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To Study the Strategies Adopted by Public Health Sector in Sri Lanka for the Prevention and Control of Spread of COVID-19

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Abstract: ***COVID-19 pandemic is continuously spreading across the world. Sri Lankan health care system relies mainly on the government sector which is responsible for providing universal care for all the citizens. This case study was carried out to study the strategies adopted by public health sector in Sri Lanka for the prevention and control of spread of COVID-19. Data were collected through review of literature and key informant interviews with officials who formulated the policies and strategies and heads of selected public health sector institutions who implemented them. Findings: Vision of Sri Lanka was a proactive intervention. National action committee; National operation center; Health sector; State Intelligence Service; Defense forces and the Police were involved in implementing strategies to prevent and control COVID-19 outbreak. Strategies in the preventive health sector included early detection, contact tracing, self - quarantine or centre quarantine of contacts with the assistance of the State Intelligence Service, Defense forces and the Police. Strategies in the curative health sector included Designation of COVID treatment hospitals; Improving diagnostic facilities; strengthening clinical management of patients and management of hospitals. Whole of government approach was the strategy and Hammer and dance theory was the process, adopted by Sri Lanka. Sri Lankan model was an aggressive strenuous and continuous process. Preventive health sector, laboratory sector, curative sector and the supply sector had an excellent coordination, collaboration and synchronization to attain this common goal.***

Keywords: Health sector strategies, prevention and control of COVID-19

1. Introduction

COVID-19 pandemic is continuously spreading across the world. This outbreak was first reported in china in December 2019 and it has spread to number of countries in the world.It has caused numerous deaths and complications such as pneumonia and acute respiratory distress syndrome. Currently, Health care systemsglobally are over whelmed by the continuous influx of patients and high rates of deaths.

First COVID-19 patient in Sri Lanka, who was a Chinese was reported on 27th of January 2020 and second patient who was a local tour guide was detected on 11th of March 2020. World Health Organization declared the outbreak as a public health emergency of international concern on 30th January 2020 and recognized it as a pandemic on 11th March 2020.

SL health care system relies mainly on the government sector which is responsible for providing universal care for all the citizens. Although Sri Lanka did not enter the phase of community spread, this pandemic seems to be a test of the adaptability of the Sri Lankan health care system. [(1)]

2. Objective

To study the strategies adopted by public health sector institutions in Sri Lanka for the prevention and control of spread of COVID-19.

3. Methodology

Review of published literature; review of health circulars issued by the Ministry of Health with regard to the prevention and control of spread of COVID-19; and key informant interviews with selected officials in the Ministry of Health who formulated and communicated the policies and strategies and heads of selected public health sector institutions who implemented the strategic activities.

4. Findings

4.1 Strategies adopted in Sri Lanka for Prevention and control of spread of COVID-19

Vision of Sri Lanka was a proactive intervention to prevent any outbreak of COVID-19 and acted well before the pandemic. “National action Committee for COVID-19” was established on 26 January 2020. “National operation center for prevention of COVID-19 outbreak” was established to manage combined operations.

State Intelligence Service carried out researches and accessed possible impacts of the disease; health sector prepared for medical emergence; and other sectors basically, defense forces were to establish and handle quarantine center and the police was to handle enforcement of law.

Travel restrictions were imposed promptly for arrivals from affected countries from 10th March 2020 and total travel restrictions were imposed into Sri Lanka by 20th March 2020. More than 40 quarantine centres were established and all arrivals were directed to central quarantine. People who came before 10th march were forced to do self-quarantine. Schools, universities and non essential services were stopped. Whole villages were sealed and quarantined when the patient had moved to many households. Entry and exit from the village was banned and they received free supplies. Strict social distancing was followed during the curfew, supervised by the security officers.[(2)]

“Whole of government approach” was the strategy adopted in SL. It broadly focused on four lines of operations; 1. Military/police/intelligence line of operation 2. Psychological line of operation 3. Economic and community

wellbeing line of operation 4. Medical and health care line of operation

1) Medical and health care line of operation

Director General of Health Services, Deputy Director Generals and Directorates in the Ministry of Health were continuously in the process of development of policies, strategies and guidelines and infrastructure development and supply chain management for their implementation.

2) Strategies in the preventive sector

Preventive sector line included the Deputy Directive Generals of Public Health Services, Epidemiology unit, Regional Directors of Health Services, Regional Epidemiologists, Medical Officers of Health and Public Health Inspectors in the preventive health sector and the hospitals of all levels of administration in the curative sector.

They focused on contact tracing and implementing preventive and control measures through primary health care staff and early detection, isolation and provide treatment in the curative settings.

Primary health care strategies included quarantine of exposed persons; promoting public health preventive methods, and conducting testing facilities in a network of laboratories. They were as follows;[3]

a) Health surveillance:

Sri Lanka had only cluster transmission. Therefore, detection of cases were done through;

- Exposed contacts by comprehensive and rapid contact tracing and
- Case identification through severe acute respiratory illness or even through postmortem testing of suspected deaths. Monitoring of geographical spread of the virus, transmission intensity, disease trends, identification of virological features and assessment of impact on health services were carried out.

b) Detecting positive cases were done through;

- Lab confirmation of suspects admitted to hospitals
- Sampling of associates of positive cases in self - quarantine or central quarantine
- Random sampling of high risk communities and high risk areas;
- Sampling at airports and ports. Patients were discharged after 2 consecutive rests become negative. [3]

Health surveillance was coordinated by the epidemiology unit. Suspected or confirmed cases were notified to area Medical Officer of Heath, Regional Epidemiologist and theNational Epidemiology Unit immediately. Surveillance was done through 345 Medical Officer of Heathdivisions. In addition, they coordinated with military, police and intelligence.

Health monitoring was done by the primary health care team. All the exposed persons were monitored for 14 days in self - quarantine or central quarantine. If symptoms appear they are admitted to designated hospitals. Those who do not get symptoms are tested before being released. A certificate was issued. Information was shared toRegional Epidemiologists, Regional Directors of Health Services, Provincial Directors of Health Services and National Epidemiology unit using a special investigation form. Compilation of data was done at Epidemiology unit. Additionally, Epidemiology unit visited quarantine centers to ensure that the investigation and quarantine are done as per national guidelines which are based on WHO guidelines.[3]

3) Strategies in the curative sector

Designation of hospitals

They included designating hospitals to manage COVID patients representing the whole country while nominating National Hospital for Infectious Disease, as the key centre. In addition several other hospitals were nominated in close proximity to quarantine centres to admit positive cases. Infrastructure was developed in existing hospitals and some new hospitals were constructed to accommodate patients to minimize the interference of managing non COVID patients in hospitals. [3]

Improving diagnostic facilities

Initially lab infrastructure for PCR testing was limited to MRI. But gradually major teaching hospitals were equipped with needed facilities to cover quarantine centres established in more than 40 places. In addition to hospital laboratories, laboratories in Universities too played a considerable role. With time selected private laboratories too entered to the diagnostic process which was centrally coordinated via MOH.[4]

In SL initial interest was focused on achieving diagnostic capability. Real time RT – PCR assay (standard direct virus detection method) usedin clinical virology laboratories with high sensitivity and specificity was used for this purpose. Major challenge was to obtain diagnostic kits.Lab testing process was not smooth as the supply chain was variabledue to episodic availability of reagents, consumablesand equipment at a time of a high global demand and logistic issues due to lockdowns and airport shutdowns.PCR testing capacity rose to 1500/day. Another challenge was the availability oftrained human resources as PCR was done manually initially. Shortage of consultant virologists to oversee the diagnostic processwas another concern. [4]

Non availability of reagents and consumables was mitigated by local manufacturing of consumables such as swabs for sample collection (by SL institute of nanotechnology) and viral transport media (by MRI).

Management of hospitals

A number of guidelines were issued by different directorates of the Ministry of Health to attend to COVID related aspects in a uniform way in the whole island. Therefore, many hospitals followed similar strategies in handling COVID suspected and COVID infected patients in their hospitals. In the hospitals steering committees have been established with the leadership of the director for decision making, implementation of policies, strategies and guidelines, to review the progress of activities and supply chain

management. Main decisions with regard to establishment of isolation rooms and wards, to strengthen infection control facilities, triage of patients at the out patient department and supply chain management have been taken at regular meetings of the steering committee. Teams composed of clinical consultants including the consultant microbiologist, consultant physician, consultant respiratory physician and anesthetists have been formulated to take decisions with regard to triage, transfers and management of suspected patients. Experienced medical officers have been appointed as COVID coordinators to gather information from all sources and disseminate information with all the relevant stakeholders including the hospital leaders, staff and outside hospital such as the MOH, RE, RDHS and to coordinate all the activities carried out in the hospital.Isolation wards have been established in existing facilities with essential changes or newly constructed temporary buildings with the help of the tri - forces.They were prepared to minimize contamination, therefore, microphones and cameras were fixed to monitor patients.

Special guidelines have been prepared to suit the needs of the hospitals in addition to following the national guidelines to handle the situation. Admissions have been triaged according to a check list, by designated nursing officersto assess the patients for risk of COVID. Fever patients have been directed to a special medical officer to assess further. Decisions regarding where to admit, whether to transfer were given by the clinical consultants' team. Patients, visitors and staff were provided with hand sanitizers, surgical masks and washing facilities. Intensive care facilities were improved using additional beds and special isolation rooms were improved withintensive care facilities to be used even for deliveries of suspected mothers of COVID-19. Strict infection control procedure was followed to enter and exit from the isolation rooms. Hospital staff was frequently trained on infection control. Distant training programmes were circulated through whatsapp groups among health care personnel. Environmental sanitation and disinfection of surfaces, equipment, instruments were carried out as per the guidelines supervised by the microbiologists.

Visitors have been limited by displaying notices. Essential telephone numbers were displayed in the hospitals' entrance and in hospital websites. Routine clinics have been postponed, clinic numbers were displayed for clinic patients to communicate with hospitals. Appointment systems were followed to see essential patients. Clinic drugs were posted to the residential addresses. Routine surgeries were postponed and surgeries were limited only to emergencies. Laboratory samples were collected from all suspected patients and transported according to laboratory guidelines to MRI or to other designated laboratories.

Whats - app groups have been developed among the clinical consultant team, hospital management and COVID coordinators for data sharing. Whats-app groups were developed among stakeholders of diagnostics and their supply management. Notifications were madeto Medical Officer of Health, Regional Epidemiology, RegionalDirector of Health Services and to Epidemiology unit on time to ease investigations. Manual and electronic special investigation forms were used to update daily regarding the parameters such as suspected admissions, number of PCR tests done, no of discharges, no of positive and negative cases, stack balance, Intensive Care Units, bed occupancy and bed occupancy of isolation wards.

A printed document with information about new suspected admissions, Medical Officer of Health area, address of residence, first contact and second contact details, were provided to national intelligence service at 10 am every day from every hospital to ease contact tracing.

Supply chain management was the most difficult task. Units were prioritized when distributing the limited resources such as N 95 masks and full Personal Protective Equipment kits. Buffer stocks of supplies were maintained. Supplies of Personal Protective Equipmentand other consumables were provided from the Medical Supplies Division of Ministry of Health while swabs with media and molecular reagents were supplied from the epidemiology unit. Pharmacists were responsible for stock balancing with the help of the infection control unit.

With regard to human resource management, only a half of the staff of all categories was recruited and the rest ½ was granted special leave alternatively, according to the circular issued from the Ministry of Health to reduce the contact rate and to safeguard the staff. Staff directly in contact with COVID patients were provided with meals. All staff attended were provided with transport facilities with the support from the Sri Lanka Transport Board during the curfew period. Temporary centres, were identified to be converted to quarantine centres for the hospital staff proactively.

Donations were entertained for supplies and infrastructure improvement such as provision of masks, pijamas, bottled water, sanitizers, hand washing facilities, dust bins and Infra Red thermo - regulators.

5. Discussion

SL started its preparedness proactively even before the epidemic wave. Therefore, it was to mainly focus on the preventive aspect of this epidemic. Preventive health system in Sri Lanka which is systematically developed over several decades was already prepared and well equipped with necessary expertise to handle the situation. The quarantine and prevention of infectious disease ordinance of 1897 was a very powerful legal regulation where the total decision making authority is with the Director General of Health Services. This prevented undue influences and criticisms by other sectors. Decisions were mainly based on the WHO guidelines. A large number of guidelines were prepared by relevant directorates of the Ministry of Health with the assistance of clinical professional bodies which built the foundation for a uniform system.

Public health sector, laboratory sector, curative sector and the supply sector had an excellent coordination and collaboration to attain a common goal. Four operational lines; military/police/intelligence line of operation, psychological line of operation, economic and community

wellbeing line of operation and medical and health care line of operation worked in close collaboration providing with mutual supports which augmented the results of the health sector strategy. Coordination, corporation and synchronization between different lines is the most important factor in this response. In addition, coordination and corporation between ministries, tri forces and police, departments, corporations, authorities, local government systems, all state and private sector stakeholders are vital in this effort. This synchronization was the leading factor to implement the desired plan in Sri Lanka.If it was not for the other sectors, the resource availability of health sector particularly with regard to human resources would never be sufficient to fulfil its planned tasks.

The process adopted by Sri Lanka is the "hammer and dance" theory by Tomas Pueyo. "Hammer" using various aggressive proactive measures in anticipating spikes of cases. In the example of navy base cluster; "hammer" included 1. Recalling all who were on leave back into base 2.Their families and close associates were sent into self quarantine 3. Identifying vulnerable groups within those who were on leave and 4. Directing their families and close associates into quarantine centres. "Dance" is the keeping the spread of virus under controllable level. Here, the numbers reported outside the navy base became zero. Therefore, the health sector could handle the case load without exhaust. This was carried out as a continuous process and reviewed after each case or cluster and then adopted to the next case with the experience gained.
This virus is a hazard 3 pathogen. [4]Therefore, it was a huge challenge to infection control practices. Entire work flow of selected hospitals had to be changed to accommodate infected patients while minimizing the risk of transmission to health care workers and other patients. Many protocols and policies were specifically developed in this regard at institutional level and national level to improve infection prevention and control. [4]

Hospital admissions dropped during this period. It was partly due to the curfew in the country.Curfew actually limitedmovement and contact between people and limited infection transmission. This eased the burden on hospitals and enabled the staff to prepare for COVID cases. Contact rate reduced during lockdown period.[2]. During the lockdown it was more convenient for the authorities to find the contact history of infected individuals. [2]

There was a limitation of PPE which were short supply globally. Institutions adapted to this issue by extended use and reuse of certain PPEs. Most routine clinical work such as routine surgeries, dental procedures were delayed to minimize the risk of exposure of health care staff.[4]

Considering the impact of the curfew and the progress of the control measures, a decision was taken to relax the nationwide curfew and moderate travel restrictions. One third of the workforce were required to report for duty. Public transport was made available with strict social distancing measures.[2]

After relaxation of lockdown, travel between districts was permitted for purposes of employment and essential needs.However, once the public transport was made available, it was observed that the distancing was not followed. Risk of virus transmission through the transportation network should not be ignored.

Further, there is a possibility of unidentified asymptomatic cases in the country. Studies show, that contact rate by not less than 50% would make the outbreak easier to control. Disease control could be done by tracing > 40% of the contacts of infected individuals and quarantine them. [2, 5]

The current strategy remains "testing, contact tracing and isolation". Outcome would be different if the virus starts to infect susceptible groups such as elderly in SL. In such case the diagnostics and clinical management approaches may be different to accommodate a high case number and to reduce mortality. [4]

6. Conclusion

Spreading of COVID-19 pandemic in the world is continuing and different countries have employed different ways and means to combat the spreading. As there is no credible vaccine has been developed so far, prevention and containment are considered as the best available option. Although Sri Lanka did not enter the phase of community spread, this pandemic was a test of the adaptability of the Sri Lankan health care system.Currently most of the positive cases are asymptomatic who rarely need medical interventions. Actually true cases are well under the curve.
Sri Lankan strategy was a whole of government approach focused on prevention, containment and management. Sri Lankan model was an aggressive strenuous and continuous process and it is a unique and a dynamic model.

7. Recommendations

1) Continuation of the strategies adopted such as screening at airports, ports and community sampling should be done with the same intensity and attention.
2) Care should be taken to ensure that virus is not leaked from person to person or from central quarantine centres to the community.
3) Public should be reminded thoroughly to adhere to the social distancing, wearing face masks and hand washing practices through media.
4) In the clinical environment there is lot to be developed; in terms of infrastructure, infection control practices, hospital isolation units capable of handling high level pathogens, intensive care facilities if another wave appears.
5) Strengthening of hospital infection prevention, improve staff awareness and training to handle infectious patients are very important. [4]
6) Lab network should be developed and streamlined further to face future waves. Proper reference facilities which includes Biosafety level 3 labs and sequencing facilities need to be improved. A collaboration network need to be established.[4]The need to increase local production of molecularconsumables should be attended.
7) PPE shortages need to be addressed by local manufacturing. Alternative Personal Protective Equipment options such as powered Air purifying

respirators (PAPRs) would be a better investmentwhen handling high risk patients confidently.[4]

8) Recruitment and training of more staff of all relevant categories would be a good decision.

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