,622** (Both Public and private sector) **504** available ventilators in public and **1,117** in private sector.

Conclusion:

After the largest increase of covid cases, the present situation is very critical for the government and people in the near future as the cases will increase more and government has to put a lot of efforts to fight against the pandemic. The doubling rate (national average) earlier was three days, which is now 9.2 days from the last 2 days (as on 2nd July 2020). It was also found that there is a decline in the death rate and at present India's death rate is stable at 3.3%, in comparison to most of the European countries such as Spain (9.73 per cent), Italy (12.72 per cent), and UK (over 12 per cent). It was found that the people also followed the lockdown in the study so a lot of improvement is shown in the recovery rate of India as per the findings, the recovery rate of India is improving day by day. In India, the rate of recovery stands 63.4% on 16th July 2020 as it was 60.96 till 16th April 2020. Despite of lockdown and Janta curfew the doubling rate of Gujarat remains highest with 31.47 days which is even more than the national rate. As per the findings the recovery rate is 48.13 which is more than the national average. Gujarat has highest mortality rate, but large amount of deaths occurs in old age people. Gujarat has three types of Covid-19 facilities—dedicated hospitals, health centres and care centres. Currently, the state has 133 dedicated hospitals with more than 12,000 beds; there are 2,200 ICU beds and 1,200 ventilators. Still due to cases increased the state face shortage of hospitals as well as equipment. Dang, Narmada, Devbhumi Dwarika, Porbandar are among the least affected districts of Gujarat and able to control the spread of virus. According to the Mahatma Gandhi Labour Institute in the state, nearly 1.5 million workers left Gujarat in April on Shramik special trains due to increasing cases in Ahmedabad. A helpline has also been started to ensure medical help reaches people in less than two hours. Ahmedabad, Surat, Baroda, Rajkot are still in the top worst affected districts. Government Hospitals and even train are kept to provide the facility to patients. Gujarat government started rapid pool testing to keep check on Covid 19 patients. Due to increasing cases, the government hospitals not able to provide services to patients and facing shortage for beds and ventilators.

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E-Health More than just an Electronic Record



Course Description: - The MOOC, "eHealth: More than just an electronic record!", is multidisciplinary in nature, and aims to equip the global audience of health clinicians, students, managers, administrators, and researchers to reflect on the overall impact of eHealth on the integration of care. It explores the breadth of technology application, current and emerging trends, and showcases both local and international eHealth practice and research.

Time: - Approximately 15 hours to complete

Objectives

- The fundamentals of E-Health
- What Kind of Health data we are currently collecting & how it will transform healthcare in future?
- How new technologies are helping health consumers participate in their own healthcare
- How eHealth can improve the coordination and efficiency of healthcare

Chapter -1 What is E-Health?

1.1 An Introduction to e-Health

WHO definition of e-Health

e-Health is the cost effective & secure use of information & communications technologies in support of health & health-related fields.

According to me, E- health is application of the internet & other technologies in the healthcare industry to improve access, efficiency, effectiveness & quality of treatment utilized by health organizations, patients, Health practitioners & consumers using HIT to improve health status of patients.

Traditionally, when one thinks of e-health, People refer to EHR (electronic health record) & devices which is not true. One of the fastest growing areas of e-health is technology we are using to support healthcare providers & consumers. Perhaps, it is used in the context of rural practice to reduce travel time for both healthcare practitioners & consumers. The most transforming area of e-health relates to health in our hands. This includes apps, website & wearable devices.

We are surrounded by people who records their every move using mobiles. They often download information, interact with their friends on social media, sharing health data or information with healthcare providers.

A Model for e-health: - There are three overlapping domains firstly, Health in the hands of consumers. This includes the growing use of wearable devices, apps and social media to monitor and report on our health and wellness. Secondly, the impact of new technologies on how health professionals communicate with patients, as well as how they communicate with each other. Thirdly, data records in the quantified self. This includes how we store data in traditional medical records through to how we store data associated with devices and apps.

1.2 Expert opinions

Challenges

- I. The implementation of the ideas of e-health is practically difficult one. eHealth is a potent catalyst for change in healthcare delivery. We have to be right up there with our education. So, the students we graduate need to be highly skilled in using it and being able to adapt to what we're expecting in the future.
- II. One of the biggest concerns that society has nowadays is how all this big data we are collecting about people's appearances about people's behaviours, about people's social connections, will be used currently and in the long-term future. This is such a difficult issue with so many possible answers.
- III. Ensuring the data privacy & security is biggest challenge. Patients and healthcare professionals need to feel one hundred percent confident about the confidentiality of digital health systems.
- IV. There are a lot of apps available now, need to be better absorbed into healthcare systems. They also need to be rationalised, standardised & Simplified to aid value & usability.

The Future

- I. 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.
- II. We have very cool devices for communication & we call them phone which can measure Physical activity. A contact lens that will enable you to measure glucose levels.
- III. New and emerging technologies ranging from things like a portal right through to assistive technologies, biometric devices.

1.3 Introductory Learning Activities

E- Health in action

A video showing about Enabled Healthcare & its benefits.

Situation -1

The old man walking in a beach with a child suddenly collapsed due to chest pain. Ambulance took him to the hospital where doctors, nurses asking him about how is he feeling, medical history etc.

Situation- 2

In this scenario there is a record of patient in e form (EHR) where medical history is available and all rights are given to different hospitals to check medical records of patient.

Learnings

- Better connecting Healthcare
- Information sharing
- Decision Making

Digital Hospital

Stephens Digital hospital At St Stephen's Hospital in Hervey Bay, a higher level of quality and safety will be introduced and medication errors will be minimised via robust decision support features. Most importantly, care will be oriented toward patient needs, patient satisfaction, and exceptional patient outcomes.

eHealth digital hospital provides the following benefits to patients as well as Doctors.

- Reduction in transcription, legibility and omission errors
- Improved medications management
- Access to modern day electronic media and social information (Patients).
- Reduced time locating/collecting patient information

2 Health in your hands

Applications or apps, wearable devices, online health information and social media are all being used to motivate healthy behaviours and monitor existing conditions. Devices are being used by a wide range of individuals to track their performance, diet, sleeping patterns, and almost every conceivable health metric. Wearable devices and associated apps can be used for a wide range of purposes. This includes capturing and displaying personal health data, plotting data to monitor and track progress, delivering information in a variety of formats and providing opportunities for communication with health care professionals and patients and providing links to social networks.

2.1 Collecting your own data

Wearables collecting your own data - Now-a-days people use their phones to click information for blood pressure, pulse, weight, BMI connecting through Wi-Fi get results of BP motivates them to look after their health. One of the bigger trends is wearable devices that interact with apps. After just over two years in the market, fitness bands are already at the same levels of adoption as tablets were in 2012. So, it can only be expected that health care professionals will see an increasing consumer led drive for them to be responsive to personal health data and mobile technologies.

Apps like Pedometer- which gives motivation to a person to walk & offering winner week trophy motivates them to achieve more towards health. Sleep tracker – Which allows to diagnose someone has sleep apnea. Fitbit – can track gym sessions too & people can chat to their friends & relatives about sessions, Healthy diet habits.

Data Can be collected in many ways for example- Wearing a Holter meter that records 24 hours of ECG. This sensory has many advantages, it allows someone to record activity outside the hospital & its measure accurately cardiac activity. The only disadvantage is that you cannot share data with your family members or specialists that are not the one that have been prescribed. You cannot analyse your data & it will directly be transferred to your specialist.

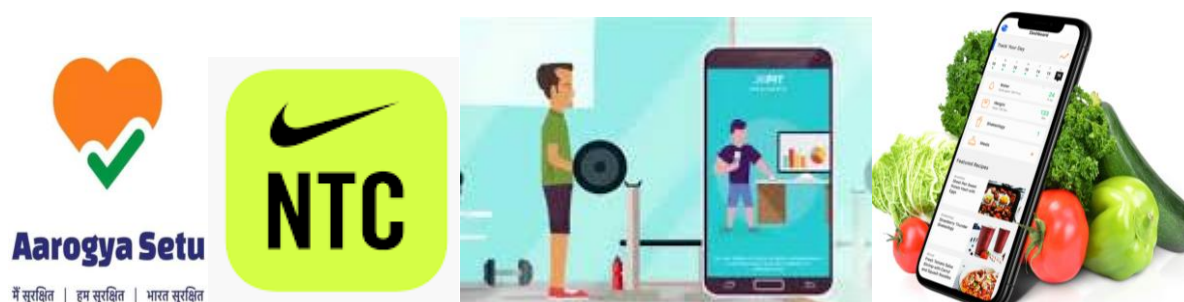
New Technologies are changing this completely. So now you have a new sensor that is not accurate as the other one but it has many other advantages such as you can share your data with your family, Friends & other specialists too & can analyse data own send it to email also. You can sample the data at any point in time without having to go to a nurse to get all these Holter installed etc.

2.2 Apps, Social Media & Health online

Mobile Apps for health

The use of apps, mobile devices, sensors, etc is commonly referred to as mHealth or Mobile Health and some 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 (Covid).



Our friends, family and colleagues are using apps and devices to monitor things like calories, distance and terrain covered, sleep cycles, moods and more. In the quest to learn, improve, share and change their behaviours. Apps are a piece of software that are usually downloaded to a mobile device. And using your own smartphone and watch as an example, you use a free health app, which gives you an easy to read dashboard of my health and fitness data. It helps you to track your movement, exercise or steps taken, heart rate, how many stairs you have climbed and other customizable health related data. This data can chart and you can check your progress, and adjust my activity levels to achieve individual goals.

2.3 Social media for health

Communication now includes being social in an online environment and India has a total population of over 1.36 billion people. Of that population, 230 million or 70% are active social media users. Indian users spend 2.4 hours on social media a day. Today mostly young people will be found using smart phones & tablets or access many social media platforms such as Facebook, twitter, Instagram, YouTube etc. Increasingly, social media is being used by governments to promote health information as well as to gather data. So, it can be used to provide healthy information on a range of conditions or answer medical questions. It can also assist conversations between patients, or between patients and health professionals, and it can also be used to collect data on patient experiences and opinions.

2.4 Designing & Evaluating E- Health solutions

When you're using your mobile phone, or website they're probably logging all that you're doing, keeping track of what you're doing. Designers actually make sure that they create the interfaces with the logging in mind so that they can continue long term experiments. we need to think about how these tools will have an effect on the way we live, on our psychological well-being, etc. This is what we call positive computing, the design and development of technologist to support psychological well-being and human flourishing. Positive computing builds around different factors as psychologists know support psychological well-being.

For example - 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 let's say 24 hours.

Evaluating Health App

Evaluation is one of those processes that brings everyone together. And this is because researchers, clinicians, and patients all have a vested interest in and a responsibility to evaluate. So, if we take apps and mobile devices to common technologies, there are several ways that we can evaluate these tools. So, on one level, we can look at the accuracy of the measurement. when my phone is telling me that I've taken 325 steps today, is it because I've actually taken 325 steps or is it because I've shaken my phone 325 times?

And app reviews are pretty subjective by nature and could ultimately come from quite suspicious sources. Selecting apps on the basis of popularity yields little or no meaningful information on the actual quality of the app. Attempts to develop mobile health or mHealth evaluation criteria are often too general, complex, or specific to a particular health domain.

We really need a reliable and objective instrument to rate the degree that mHealth apps satisfy quality criteria. And this scale or tool really needs to be easy to understand and easy to use with minimal training.

Existing criteria for assessment of app quality were categorized by an expert panel and they used it to develop a new mobile app rating scale. And they developed sub-scales, items, descriptive, and anchors and called it the MARS. Five broad categories and criteria were identified, including four objective quality scales. Engagement, functionality, aesthetics and information quality, and one subjective quality scale, which were refined and developed into a 23-item MARS tool. Their results show that the MARS demonstrated excellent internal consistency, which is how well items on the test measured the same constructor or idea as well as excellent inter-rater reliability. So, the degree of agreement between raters.

3 Data & the Quantified Self

3.1 Electronic Health Record

Digitizing paper records is clearly beneficial. It enables a patient's medical history to be tracked over time. To alert patients for routine or follow up consultations, to monitor patients' vital signs. And overall, to improve the quality of care. In terms of now having more information that's real-time about patients about having a vast amount of information. whereas we used to have to laboriously write down notes, where the notes may not even be easily decipherable. With increasing connectivity means the ability to share cases, information, and to improve the diagnosis for patients. As we connect, hospital to hospital, state to state, patient information should be available across the entire network. This is great for patients. It means that their previous images, their previous results, and their previous context is available to the next clinician at the time of imaging.

3.2 Predictive and Precision Medicine

Data is all around us and we can now collect massive amounts of data on our health. This data can relate to our genome or can be collected from mobile devices, tests and procedures. Improvements in data storage analysis and presentation is giving us new and expanded forms of knowledge on both individual and community health and well-being.

If you have an I pad & you can record all the information in it. You can record your genome and if the software is not updated it will show you that you are using wrong way in the iPad after downloading free now software you can add all the details of your body. Like for e.g. your previous medical records including lifestyle or family data & blood test which will help you to reduce the no. of blood test. You can add your doctors or any Gps and can have suggestions from them. So, in today's world you are a data & can own yourself.

3.3 Patient Reported Data

Collecting patient reported outcomes is as integral as doing various tests like blood tests, monitoring their blood pressure, etc., for telling us more holistically about the patient care. So, using eHealth can mean that we can efficiently collect the patient reported outcomes from patients. We can do the analysis and testing of those measures to get a result that's useful for doctors for example, or other healthcare team members. For example, if a patient comes in to the clinic before their appointment, they can be given a tablet where they just simply sit down and complete an assessment on the screen. And it might take them five minutes, it might take 15 minutes, depending on what sorts of questions are important for the type of care that they're getting. So that's very efficient collection of patients reported outcomes.

3.4 Privacy and security

When considering genomic data and privacy, it's just the huge volume of data that we're dealing with. Every patient may have a genome that equates to about 750 megabytes or an audio CD, but the way you actually sequence it magnifies this greatly and so we are dealing with very large volumes that are probably only matched by radiology and MRI. It's very different to keeping patient records in a database. So, you have to look at sending data elsewhere. And the cloud is really something that's quite important to consider in this matter. And you can break that down into two different types of problems. You've got storage and then you have actual processing.

When you're storing large amounts of data it's quite easy. It's matter of encrypt the data, send it to someone else, and just make sure you get it back at the end of the day. There's no trust in that third party that has to be in place. But if you're processing data elsewhere, and that's quite important in genomics, because there's a number of algorithms and software pipelines that need to be used, then there's an element of trust that has to come into this. here are one or two technical issues, so we think about the way, for example, that it's encrypted and the way that it's held so, we use a technique known as homomorphic encryption. Which allows calculations, for example people can send data analytics to you to try and study your data, and they actually do those calculations on data that remains encrypted. So, they never actually see the data.

4 Interacting with Health Professionals using New Technologies

4.1 Improving access to healthcare

Case Study of Physiotherapist: - I just kept finding myself in these rural and remote areas and the recurring theme that I kept finding was that this lack of access to quality injury management. They could travel long distances to seek healthcare. **Physios Online**, we wanted to create a better way. people can get a full assessment done of their injury, come up with a diagnosis of what they're dealing with and give them a rehab plan to continue on with, all at a distance. It means we can access millions and millions of patients without burdening the health system as much as it would. Because these patients are doing so well now, they're normally working part or full time. So often they don't have a couple of hours spare in the week to do their supportive care consults. what we can do is maybe think of a different way to deliver that service. So, we find that Skype, or video conferencing is a really, really good way of connecting with those patients. one of the biggest benefits is sort of the ability to access a broader patient group, otherwise be able to access in our traditional face to face clinics.

The most exciting thing about eHealth now is that we're actually starting to think about what it means to integrate e technologies into settings. Into schools, into universities, into workplaces. Telehealth, a lot of the dialogue is around the advantages to the patient, and rightly so. We can certainly improve access and improve quality of healthcare for the patients. But it also gives unprecedented opportunities to the actual health professional themselves.

Face – face consultation

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 than a face to face consultation.

Conclusion

In this e- learning course I got to know a lot of information about e- Health, data privacy, Electronic Health records, Lifestyle apps, Health information online. The course is very effective and in depth. The case studies detailing actual e-health initiatives in a wide variety of healthcare areas. The impact of big data sets such as a genome and the challenge and opportunity. how ideally, new developments should target the sweet spots between the three domains of e-health.