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Role of Information Technology in Covid-19 Prevention

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Abstract

With the sudden outbreak of the novel coronavirus in china the whole world has come to a stand-still. The outbreak was first identified in Wuhan, Hubei, China, in December 2019. It didn't take much time for the novel coronavirus to leave china mainland and spread to other countries of the world. With a few months more than 150 countries started to report cases for the disease. Panic was created in all the whole world. In the next few weeks, the confirmed cases were recorded as 89206 and the death toll was more than 812 world-wide (29th February 2020).

Keywords: COVID-19, Coronavirus, WHO, Information Technology, SARS, Big Data.

Introduction

Coronaviruses are a family of viruses that cause diseases in humans, mammals and birds. It basically attacks the respiratory tract and infects them. Infections can be mild such as common cold and others can be severe such as COVID-19 (Corona Virus Disease 2019) [1], SARS (Severe Acute Respiratory Syndrome) etc. Once infected, patients start to develop soar-throat, cough, tiredness and in severe cases, difficulty in breathing.

Information Technology [2] is a field of science that deals with the use of computer systems, storage, networking and telecommunications for storing, retrieving and sending information. IT sector has a great potential in helping in prevention and to an extent cure of the current pandemic of COVID-19.

Covid-19

Once COVID-19 was identified in 2019 in Wuhan, capital city of Hubei province, China, it has fast spread globally [3]. With the widespread of the disease like wild fire the World Health Organization (WHO) declared the disease as a Public Health Emergency of International Concern [4]. In early March 2020, more than 35000 people were infected with the disease and more than 3100 were killed. The novel coronavirus is now named as SARS-CoV-2 [5].

Like other coronavirus, the novel coronavirus atoms are spherical and have spikes of protein on their surface. The spikes hold to the human/ animal cells and then change their structure and fuse their membrane with the cell membrane [6]. The viral genes then enter the host (human/ animal) cell and start producing more of the virus.

To help quick research and development of any kind of medication, china released the genome sequence of the new novel corona virus [7]. Until now there is no standard vaccine or cure for the virus. COVID-19 was declared present in all the continents of the world except Antarctica on 26th February 2020 [8].

Time from exposure to onset of symptom is generally between 2 to 14 days, with an average of five days in humans.
The death rate due to novel coronavirus, in humans, is higher than the seasonal flu. It also varies by persons age, present health condition. It also depends or varies by location as well. For instance, at Wuhan, the death rate reached 2.9% where as it was just 0.4% at other places [9].

Symptoms: The most-early symptoms of the disease include flu, fever, cough, fatigue and/or shortness of breath. The extreme symptoms include difficulty in breathing, persistent chest pain or pressure, confusion, difficulty waking, and bluish face and/or lips. Other symptoms can be sneezing, running nose, nausea, vomiting and diarrhoea [10].

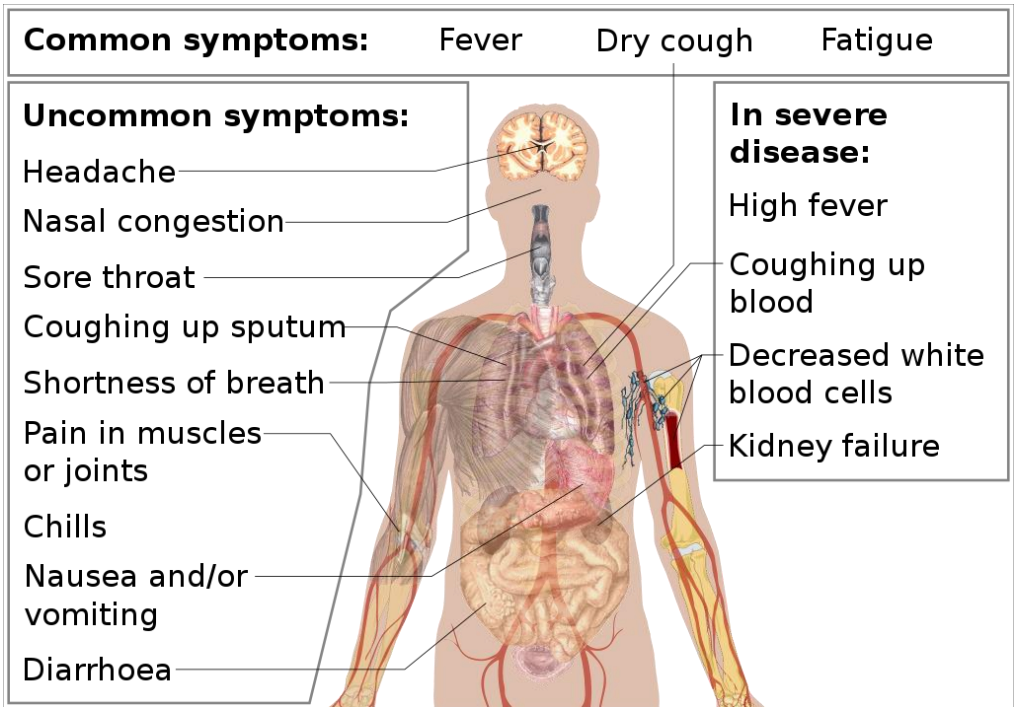

Fig: Picture depiction of symptoms [11].

Cause: It is caused by the novel coronavirus. It is basically spread between people via respiratory droplets released via coughs and sneezes. Estimates have been made that the virus remains viable up to 18 hours on copper, 55 hours on cardboard, 90 hours on stainless steel, and over 100 hours on plastic [12]. It can also be spread to other people by touching the contaminated surface and then their face [13]. It is most contagious when patients start to show the symptoms, but it can spread even before symptoms start to show.

Affected parts: The lungs are the most effected organs by COVID-19. The virus accepts host cells via the enzyme ACE2 which is present in high number in the alveolar cells of the lungs. As the alveolar diseases increase difficulty in breathing develops which may lead fatal [14].

Covid-19 Timeline

17 November 2019: A confirmed case from a later date emerged, but was not recognized at that time, according to a report by SCMP.

1 December 2019: A confirmed case started experiencing symptoms.

10 December 2019: Patient zero.

12 December 2019: Broadcast was made on a later date, 9 January 2020, stating "new viral outbreak was first detected in city of Wuhan on 12 December 2019".

18-29 December 2019: Bronchoalveolar lavage fluid (BAL) was collected from patients between 18th and 29th December. Between 20 and 29 December, a report was published of 7 people with severe pneumonia.

21 December 2019: Paper was published stating the first cluster of patients with "pneumonia of an unknown cause".

25 December 2019: Wuhan Fifth Hospital gastroenterology director reported suspected infection by hospital staff.

26-27 December 2019: An old couples chest CT scan displayed an abnormal pattern. It was reported to city CDC.

29 December: A publication dated 31 January 2020 stated that 4 individuals were admitted with pneumonia and had same working/visiting patterns (Huanan Seafood Market). Samples were taken.

30 December 2019: Urgent notice was issued on the treatment of pneumonia of unknown cause. 27 suspected cases, 7 critical, 18 stable, 2 discharging soon. News of outbreak started circulating into social media. 14 days travel history was checked and the suspected patients were put in isolation.

31 December 2019: China contacts World Health Organisation (WHO). Cities start inbound screening processes. Huanan Seafood Market was disinfected, people were told to wear masks. Senior health experts sent to Wuhan city for inspection and verification.

1 January 2020: 266 infected people identified. Huanan Seafood Market was closed.

2 January 2020: 41 admitted patients out of which 27 were confirmed to have Novel coronavirus. They were shifted to better medical facilities.

3 January 2020: Scientists determine the genetic sequence and named it 2019-nCoV. Wuhan reported 44 cases, 11 were seriously ill. 121 closely related people were closely monitored.

4 January 2020: Doctors warned the disease may spread from human to human. Singapore reported a 3-year-old girl having pneumonia and a travel history to Wuhan. Later she was tested negative. WHO waited for China to release information about the Wuhan virus.

5 January 2020: 59 suspected cases, 7 critical. All patients were quarantined. 163 contacts were monitored. No human to human transmission reported.

6 January 2020: Cause of the disease was still unknown.

7 January 2020: Social media was monitored. China did not disclose any information. US issued travel notice for travellers to Wuhan.

8 January 2020: China announced new coronavirus. South Korea announced 1st case. She had travel history and had visited Wuhan, and had returned on 31 December. Suspect experienced cough and fever.
9 January 2020: WHO confirmed isolation of novel coronavirus from a patient. 41 positive cases. 1st death occurred of a 61-year old man. Death was reported on 11 January 2020.
10 January 2020: Guidelines were issued. Li Wenliang, started having symptoms of dry cough. He experienced fever on 12 January 2020 and was tested positive on 30 January 2020. His parents were also admitted in the hospital.
11-12 January 2020: 41 confirmed cases, and more than 700 close contacts were being monitored. No new case since 5 January 2020. WHO published initial travel advice guidelines.
13 January 2020: Thailand witnessed 1st case. 1st outside china. Was resident of china and reached Bangkok on 8 January 2020, aged 61 years.
14 January 2020: Human to human transmission was suspected for the first time.
15 January 2020: 2nd Death occurred for a 69-year old man in China.
16 January 2020: 1st case in Japan, a 30-year old Chinese national. Had close contact with an affected person in Wuhan.
17 January 2020: Thailand witnesses 2nd case- a 74-year old woman. Arrived to Bangkok from Wuhan. Cases in China-45. Yang Xiaobo died of pneumonia.
18 January 2020: Total cases in china-62, critical-8, discharged-19. Patents age ranged from 30-79 years. Annual Banquet was held in Wuhan with forty thousand families in attendance.
19 January 2020: 1st case outside Wuhan in china. Total-201 Total Death-3
20 January 2020: Two medical staff infected. China declared the virus to be human to human. 1st confirmed case in South Korea. Beijing-3, Guangdong-13, Shanshai-1. Total in China-218. 21 January 2020: China-312, Death-6. 1st case in Taiwan, USA and North America.
22 January 2020: China-571, Death-17. New cases in multiple cities across the globe. Greater Wuhan was quarantined from 23 January 2020. No traffic in and out of Wuhan.
23 January 2020: China-628, Death-17. Wuhan under quarantine.
24 January 2020: First human to human transmission outside China was documented in Vietnam. Hubei province under quarantine.
25 January 2020: The rising situation was stated as "a grave situation". Multiple cases around the globe. Death of a doctor from Hubei province
26 January 2020: Shanghai reported 1st death of 88-years old man. Multiple cases around the globe. China started nationwide screening, identification and isolation of infected travellers. Another personnel in Hubei province dies due to pneumonia.
27 January 2020: Estimates of 100000 cases in China was presented. Canada, Sri Lanka, Cambodia, Germany and Taiwan report their 1st cases. Beijing reports its 1st death.
28 January 2020: A research paper reported an estimate of 26701 cases. Cases rise throughout the globe. Xiangyang under quarantine.
29 January 2020: UAE, Finland confirm their 1st case.
30 January 2020: Tibet, Philippines confirm their 1st cases. **India confirms its 1st case** in a student who returned from Wuhan University.
31 January 2020: UK, Russia, Sweden and Spain confirm their 1st cases [15].

1 February 2020: 1st case in Spain, Australia-12 Japan-20 Singapore-18 South Korea-12 USA-8, Vietnam-6
2 February 2020: **India-2** South Korea-15 UAE-5 USA-11 Vietnam-7. Philippines confirms 1st death outside China.
3 February 2020: **India-3** Vietnam-8. Hubei death-101
4 February 2020: 1st case in Belgium. Hong Kong-13 Malaysia-10 Singapore-24 South Korea-16 Thailand-26 Vietnam-10. Hong Kong-1st Death
5 February 2020: China-10117 Hing Kong-21 Japan-35 Malaysia-12 Philippines-3 Singapore-28 South Korea-18
6 February 2020: Zhejiang, China-1000. Germany-13 Italy-3 Hing Kong-24 Diamond Princess-45 Malaysia 14 Singapore-30 Taiwan-16 UK-3 Vietnam-12
7 February 2020: China: Guangdong-1000, Death-Wuhan-545 Hubei-154 Gansu-1. Diamond Princess -86 Germany-14 Hong Kong-26 Malaysia-15 Singapore-33 Vietnam-13
8 February 2020: China: Wuhan Death-608. France-11 Diamond Princess-89 Malaysia-16 Singapore-40 Thailand-32 UAE-7. Aerosol confirmed as medium of transmission.
9 February 2020: Chian-40231 Death-811. Hing Kong-36 Malaysia-17 Singapore-43 South Korea-27 Spain-2 Taiwan-18 UK-4 Vietnam-14 Diamond Princess-96
10 February 2020: Hong Kong-42 Diamond Princess-135 Malaysia-18 Singapore-45 UAE-8 UK-8 USA-13
11 February 2020: Germany-16 Hong Kong-49 South Korea-28 Singapore-47 Vietnam-15 Thailand-33. WHO gives new name to the virus, COVID-19.
12 February 2020: Hong Kong-50 Diamond Princess-174 Singapore-50 UK-9 USA-14
13 February 2020: Vietnam-16 Diamond Princess-218 Hong Kong-53 Malaysia-19 Singapore-58 USA-15 1st death in Japan.
14 February 2020: Canada-8 Hong Kong-56 Japan-37 Singapore-67. 1st case in Egypt.
15 February 2020: 1st death in France, outside Asia. France-12 Diamond Princess-285 Malaysia 22 Singapore-72 Thailand-34
16 February 2020: Hong Kong-57 Diamond Princess-355 Japan-59 Singapore-75 South Korea-29 Taiwan-20 UAE-9. 1st death in Taiwan
17 February 2020: Hing Kong-60 Diamond Princess-454 Japan-66 Singapore-77 South Korea-30 Taiwan-22 Thailand-35
18 February 2020: Hong Kong-62 Japan-74 Diamond Princess-542 Singapore-81 South Korea-31
19 February 2020: Hong Kong-65 Iran-2 Singapore-84 South Korea-51 Taiwan-23 Diamond Princess-621 Japan-84. Death: Hong Kong-2 Iran-2
20 February 2020: Hong Kong-69 Iran-5 Japan-94 Singapore-85 South Korea 104 Taiwan 24 USA-16 Diamond Princess-634. Death: Diamond Princess-2
21 February 2020: Australia-19 Canada-9 Italy-20 Iran-18 Japan-109 Singapore-86 South Korea-204 Taiwan-26 UAE-11 USA-35. 1st case in Israel and Lebanon. Death: Italy-1 Iran-2
22 February 2020: Australia-22 Hong Kong-70 Iran-28 Italy-79 Japan-135 Singapore-89 South Korea-433 UAE-13. Death: Iran-5 Italy-2. Urine sample tested positive of a patient.

23 February 2020: Canada-10 Hong Kong-74 Iran-43 Israel-2 Italy-152 South Korea-602 Taiwan-28 UK-13 Diamond Princess-691. Death: Iran-8 Italy-3 South Korea-2 Diamond Princess-3
24 February 2020: Canada-11 Hong Kong-81 Italy-229 Singapore-90 South Korea-833 Spain-3 Taiwan-30 USA-53. 1st cases in Afghanistan, Bahrain, Kuwait, Oman and Iraq. Death: Italy-7
25 February 2020: Bahrain-2 France-14 Germany-18 Hong Kong-84 Iran-95 Iraq-6 Italy-323 Kuwait-9 Oman-4 Singapore-91 South Korea-977 Taiwan-31 Thailand-37. 1st case in Algeria, Austria, Brazil, Croatia and Switzerland. Death: Iran-16 Italy-11 South Korea-11 Diamond Princess-4
26 February 2020: Australia-23 Bahrain-33 Canada-12 Crotia-3 Finland-2 France-18 Germany-27 Hong Kong-91 Italy-374 Iran-139 Japan-140 Kuwait-25 Lebenon-2 Russia-5 Singapore-93 Spain-13 South Korea-1146 Sweden-2 Taiwan-32 Thailand-40 USA-60 Diamond Princess-705. 1st case in Greece, Georgia, Norway, North Macedonia Pakistan and Romania. Death: France-2 Italy-12 Japan-3 South Korea-12
27 February 2020: Austria-3 Canada-14 France-38 Germany-45 Greece-3 Hong Kong-93 Iran-245 Iraq-7 Israel-3 Italy-655 Japan-186 Kuwait-43 Lebanon-3 Malaysia-23 Norway-4 Oman-5 Singapore-96 South Korea-1766 Spain-28 Sweden-7 Switzerland-8 UAE-19 UK-16. 1st case in Denmark, Estonia, Netherlands, Nigeria San Marino. Death: Iran-26 Italy-17 Japan-8
28 February 2020: Australia-24 Bahrain-38 Canada-16 Croatia-5 Denmark-2 Finland-3 France-57 Georgia-18 Germany-60 Greece-4 Hong Kong-94 Iran-388 Iraq-8 Israel-7 Italy-888 Japan-198 Kuwait-45 Lebanon-4 Malaysia-25 Netherlands-2 Norway-6 Romania-3 Singapore-98 Spain-32 South Korea-2337 Sweden-11 Switzerland-15 Thailand-41 UK-20 USA-66. 1st case in Azerbaijan, Belarus, Iceland, Lithuania, Mexico, Monaco and New Zealand. Death-Iran-32 Italy-21 Diamond Princess-5
29 February 2020: Australia-25 Austria-10 Azerbaijan-3 Bahrain-41 Canada-20 China-79251 Croatia-6 Denmark-3 France-100 Georgia-3 Germany-66 Greece-7 Iran-593 Iraq-13 Italy-1128 Lebanon-7 Mexico-4 Netherlands-7 norway-15 Pakistan-4 Singapore-102 South Korea-3150 Spain-58 Sweden-13 Switzerland-18 Taiwan-39 Thailand-42 UK-23 USA-68. 1st case in Ecuador, Ireland, Luxembourg, Qatar. Death: China-2835 Iran-43 Italy-29 South Korea-17 USA-1 [16]

March 2020 [17]:

Country	**1Mar**	**3**	**6**	**9**	**12**	**15**	**18**	**21**	**24**	**31**
Australia	26	38		80						4862
Austria	14		55							10298
Bahrain	47			118						567
Belgium			109	239						12775
Brazil			13	30	149					5812

Canada	24	33	51	67						8612
Denmark			174							2860
Ecuador	6	10								2302
Egypt	2		15		80					710
Finland	6			30						1418
France	130	212	613	1412	2876					52128
Germany	129	188	639	1176	2745					71808
Greece			45							1314
Hong Kong	98									715
Iceland			43							1135
India	**2**		**31**	**44**						**1590**
Indonesia			4	19		117		450	686	1528
Ireland		2		24	70	169	366	785	1329	3235
Japan	198									2890
Lebanon				41						463
Malaysia	29	36	83	117	158	428	790	1183	1624	2766
Netherlands	10		128	184						12595
New Zealand			4			8	20	52	155	708
Pakistan				16						2042
Panama				1		55	109		443	1181
Philippines				24	52			307		2084
Poland			5	16						2347
Portugal			13							7443
Qatar	3		11							781
Romania					48					2245

Russia	5		13							2337
Saudi A.				15		118				1563
San Marino	8	10			77					236
Singapore	106	110	130	160	187	226	313	423	558	926
Spain	84	151	360	1231	3059					95923
Sweden	14	30	137	203						4435
Switzerland			210	374	586					16605
Taiwan	40									329
Thailand	42					114				1771
UAE				59						664
UK	35	51	163	317	596	1372	2626	5018		25150

Table: Countries affected by novel coronavirus (For simplicity countries with more than 500 cases are listed) [17].

Country	**China (Death)**	**Iran**	**Italy**	**SouthKorea**	**USA**
1 Mar20	79824	978	1694	3736	89
2	80026	1501	2064	4212	102
3	80151 (2943)	2336 (77)	2502 (80)	5186 (36)	126 (9)
4	80270 (2981)		3089 (107)	5621	159 (11)
5	80409 (3012)	3513 (107)	3890 (148)	5766 (36)	228 (14)
6	80552 (3042)	4747 (124)	4668 (197)		332 (17)
7		5823 (145)	5915 (233)	7041 (40)	444 (11)
8		6566 (187)	6566 (343)		564 (21)
9		7161 (225)	9172 (463)	7478	717 (26)
10		8042 (299)	10149 (631)		1000 (31)
11		9000 (354)	12462 (827)	7710 46	1272 (38)

12			15113 (1016)		1645 (41)
13			17660 (1266)		2204 (49)
15			24747 (1809)		3485 (65)
18			35713 (2978)		8736 (149)
21					23649 (302)
30 Mar20	82554 (4055)	44605 (2898)	105792 (12428)	9887 (165)	188592 (4055)

Table: List of countries most severely affected [17].

Precautions/Preventions

Applying and following the preventive measures are the only strategy currently available to limit the spread of the novel coronavirus and the cases. The current preventive strategies are mainly focused on self-isolation as well as the isolation of patients who have been tested positive or the patients who are under the scanner. Careful measures should be taken for preventing infection and controlling the infection agents. Appropriate measures need to be adopted during the diagnosis of the cases and the provision of clinical care of the infected patient. For instance, droplet, direct contact, and airborne precautions should be adopted and applied strictly during specimen collection, regular check-ups of the cases, medication and other hygienic activities. Sputum induction should be avoided unless very necessary [18].

The WHO and other organizations have issued the following general recommendations [18]:

- Avoid close contact with subjects suffering from acute respiratory infections.
- Wash your hands frequently, especially after contact with infected people or their environment.
- Avoid unprotected contact with farm or wild animals.
- People with symptoms of acute airway infection should keep their distance, cover coughs or sneezes with disposable tissues or clothes and wash their hands.
- Strengthen, in particular, in emergency medicine departments, the application of strict hygiene measures for the prevention and control of infections.
- Individuals that are immunocompromised should avoid public gatherings.

The most important strategy in this type of outbreaks is for the populous to undertake is to frequently washing their hands, using portable hand sanitizer and using it regularly and avoiding touching their face and mouth after interacting with a possibly contaminated environment [19][20].

Healthcare workers who are constantly caring for infected or suspected individuals should utilize strict contact and airborne precautions and should include Personal Protective Equipment's, such as N95 or FFP3 masks, eye protection gear, gowns and gloves to prevent transmission of the pathogen [18].

Medication

Meanwhile, scientific research is growing to develop a coronavirus vaccine. In recent days, China has announced the first animal tests, and researchers from the University of Queensland in Australia have also announced that, after completing the three-week in vitro study, they are moving on to animal testing. Furthermore, in the U.S., the National Institute for Allergy and Infectious Diseases (NIAID) has announced that a phase 1 trial has begun for a novel coronavirus immunization in Washington state [18].

Information Technology

In its most basic form, Information Technology refers to the use of technology to solve and reduce organizational or businesses problems on a broad and larger scale. Whatever be the work or role, each member of an IT department works in tandem with others to solve technological problems, be it big or small [21].

There are a number of prime responsibilities for an IT department. Some of them are:

- **Info Tech. governance:** This implies to a combination of a number of protocols, policies and processes that make sure IT systems are running efficiently and effectively and in alignment with the needs of the organization.
- **Info Tech. operations:** Operations includes providing technical support, to the end users who mostly are novice users, network maintenance for efficient working, security testing to protect the system from unauthorized breaches and device management duties.
- **System Hardware and infrastructure:** It refer to all the different kinds of physical components of the IT infrastructure such as server systems, end user interfaces, connecting components, features and upgrades etc. This also includes jobs like setting up and maintenance of different networking equipment internet like routers, home and office phone systems and individual devices like PDA's and laptops.

Importance of IT Department:

In the most simply way, the workload of majority of the world organizations would crawl slowly without proper functioning IT systems. Now a days it is hard even impossible to find a business or industry that doesn't totally rely on computers, handheld devices and the networks to inter-connect them or connect them to the internet. Maintenance of a standard level of security, service and interconnectivity is the task the department has to take care about [22].

Ever increasing number of companies are willing to implement more modern, sophisticated and robust solutions which is provided by IT. Listed below are some requirements that the current and future IT specialists and engineers will be working on [21]:

- **Data overload:** Most businesses now a days need to mine or process big-data. To accomplish this task they requires huge capacity of processing power, refined software set and good analytical skills.
- **Mobile and wireless usages:** Industries and businesses are providing remote work options. It requires smartphones, PDA's, tablets and laptops with good internet connectivity and should be portable and easy to carry.

- **Cloud services:** Almost all businesses now use and work with cloud-based services. They provide central hosting platforms that maintain the big data generated on the daily basis.
- **Bandwidth requirement for video hosting:** Videoconferencing is the way to go. It has become more and more popular in the past few years, so more and more network bandwidth is required to support them to function properly.

Based on the above trends, it is estimated that employment of computer and information technology occupations is projected to grow 13 percent from 2016 to 2026, which is faster than the average for all occupations, according to the Bureau of Labour Statistics [21].

IT and COVID-19

The Wuhan novel coronavirus outbreak has become a global calamity affecting the whole world, leaving thousands of people dead and millions of others vulnerable. Businesses like supply chains have collapsed, economies have completely derailed, factories have shut down operations and huge cities are under lockdown throughout the globe. China, from where the novel virus originated, has not been the worst hit. Countries like Italy and the United States are worse hit by the virus. By utilizing resources at its disposal and using the latest technology, countries are trying to mitigate the spread of the virus to a significant extent. In 2002, with the outbreak of the SARS (Severe Acute Respiratory Syndrome), it took the scientists, at that time with the technology present then, took more than a year to decode the genome of the virus, whereas, today, thanks to advanced technology, the novel coronavirus genome was identified within a month's time.

Following are some ways through which countries are waging war against this deadly strain.

- **Robotics**

Robots can be used to prepare meals at the hospitals where the patients are being treated for the disease. They can also help in spraying disinfectants and cleaning around the facility, they can further used to dispense hand sanitizers when required. Robots can be on the frontlines everywhere we need to prevent the spread of coronavirus. Robots can also be used for performing diagnosis and conducting thermal imaging. They can also be used to transport medical samples and gathering reports. Robots can help in a very big way at places where quarantine is being observed

- **Drones**

In severely affected areas, drones can come to the rescue by transporting both medical equipment and patient samples. This will help in saving time, reducing the time of delivery and preventing the risk of contamination of the samples. Drones can also be used to monitor areas where quarantine is being observed and to check unwanted movement of the people. Drones can also be used for spraying disinfectants in the countryside. Drones can be used to broadcast warnings to the citizens not to step out of their homes and punish them for not wearing facemasks etc. Drones can also be used to transport medicines to ill or needy citizens.

- **Big Data and Facial recognition**

With cameras installed at most places on roads, the government can implement and use facial recognition software and big data techniques to monitor the citizens in the area. Face recognition and infrared temperature detection techniques can be implemented in the leading cities. CCTV cameras can also be installed at vulnerable locations to ensure that those who are quarantined don't step out.

- **Autonomous Vehicles**

At a time like this, where we have severe crunch of healthcare professionals (Doctors, nurses, other staff) and the risk joined with people-to-people contact holds, these autonomous vehicles can prove to be of great utility in delivering essential goods like medicines and foodstuffs. Self-driving cars which work on electricity or are battery operated can be used for cleaning the streets, and other vehicles present on the streets. These vehicles can also be used to disinfect hospitals. Self-driving cars be used to deliver products to households. They would cover the last

mile of the supply chain ledger and complete the job without any fear of virus transmission and infections.

- **Using IoT and AI**

AI and IoT together can help improve operational cost as well as efficiency in detecting the cases at an early stage. IoT sensors can collect patient data at every instance and help make conclusions regarding the disease and its lifecycle. IoT sensors can also be used to monitor the health and conditions of the doctors and the other staff. AI would carve outcomes which will help monitor the vital elements of the disease that increase or decrease the effects of the disease on the patients. With the data we can make decision on how to curb the disease and at the same time we will have the knowledge about how the disease is affecting the patients. Once we have the big data from the IoT sensors, AI would come in handy in preparing cheaper kits for detecting the symptoms. Cheap voice patters detection kits can be manufactured which would detect the voice difference pattern between the suspects and the normal people.

Conclusion

With the sudden outbreak of the novel coronavirus it is the duty of every citizen of all the countries around the world to help in eliminating the deadly contagious virus. In this paper we have introduced a number of methods to keep the citizens safe from infections and unwanted transmission. With the help of the technology and wise actions we can do our bit in safeguarding ourselves and our near and dear ones from the disease.

Since its first identification in Wuhan, COVID-19 has spread rapidly throughout the world. The disease is highly contagious and spreads easily from person to person. Due to lack of vaccine and medications against the virus, it is associated with high mortality. Using the latest technology for the prevention and control of this disease can prove to be highly beneficial. Technologies are being used to performing diagnosis, conducting thermal imaging, monitor areas where quarantine is being observed, infrared temperature detection, disinfect hospitals and monitor the health and conditions of the doctors and the other staff. Thus, IT sector has a great potential in helping in prevention and to an extent cure of the current pandemic of COVID-19.

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