

Summer Training
at
Fortis Hospital, Anandapur, Kolkata

From 10/05/2021 to 02/07/2021

A report
By
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MBA – HOSPITAL AND HEALTHCARE MANAGEMENT
2020-22



MS/TC/2021/003

Date: -02.07.2021

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr.Arkodipto Mallick**, student of **IIHMR, Jaipur** has completed his two months' summer training in the hospital from **May 10th, 2021 to July 2nd, 2021** in order of partial fulfilment of his study on **MBA Hospital & Health Management Program**.

During his internship he was placed in the **Quality Department**.

We Wish him Success in life.



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ACKNOWLEDGEMENT

I would like to take this opportunity to thank Mrs. Richa Singh Debgupta, Senior Vice-president, and Mr. Pratyush Srivastava, Zonal Director of Fortis Healthcare, Anandapur who has allowed me to do my summer training from this prestigious organisation. I would also like to thank Dr. Arafat Faisal, Head - Medical Operations who has guided me to find the right project to work on and providing me ideas.

I would like to express my appreciation towards Ms. Banrishisha Basaiawmoit, Quality Department Head and Head Quality Nurse, Ms. Maumita Saha for guiding me through the various aspects of this department during my training period in Fortis Hospital, Anandapur and also being there to help me through any problems I have faced and clearing all my doubts. I would also like to acknowledge our Academic Coordinator, Mrs. Shruti Sinha for providing us with our desirable departments to work in, without I would not have been able to learn from the department of my choice also providing us with constant support.

The contribution of my mentor from IIHMR University, Mr. Ashish Bandhu for being there for clearing all my doubts round the clock. Also guiding us through the project process giving us valuable suggestions. Without it, this project would not be possible.

A special thanks my family for believing in me and always provide support whenever I need it. They have always guided me on the correct path.

Thanks are due to my colleagues who have been always helpful and have helped me wherever I stumbled upon. And have always provided me with moral support and guidance in helping me finish this project.

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ACRONYMS/ ABBREVIATIONS

ABBREVIATIONS	FULL FORMS
TQM	Total Time Management
EWS	Early Warning Score
NABH	National Accreditation Board for Hospitals and Healthcare Providers
NABL	National Accreditation Board for Testing and Calibration Laboratories
BLS	Basic Life Support
CPR	Cardiopulmonary Resuscitation
CSSD	Central Sterile Supply Department
ETO	Ethylene Oxide Sterilizers
WB	Whole Blood
PRBC	Packed Red Blood Cell
FFP	Fresh Frozen Plasma
MRD	Medical Records Department
LAMA	Leaving Against Medical Advice
WHO	World Health Organisation
COVID-19	Coronavirus disease 2019
PHEIC	Public Health Emergency of International Concern
ICMR	Indian Council of Medical Research
RT-PCR	Reverse Transcription – Polymerase Chain Reaction
DCGI	Drugs Controller General of India
SpO2	Oxygen Saturation
Inj.	Injection
Tab.	Tablet
HRCT	High-Resolution Computed Tomography
CRP	C-reactive protein
CBC	Complete Blood Count
KFT	Kidney Function Test
LFT	Liver Function Test
CAD	Coronary Artery Disease
T2DM	Type 2 Diabetes Mellitus
HTN	Hypertension
RA	Room Air
MLC	Medico-legal Case
SARS-COV-2	Severe Acute Respiratory Syndrome Coronavirus

OBSERVATIONAL LEARNING

About Fortis

Fortis founded in 1996, the goal being "creating a world-class integrated healthcare delivery system in India that combines the greatest medical capabilities with compassionate patient care."

It is nation's fastest-growing health-care organisation. The first hospital was founded in Mohali, Chandigarh in the year 2001, to 43 health-care institutions today. Among these are the world-renowned Escorts Heart Institute and other institutions. Fortis is a proud member of India's healthcare delivery system(1).

Hospital Profile Of Fortis Hospital, Anandapur

Fortis Hospital Kolkata, which opened its doors on January 9, 2011. It is a Super Speciality Hospital located in Kolkata with 400 beds. It is a subsidiary of Healthcare India Ltd, one of the leading healthcare providers in India. Cardiology, heart surgery, orthopaedics, neurology and surgery, gastrointestinal department, kidney and urology, emergency care, and critical care are all areas of emphasis. Among the characteristics are round the clock accident and emergency services, including trauma management and ambulances, blood bank, operation theatres, cath-lab, and diagnostic center. Fortis Anandapur Hospital is a NABH-accredited facility.

Initiative

Sparkle is a Fortis attempt to enhance and satisfy international cleaning standards. They adhere to the 55 principles in order to maintain the facility clean.

5 'S' include 1. Sparkle shot, 2. Straighten, 3. Shine, 5. systemize, 6. Sustain.

Green card recognition program or Dil Jeet Liya Aapane is an initiative they started and when the needful service of an individual will be honoured by offering him/her a card (named Green Card) with a note of recommendation. To be a true "Fortis Ambassador" one has to pass the white belt test full is based on a person's level of familiarity/ information about the hospital and its facilities.

Values

Patient Centricity

1. Try to provide best outcome and assistance to the patient.
2. Compassion, care, and understanding should be shown to patients and caregivers.
3. Needs of the patients should come first.

Integrity

1. Follow the principles and be honest.

2. Follow Model, live by the values.

3. Show moral bravery by speaking up and doing the right thing.

Teamwork

1. Actively encourage one another and work as an unit.

2. Respect and value people, regardless of their ideas, experiences, or background.

3. Put organization needs first.

Ownership

1. Responsible and proud of your action.

2. Go above and beyond the call of duty if needed.

3. Commitment and agreement.

Innovation

1. Improve and innovate in order to outperform expectation.

2. Not to lose hope and attitude to do what is necessary.

3. Challenges to do things differently.

Mission & Vision

Everyone is part of a team that has established an outstanding reputation for or each cutting-edge technology in healthcare services and is a benchmark for service quality.

Mission

“Globally respected Healthcare organisation recognised for clinical excellence and distinctive patient care”

Vision

“Saving and Enriching Lives”

Quality Department

What Is Quality Management?

Quality management is managing all activities must be accomplished in order to maintain a certain level of standards. It includes implementing a quality policy, and designing and implementing quality planning, assurance, control, and to improvement what is already there. It is also known as total quality management. (TQM).

Types of quality:

- Product Quality
- Service Quality
- Experience Quality
- Data Quality
- Information Quality
- Quality of life

How Quality Department Works?

Quality can mean different things to different people and is frequently defined as a trait or a property. Quality in healthcare refers to the extent to which individuals and patient groups receive healthcare services in order to improve health outcomes. The role of quality management at Fortis Hospital is to assist healthcare workers in their efforts to constantly enhance healthcare delivery operations. The quality team primarily examines and analyses patterns within the hospital, with the goal to improve the experiences of the patients.

What Are Quality Audits?

A systematic and impartial assessment to evaluate if quality activities and associated outcomes are in accordance with the intended arrangements, and whether these arrangements are being executed successfully and are appropriate for achieving objectives.

Some of the types of audits:

- Consent Audit
 - MLC form audit
 - Early Warning Score Audit
 - Prescription Audit
- Consent audit- Consent audit is conducted by the Quality Team to check the compliance and proper filling of the consent that is mandatory for documentation purposes. Different types of consents: e.g. General consent, procedural consents, consent for blood and blood products, consent for high-risk operations and treatments, consent for anaesthesia risks, benefits, and alternatives, consent for surgery/procedure, consent on sedation, restraint consent, other consents, in case of an international patient the required documents are there in the file, was bilingual consent required & used. Doctor's documentation, Nursing documentation,

Dietician & Physiotherapist documentation. Here it is checked that the consents have the signature and name of the patient, name, and signature of the witness, and relationship with the patient any relative or any other person who is signing the consent.

- MLC form audit – MLC forms are to be filled with utmost details to avoid any future discrepancies later. The identification marks of the victim, proper documentation of the police who is informed and the police who comes to inspect the case as well as a proper stamp of the respective police station which is informed.
- Early Warning Score (EWS) audit- EWS is a guide used by medical providers to determine the extent or severity of a patient's condition. It is based on a patient's vital indicators. Proper monitoring and documenting of these can aid in determining a patient's progress. A quality audit of the EWS sheet can assist discover gaps in documentation or anomalous readings that should be reported to the appropriate authority. Giving an appropriate score and continuing to follow up on issues to enhance overall compliance among nursing staff.
- Prescription audit- During the audit it is checked how many drugs there in the dosage form are mentioned properly or are there any error-prone abbreviation used, the dose, route, and frequency written, the allergy and reconciliation documented properly. The drug's name must be written in capital. If there is any use of high-risk medication which should be well documented.

Objectives

- The resources (materials, equipment, and people) used to convert inputs into outputs, the procedures used, the environment in which the process occurs, and the metrics used to determine process performance.
- A company is formed in order to deliver value to its customers.
- Customers receive value in the form of products and services.
- • Quality management is concerned with the management structure that ensures quality.
- • A complete management system will be implemented.
- • As a result, brand value and financial results will improve.
- Proper instructions and procedures to follow to increase the efficiency and effectivity.
- Follow the guidelines laid down by NABH.

Figure 1: Objectives of the quality department



National Accreditation Board for Hospitals (NABH) Quality Standards

National Accreditation Board for Testing and Calibration Laboratories(NABL) provides NABH quality standards. NABL, just like the NABH, is an autonomous organisation that falls under the purview of the standard Council of India. NABL's major goal is to determine an accreditation system for medical investigation services that's appropriate in India and is predicated on applicable National and International Standards and proposals. The NABH quality standards offer a foundation of standard of patient treatment and quality to improve in the least levels of health organisations, and these standards also aid within the development of a top-quality culture at hospitals. The NABH standards for hospitals are developed by a technical committee, which aims to gauge the whole set of criteria before granting accreditation to institutions. As shown within the figure, the NABH quality standards are divided into ten chapters, each of which has 102 Standards and 636 objective components.

Assessment Criteria

A hospital that wishes to be NABH accredited must ensure that standards are implemented throughout its institution. The Internal Committee for assessment will assess the implementation in the medical facility. Report to be submitted to the Core Assessment Committee as an Internal Assessment report. This Internal Assessment report will be reviewed, assessed, and planned for by the core assessment committee. The hospital must be able to show to the NABH Assessment team, applicable NABH Standards are rigorously observed.

Benefits Of NABH Accreditation

Benefits For Patients

Among all stakeholders, patients stand to benefit the most. Accreditation improves treatment quality and safety of patient safety, and patients treated by credentialed medical professionals. Patients' rights are recognised and safeguarded. Patient satisfaction is assessed on a regular basis.

Benefits For Staff

It promotes continual learning, a positive work atmosphere, leadership, and, most importantly, ownership of clinical procedures. It enhances the staff's overall professional and skill development.

Benefits For Hospital

Accreditation provides a process for empanelment with insurance companies and other third-party providers. Accreditation gives access to trustworthy and recognised information on facilities, infrastructure, and levels of care.

Implementation Of Quality Standards

This process's goal is to ensure quality standards are applied and incorporated into hospital services. Noncompliance of standards is identified in the Survey report, take the appropriate actions, organise committees, train employees, develop necessary papers, and educate staffs. The authority supplied structural equipment as well as statutory needs. The application of the standards implemented according to Quality Indicators.

Quality Improvement Principles in The Healthcare System

Quality improvement is strongly associated with the way of service delivery, the extent of patient pleasure, efficiency, and outcome. an efficient programme continually integrates quality improvement principles so as to realize a better level of performance and a more successful organisational healthcare system. Here are four important ideas that healthcare systems may use to enhance quality:

1. Work as Systems – a corporation must understand the key processes and how to deliver it, considering it as small and straightforward or big and sophisticated. Organization's quality improvement strategy should be to streamline "Input – Process – Output" to suit the stress of a given organization's healthcare delivery system.

Focus on Patient Quality improvement is to assure what the patients want and need. To ensure focus on the use of data and care-coordination.

Benefits Of Quality Improvement within the Healthcare System

It benefits by providing a safe, effective working in an hospital with improved processes and also reduce the cost. In all it improves the efficiency at which the health facility works.

Staffing

- Medical Administration - Head
- Quality Department Head
- Quality nurse

- Academics coordinator

Workflow Of the Department

- All check all organization processes to ensure quality service.
- To assure to provide quality care and follow up and check with medical professionals as well medical equipment and services are fulfilling the required criteria.
- To inspect and implement proper changes into the system so that the over-service provided by the hospital improves.

Figure 2: Steps of quality assurance



To ensure proper service is provided, several mock drills take place in regular intervals to prepare the medical staff to respond quickly and appropriately based on the protocols set by the hospital for efficient functioning.

Methodology

The methodology of my assignment is purely based on personal observation of the working activities of the Quality Management Department.

Nature of data: -

Primary data - Primary data was gathered by first-hand observation.

Secondary data - Secondary data was gathered through the hospital information system.

CODE BLUE - BLS/ CPR Mock Drill

BLS is a degree of medical care provided to victims of life-threatening illnesses or injuries until they are able to get full medical care at a hospital.

It is an emergency treatment that combines chest compression and artificial ventilation to manually preserve brain function. It is a quick response before further management is started. Used in people who suffer cardiac arrest. First 6 mins is very crucial as patient can be revived during this time will suffer less brain damage.

Quality of CPR –

Correct hand/finger positioning at the centre of the chest.

A compression rate of at least 100-120 beats per minute. (Complete 30 compressions in fewer than 18 seconds.)

A depth of at least 2 inches (5 cm).

Complete recoil of the chest following each compression.

Minimize compression interruptions.

Steps Of BLS –

1) Assessment and safety.

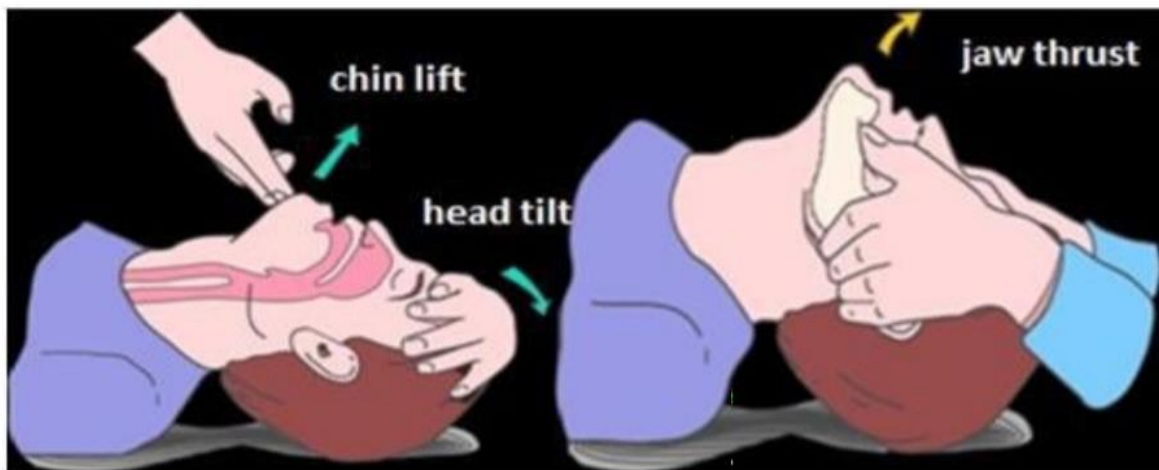
- To ensure the place is safe for you and the victim.
- To make sure the patient is responsive to questions.
- To see if the patient is breathing normally.

2) Activate “CODE BLUE”

- Check pulse and if the patient is breathing simultaneously.
- Check for carotid pulsation for 5 seconds but not to exceed 10 seconds.
- No pulse, start CPR.

3) Securing the airway as shown in the picture below.

Figure 3: Opening of the airway of the victim



4) Breathing

- Hold the mask with the E-C Clamp method.
- Make a head tilt.
- Start with the narrow end of the mask and work your way up.

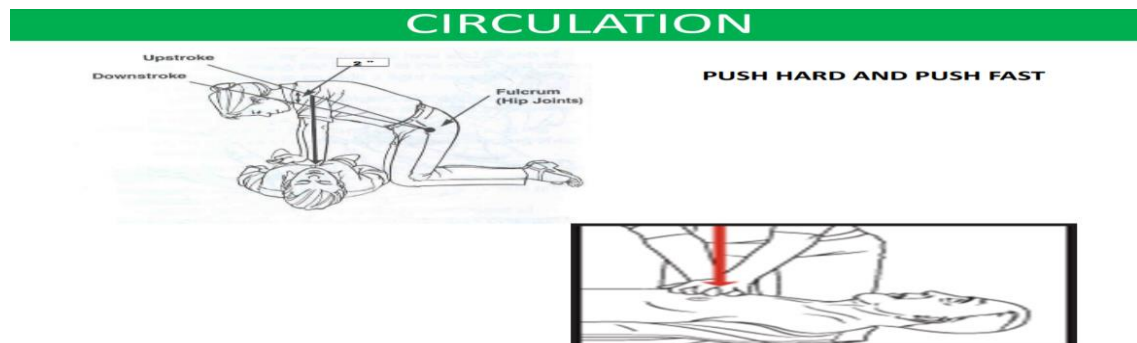
- Using one hand's thumb and index finger, positioning like "C" as shown in the picture below.
- Lift jaw angles with remaining fingers.

Figure 4: E-C clamp technique for efficient respiration during CPR



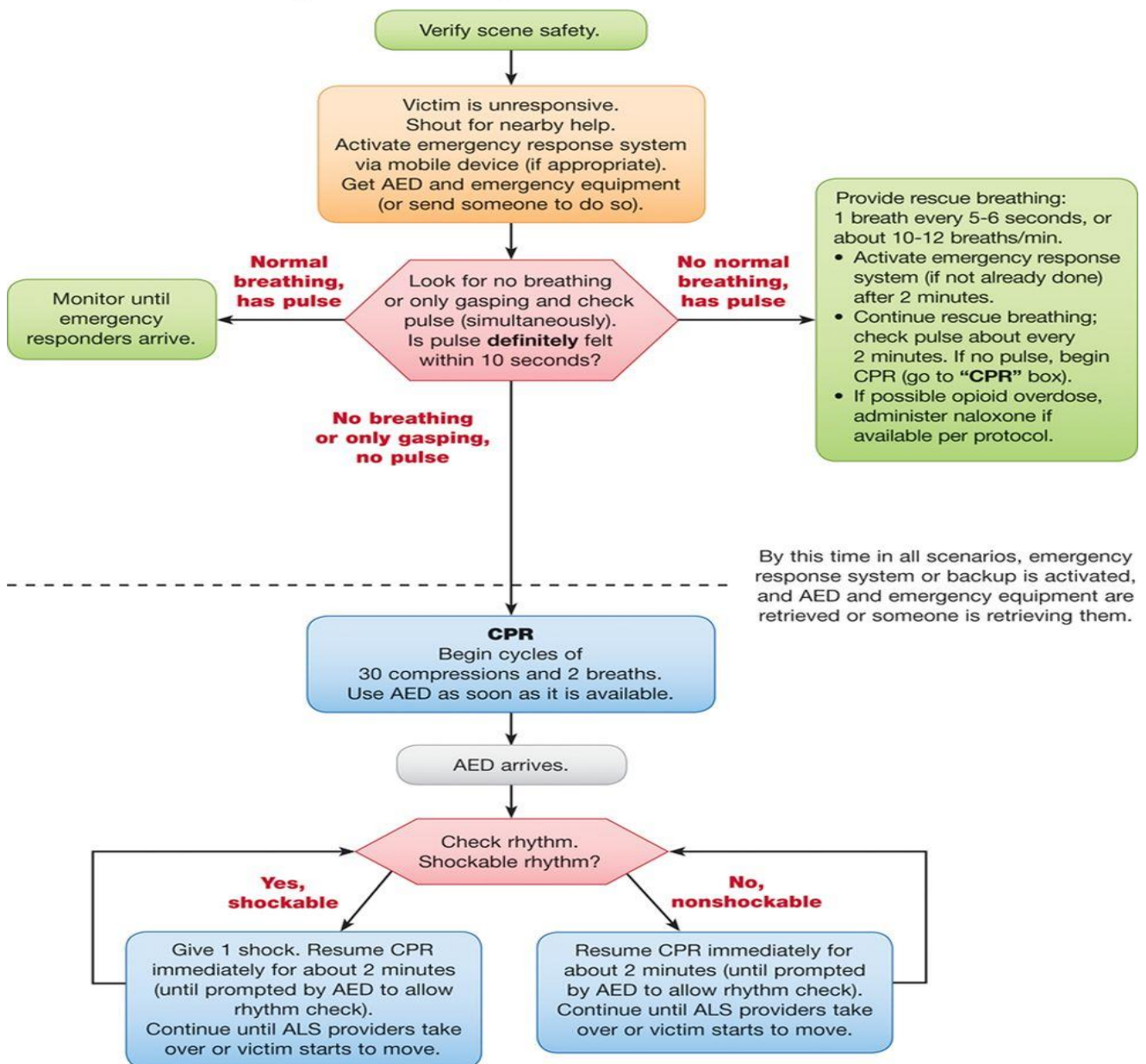
5) Circulation

Figure 5: Positioning for Quality CPR



Cardiac Arrest Algorithm

BLS Healthcare Provider Adult Cardiac Arrest Algorithm—2015 Update

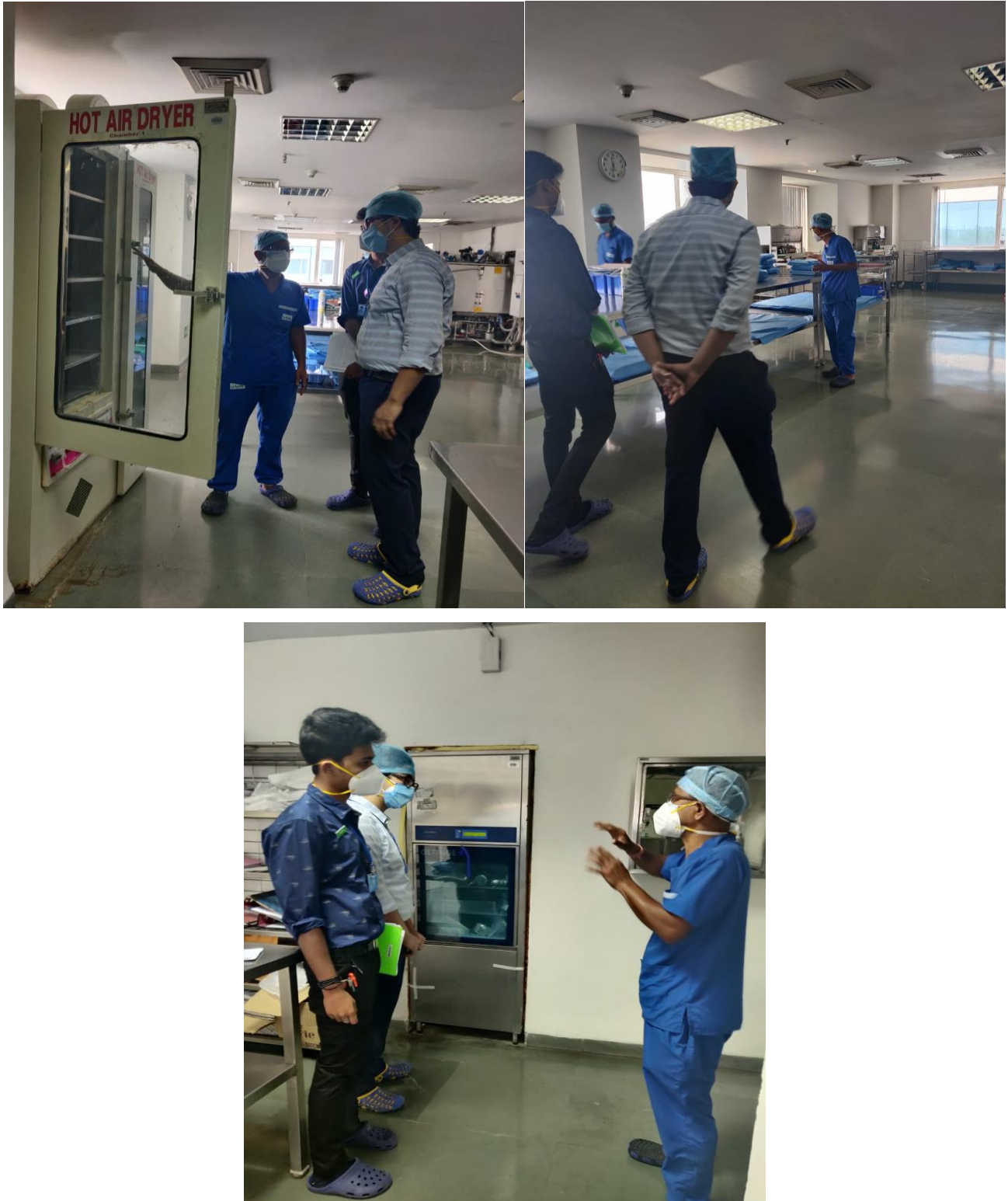


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Central Sterile Supply Department (CSSD)

CSSD works on treating all the soiled instruments and linens and treat them properly to sterilize them and then send them back to the respective departments and operation room again. To ensure sterility in the wards and OR and the use of proper sterile instruments is of utmost importance as it directly reflects the standard of the hospital. So proper and efficient functioning of the CSSD is essential and to ensure standards, visit the department on a random basis by the quality team is important to check the quality standards.

Figure 6 : CSSD Internal audit rounds



CODE RED Mock Drill

Code Red is activated in case of any incidence of fire in the hospital. And to assure the safety of the patient similar mock drills are arranged in the hospital to check the response time of the teams and to educate the staff about how to uses various fire safety equipment. To evacuate the patients is of topmost priority. During the internship, one such mock drill was arranged in the OT in association with the fire safety department in case a

fire breaks out in the OT. The OT staff were educated about the various types of fire extinguishers available in the hospital and where to use each of them.

- 1) Water-based extinguisher – to be used in a non-electrical type of fire only. It is useful to Class A fires like wood, paper, textile.
- 2) Powder-based extinguisher – the powder can be nauseating if not used properly but can cover a very large area, so proper evacuation of the area is important before using such a device. It is useful against Class B and Class C fire as well as an electrical fire.
- 3) CO₂-based extinguisher – Also used against Class B and Class C fire especially on flammable liquids. The OT staff were educated about how to use the extinguishers. The extinguisher should be aimed at the heart of the fire.

The protocol that is fire safety are 'RACE' and 'PASS'(3).

RACE stands for –

- Rescue - Anyone who is in urgent risk of being burned by a fire.
- Alarm - Activate the nearest fire alarm and contact the fire service.
- Contain – Attempt to contain the fire (while not harming oneself)
- Extinguish – If extinguishing is not feasible, exit the area and close the doors.

PASS stands for –

- Pull – Pull the pin or press the lever.
- Aim — Aim the extinguisher toward the base of the flames.
- Squeeze - Squeeze the fire extinguisher handle.
- Sweep – From side to side at the base of the fire.

Figure 7: Code Red Mock drill





Facility Management And Safety

According to the NABH Accreditation Standards 5th Edition, Facility Management and the safety of the facility is an important element. These guidelines are further divided into 7 components –

- 1) The hospital should create a secure environment.
 - The department or system should inspect the patient safety devices and the infrastructure built in the organisation for the same, as well as the instruments on a regular basis.
 - The organisation should have facilities for differently abled people to use.
 - Once a month, complete facilities inspection rounds. Inspection rounds should be properly documented, and any necessary corrections should be implemented. Before any construction or renovation proper risk management should be done.
- 2) The organisation should work in a planned and environmentally friendly manner.
 - Each service provided by the organisation must have adequate spacing,
 - New updates and facilities built should be updated in the drawings in the organisation for better navigation.
 - The signs boards used in the organisation must be understandable and visible to the patients and their families.
 - Availability of round the clock provision of water and electricity.
 - Alternate source of water and electricity should be there for back up.
 - The functioning of the alternate sources should also be checked periodically.
 - The organisation takes initiatives towards energy efficiency and environment friendliness.
- 3) The organisation should function in a way that ensures the safety of patients, their families, personnel, and visitors.
 - Structural safety while planning, designing and construction of the hospital and replanning works.
 - Operational planning like exits and entries and proper areas for patients and their family and visitors.
 - Electrical safety audits for the facility.

- Disposal of the used materials which is not needed in the organisation anymore in a proper way.
 - Hazardous materials to be used safely within the organisation.
 - Protocols for managing spill accidents.
- 4) The organisation has a facility, engineering support services, and a utility system programme.
- The organisation plans for utilities and equipment based on the service or plan. Item inventories are properly maintained.
 - Utility equipments are regularly inspected and maintained.
 - Competent personnel should operate, test and use the equipments.
 - Maintenance staffs should be available round the clock.
 - Downtime of the critical equipment breakdowns should be monitored, and proper actions should be taken to correct them.
 - Written guidance supports for equipment replacement should be done, identification of unwanted material and disposal.
- 3) The organisation must have a programme for managing medical equipment.
- • The organization's medical equipment strategy is in compliance with its services and strategic plan. Medical equipment must be inventoried, and appropriate logs must be kept.
 - The medical equipment operational and maintenance plan should be followed.
 - Medical equipment should be inspected and calibrated on a regular basis to ensure optimal operation.
 - The equipment should be operated and maintained by qualified staff.
 - Written advice for the replacement and disposal of medical equipment.
 - Adequate monitoring of medical equipment and devices in relation to adverse events and compliance hazard alerts.
 - Critical equipment failure downtime should be monitored, and appropriate actions should be taken to remedy it.
- 6) The organisation has a medicinal gas, vacuum, and compressed air programme. Written instructions should be followed in the procurement, handling, storage, distribution, use, and refill of medicinal gases.
- Medical gases are handled, stored, distributed, and used in a safe manner. • Medical gas protocols handle safety concerns at all levels.
 - In the event of a breakdown, backup supplies for medicinal gases, vacuum, and compressed air are available.
 - The organisation tests the operation of these alternative sources on a regular basis.
 - There is an operational, inspection and testing and maintenance of such items.
- 7) The organisation has preparations in place for fires and non-fire emergencies should be inspected.

- The organisation has protocols for early identification and containment of emergencies related to fire. The organisation must have proper exit plan in such cases.
- Mock exercises should be conducted at least twice a year.
- Maintenance plan in place for firefighting equipments and infrastructure.
- The organisation has a plan in place for service continuity in the event of a fire or a non-fire emergency.

Figure 8 : NABH accreditation standards: Facility Management and Safety internal audit visits
Ambulance services and equipment (top left), iron stains for fire safety and emergency evacuation (top right)



Fortis In-House Blood Center

Fortis Anandapur has an in-house blood house located on the 2nd floor. Where blood is collected and stored before it is used for transfusion for patients. Various components of blood are separated. And used when needed by patients.

How Fortis Blood Center Works

Two types of blood donation occur in blood bank – Voluntary and involuntary donation. Which is stored and goes through multiple screening test. Then divided into 3 parts – PRBC, FFP, Platelets. Bulk transfer is when blood is brought from outside and stored. In both the cases the blood is sent to the in-patient or out-patient when required.

How Does a Patient Get Blood from The In-House Blood Center?

When blood is required for a patient, the duty doctor or the ward in charge sends a requisition with the patient's blood sample. Cross-matching is done in the blood bank between the donor's blood and the recipient blood. After cross-matching the blood is sent back to the ward and can be given to the patient.

Medical Records Department (MRD)

It keeps all the medical files of all the patients who are getting admitted to the hospital. It keeps in check all the files that are discharged from the hospital and to check whether all the forms and summaries and documents of a specific patient is present in the file.

Various types of discharge files are: -

- 1) Normal discharge
- 2) Leave against medical advice (LAMA)
- 3) Covid file
- 4) Death files

MRD department keeps a checklist which is cross checked with each medical file received. These are –

1. Discharge Details
2. Admission details
3. Physician Section
4. Nursing Section
5. Physiotherapy
6. OT/ Procedure Section
7. Consent forms
8. Investigations and Reports
9. ECGs
10. Miscellaneous

CHARACTERISTICS, CLINICAL PRESENTATION OF COVID-19 PATIENTS WHO DIED IN FORTIS, ANANDAPUR, KOLKATA

Introduction

Covid-19 pandemic is a worldwide pandemic of the SARS-COV-2 virus causing coronavirus disease. It primarily affects the respiratory system causing acute respiratory distress. The virus also affects the heart with patients showing increased chances of cardiac arrests, Kidney failures, and clotting disorders. It also produces neurological symptoms causing headache, dizziness, loss of smell occurs in a high proportion of patients.

The Covid-19 pandemic which started with the reporting of a cluster of cases with pneumonia-like symptoms were seen in the Hubei province of China on 31st December 2019 to the WHO. The most common clinical features in these early cases were fever, fatigue, and dry cough. The second meeting of the Emergency Committee by the WHO declared it as Public Health Emergency of International Concern (PHEIC). The disease soon started affecting people in other countries. 25 countries were already affected by COVID-19 by 17th February 2020 with almost 70,000 confirmed cases and more than a thousand dead(4).

Global Scenario

The COVID-19 has caused a global pandemic in 2019, caused by the severe acute respiratory syndrome coronavirus 2. (SARS-CoV-2). The virus was discovered in December 2019 in Wuhan, China. 180 million cases and more had been reported, with death toll crossing over 3.9 million due to coronavirus 2019.(4).

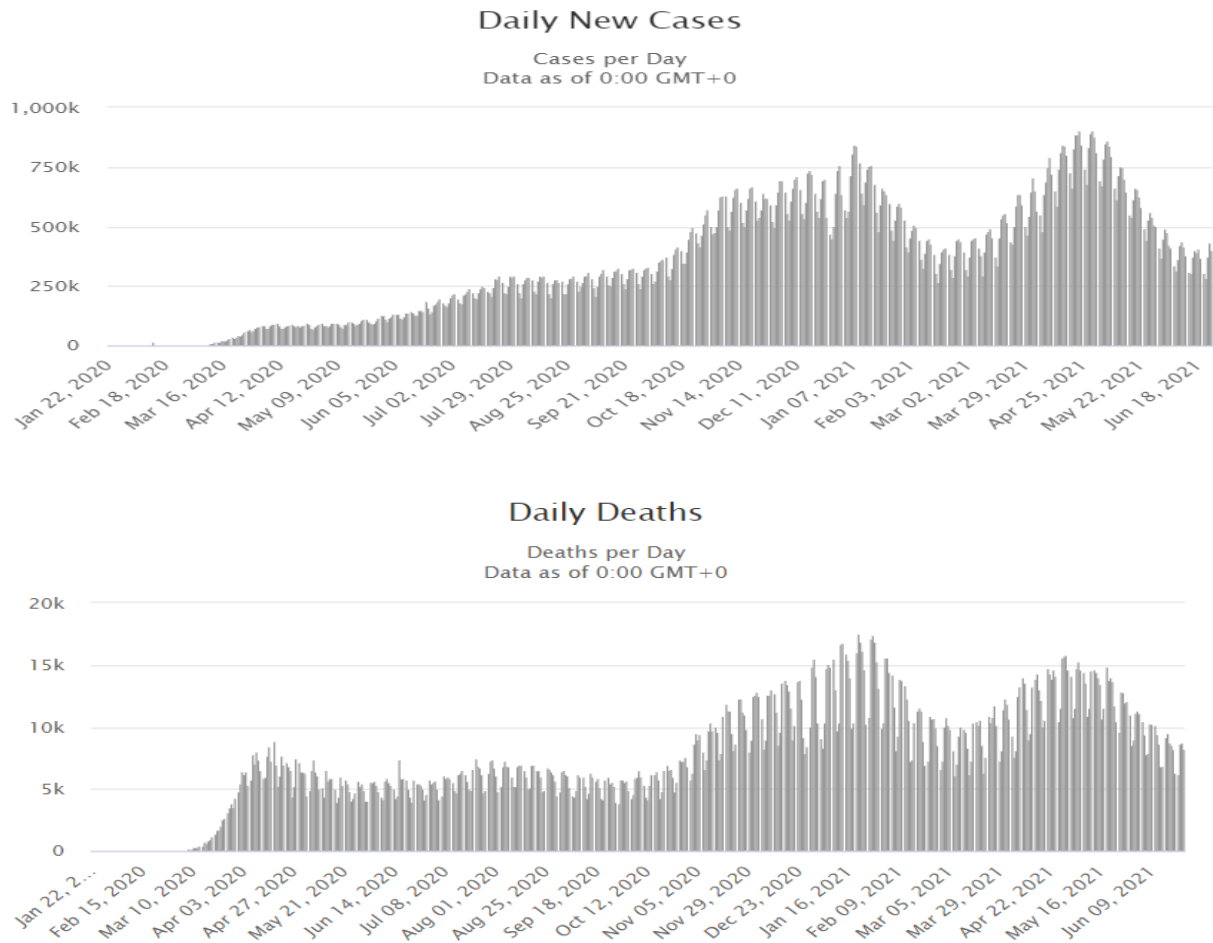
The first case of COVID-19 was confirmed in Wuhan city, Hubei, China in 2019. As many cases remain asymptomatic the human-to-human transmission must have been going on before the first detection.

The severity of this disease may vary from asymptomatic to life-threatening symptoms. As it is an airborne disease that can spread from an infected person to a normal person quite easily. the affected person may remain symptomatic for approximately 20 days, but in some cases, it has been more.

Deaths occurring due to COVID-19 are generally counted with the people who have been tested positive with the disease and then died. But a huge population who are not have been tested positive for the disease can also die cause of this disease, it is further supported by the high infectivity of the virus as well as a large portion of the population remain asymptomatic(5,6). The Death-to-case ratio varies with country and region.

Even though treatment regimens were improved, and preventive measures were implemented among the public, the vaccines were much needed to put a check on this virus and for the return to normal living conditions.

Figure 9: COVID-19 daily census data



Source : COVID live update available at <https://www.worldometers.info/coronavirus/>

Vaccines

By June 2021, 18 vaccines were authorized for public use. Phase III trials of these vaccines have very good results. With the start of the global vaccination drive many vaccines were found to be less effective against the newer variants of the disease. Every country around the globe had been affected by the virus and even though vaccination prevented the disease from becoming severe in a considerable number of cases, it was not a cure. But many countries started relaxation the guidelines. Some even did not anticipate a second wave or the magnitude of the second spike of cases were underestimated. Second wave of the virus has hit different countries at different time frames. India was one of the countries which suffered a lot because of this. The health sector was overwhelmed by cases as the second wave hit in April.

Indian Scenario

The first incidence in India was in Kerala. Since then, the disease has spread all across India and the cases had also multiplied. The first wave peaked in September 2020, with roughly 80,000-1,00,000 cases reported daily.

The initial wave's climax was gradual. On the contrary, the second wave was fairly rapid, peaking in late April to early May with 3,00,000-4,00,000 cases recorded each day. The second wave crested faster, although it was considerably shorter in length than the first.

Several advancements had occurred in the field of COVID-19. From the introduction to proper protective guidelines like wearing masks, social distancing, proper sanitization, for the introduction of lockdowns to minimize the disease spread to the development of various vaccines, to have a proper treatment regime for treating coronavirus cases.

The daily cases were also reduced to 9,000 to 10,000 cases per day(9). By March end the second wave came into the picture as the daily cases also started rising again. The total active cases in India also surpassed 10 lakhs by 9th April. By the end of the month, the active cases crossed 25 lakhs. The daily cases reported were also 3-4 lakh cases per day with a daily death toll of 2-4 thousand deaths per day(10).

Factors contributing to the sudden increase in cases: -

- The virus's Delta and Kappa strains have a high infectivity.
- Many temporary hospitals were dismantled as the first wave started to decline.
- Safety guidelines were not properly followed in public gatherings after the lockdown was removed.
- Economic setbacks put pressure on the government to remove or put relaxation on the lockdowns.
- Vaccination of a huge population like India is difficult and a vaccine shortage.
- The severity of the second wave was not well estimated in the models.

The second wave challenged the health care system in multiple ways, shortage of medical oxygen due to not prepared enough for the second wave, proper storage places as well as lack of cryogenic tankers. The government had to increase production by setting up new oxygen plants and use railways and airways to increase the delivery of oxygen to the health facilities and suppliers. In response to the emergency in India, many countries have come forward to aid India by supplying oxygen, medicines, materials needed to manufacture vaccines and ventilators(11). As India has shown generous support to several countries through vaccine supply, India got the rewards of its goodwill during the second wave crisis. The number of cases started showing a decreasing trend by the end of May. The daily deaths have also started decreasing. The two variations discovered in India were dubbed Delta and Kappa strains by WHO in May(12).

Health Care and Testing

In March 2020, the Union Health Ministry along with various other units like Integrated Disease Surveillance Programme, National Cooperative Development Corporation, and experts from government hospitals discussed how to tackle this pandemic. While India focused on containment of the clusters or high alert zones and breaking the chain of transmission in the process. Laboratories that could test for the virus were also increased.

On 14th March 2020 scientists were able to isolate the viral strain at the National Institute of Virology. India was the fifth country to do so. It helped in developing medicines, vaccines, and diagnostic kits that could cure or detect the virus(13).

Initially, only the sample of people who had travelled to high-risk countries or had contact with a COVID-19 positive person or people with similar symptoms were tested. Later all pneumonia cases were included in testing(14). On April 9, the Indian Council of Medical Research(ICMR) altered its testing approach again, allowing testing of anyone displaying symptoms in hotspot areas of the nation for a week. Even so, a lot of community transmission went unnoticed owing to individuals not adhering to the lockdown standards, as well as the high asymptomatic COVID-19 rates in the population(15).

The first Indian firm to gain regulatory approval for its RT-PCR testing was Mylab Discovery Solutions on March 24(16). On April 13, the ICMR suggested pool testing in low-incidence regions to enhance testing capacity and conserve money. If a large number of people test positive then all samples are tested.(17).

Testing labs that were operational by 9th July, 2020 were around 1130(18). Due to testing limitations, more laboratories which were well equipped were also authorized for testing. India has the greatest number of daily exams in the world by September 2020. By 5th May 2021, 2,506 testing facilities (public and commercial) were operational, with a total daily national testing capacity of 1,500,000 tests(19).

Development And Use of Vaccine

In January 2021, the Covishield, made by Serum Institute of India (SII), and Bharat Biotech vaccine, Covaxin (which was produced in association with ICMR and National Institute of Virology)(20).

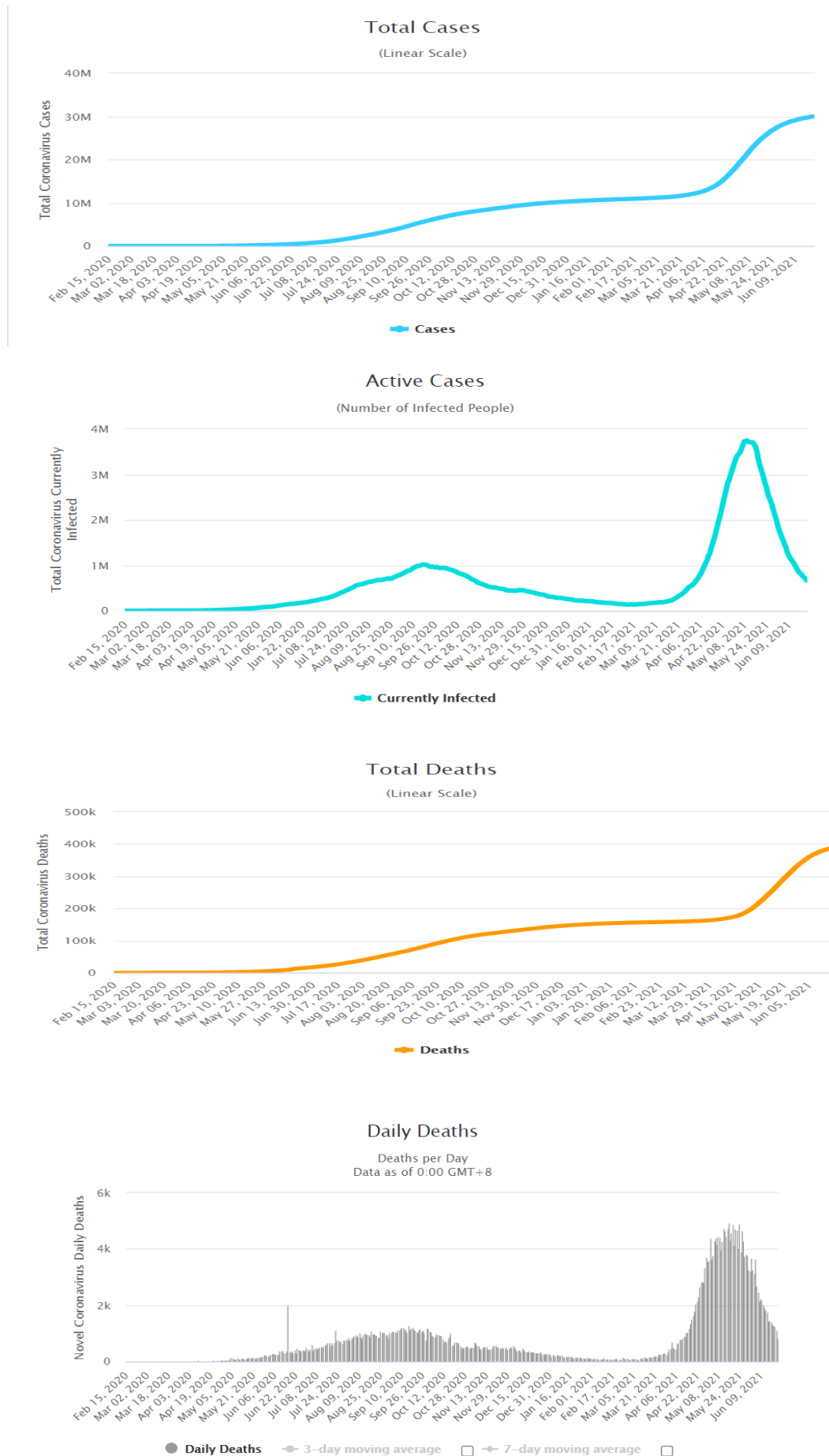
Covaxin's clearance was received with considerable scepticism because the vaccine had not yet finished phase 3 testing. In many places Covaxin was kept as a "buffer stock", predominantly Covishield was distributed. After completion of the study, Covaxin was granted authorization to be used for emergency(21).

Vaccination policy focussed on giving vaccines on a priority basis. In phase I all medical and non-medical staffs were given vaccine, almost 70% of the healthcare workers and frontline workers were administered at least 1 dose of the vaccine(22). In phase 2, it focused on 60+-year-olds and 45+-year-olds with comorbidities that were included in the vaccination drive(23).

But after March there was a shortage of vaccines due to very high demand(24). In phase 3 the vaccination drive was opened to 18+ years old(25). It was after the second wave hit India. And to vaccinate a huge population the vaccine shortage increased(26).

Many pressing concerns were the wastage of vaccines due to no proper place to store the vaccine. The government allocated a budget to increase vaccine procurement and cold chains to properly store the vaccines.

Figure 10: COVID-19 cases of India



Source : COVID live update available at <https://www.worldometers.info/coronavirus/>

First Wave V/S Second Wave

During the early period of coronavirus disease 2019, the healthcare system had very little knowledge about the disease as it was a new strain and identification of the basic symptoms and organs affected by the virus, as well as to identify a proper mode of action to treat the affected individuals. Through the course of this pandemic, various medicines have come in as the drug of choice. From identifying risk-prone populations to increasing the test done for identifying the affected individuals, the health sector has learned a lot about the disease process.

While India was able to bring the first wave under control and it was showing a decreasing trend, the second wave presented us. It had several mutant variations of the SARS-COV-2 virus which involved others organ systems, affecting younger age groups and also having higher virulence leading to numerous new challenges faced by the health care system.

Though the second wave was much shorter compared to the first wave, the peak was much greater than the first leading to an overburden on the healthcare delivery system. Alternative methods like home remedies and triaging for patients were done according to the severity of the patients.

Table 1 Differences between the First and the Second wave of COVID-19 in India.

PARAMETERS	FIRST WAVE	SECOND WAVE
Causative organism	SARS-COV-2 virus.	Mutant variants of SARS-COV-2 virus.
Symptoms	Mostly related to the respiratory system.	Other system involvement like gastrointestinal and renal etc.
Shortness of breath	Lesser cases.	More cases.
Age of the patient	Older population.	The younger population is also affected.
Patient with comorbidities	More affected.	Did not discriminate.
Availability of medicines	The shortage was there.	Available in hospitals and pharmacies.
Health care workers	Less trained and not vaccinated.	More trained and vaccinated.
Ventilator beds	Was within the hospital capacity.	Beds were increased to meet the increasing number of patients.
Investigative testing	Less	More.
PPE	Were in short supply.	Supply was in plenty.
Vaccine	Not available.	Available.
Treatment cost	High.	Markedly reduced.
Oxygen requirement by patients	Less.	More.
Disease spread	Slower.	Faster.

Death rates	Higher.	Lower.
Positivity rates	Lower.	Higher.
The peak of the wave	Gradual.	Steep.

Source : <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8106236/>

Aside from severe respiratory distress currently linked with severe COVID-19, the virus may also raise patients' risk of heart attack, renal failure, and coagulation problems, according to the researchers. A third of individuals may experience neurological symptoms such as headache, dizziness, tiredness, and loss of smell. Patients with severe COVID-19 are also at risk of having a stroke caused by a blood clot. COVID-19 should be seen by doctors as a multisystem illness. There are several cases of clotting, but it's also crucial to remember that a significant number of these individuals suffer kidney, heart, and brain damage. Anti-coagulants have been added to the treatment regime of COVID-19 to prevent clotting and further damage to these organs.

Various scientific reports cite that these varied problems are caused by systemic inflammation, which occurs as the immune system attempts to keep the virus in check. When the virus targets blood vessel cells, inflammation rises and blood clots, both large and tiny, develop. These blood clots can happen throughout the body, damaging organs and creating a vicious cycle. Furthermore, in extreme situations, the immune system's downstream messenger signals may spiral out of control, adding to these broad consequences.

The clinical guidelines of ICMR and AIIMS state 3 categories of patients and their treatment plans –

- 1) Mild disease – Symptoms like dry cough without any other ailment associated with fever. Advised for home isolation and regular monitoring of vitals. If the symptoms deteriorate seek for further medical advice and can be admitted in hospital.
- 2) Moderate disease – Respiratory rate more than 24/min, breathlessness or SpO₂ between 90% to <93% on room air. Advised for admission in hospital may not need ICU admission. Treatment with Oxygen supports antiviral, anticoagulants and steroids. Monitoring of vitals are important to check the progression of the disease.
- 3) Severe disease – Respiratory rate more than 30/min, breathlessness or SpO₂ less 90% on room air. Should be shifted to ICU for continuous monitoring. Respiratory support is need. May be put on Non-invasive or invasive ventilation. Rest of the treatment protocol includes the similar medications.

Contribution of Fortis Hospital in COVID-19

Fortis, Anandapur has been a center that has been treating patients infected with the coronavirus since the pandemic hit India. Even though the presentations of the illness have been different from the first wave, the second wave has posed a certain challenge to the center that was not there during the first wave. The sudden spike in patients infected with COVID-19 has let to set up a triage for patients who can be treated with home remedies and if the symptoms don't improve can be brought to the hospital with certain cut-offs. The second

basis was the people who needed hospital admission but can be admitted in the ward looking at the severity of the disease. The third category of patients who are critically ill and would need ICU admission for further management.

The classification criteria that are being followed in the Fortis Hospital, Anandapur is the guidelines declared by the government along with specific hospitals and other government agencies.

So based on the criteria, patients were identified, and proper treatment was advised accordingly. Even so, the clinical presentation of the second wave has been characteristically different from the first wave, like extra-pulmonary involvement and affects a wider age group, making the disease much more unpredictable. The high infectivity rate also has increased the number of patients presenting to the hospitals with signs and symptoms, leading to a difficult task to admit all the patients at the same time. Superimposing on that the nationwide shortage of medical oxygen which has been an important treatment plan for COVID-19 patients has made the situation much more complex. Learning about the severity of the patients contracting COVID-19 and the post-COVID-19 complications arising from the diseases will guide in the multi-system treatment of patients. Furthermore, it will help in setting up proper guidelines to treat the cases in home isolation better.

Research question – What are the characteristics, clinical presentation of COVID-19 patients who died in Fortis, Anandapur, Kolkata?

Research objective –

1. To describe the clinical characteristics of COVID-19 patients who died in Fortis Hospital, Anandapur.

MATERIALS AND METHOD

Research Design - It is a cross-sectional descriptive study of the COVID-19 patients that were admitted in Fortis Hospital, Anandapur.

Study Duration - 15th April 2021 to 15th June 2021

Data source – Secondary data was collected from the medical records of the COVID-19 patients who died in Fortis Hospital, Anandapur, Kolkata during the period of the study.

Sample Size – 72.

Sampling technique – Non probabilistic purposive sampling.

Inclusion Criteria –

1. Patients who were died due to COVID-19 in the Fortis hospital.

Exclusion Criteria –

1. All COVID-19 patients who were alive during study period.

This study is based on the COVID-19 deaths from April 15, 2021, to June 15, 2021. The data contains the reports of COVID-19 live cases, death cases of the global scenario as well as the Indian scenario and to do a comparative analysis based on the data of Fortis Hospital, Anandapur.

The whole cases of death files of COVID-19 patients from the hospital from April 15th, 2021 to June 15th, 2021, is considered. The total death and discharges of the hospital from January to May has been used for comparative analysis of the data. The data from the hospital medical records provides the various risk factors and the condition of the patients when they approached the hospital or the progression of the disease and the various organs that were affected by this disease.

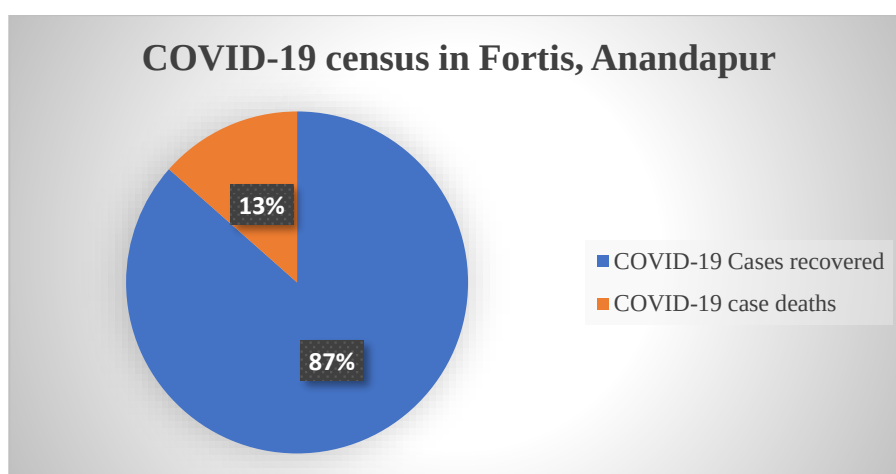
Data Compilation and Analysis

In this study, the case records for 534 COVID-19 patients who either discharged or died between 15th April 2021 to 15th June 2021 were available. Among these 72 cases of died patients were scrutinized for this study. Data was entered, compiled and analysed in Excel.

Data Analysis

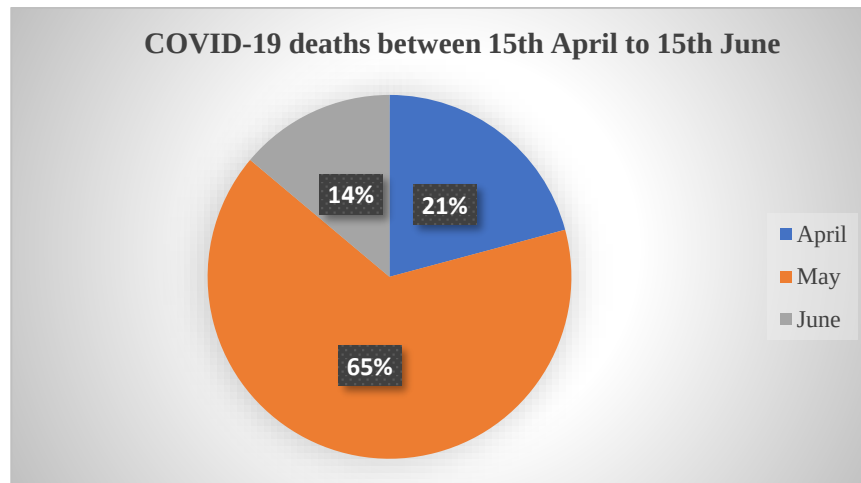
Considering the total number of cases been treated in the hospital during the period of this study period and the number of mortalities during this period, the mortality rate found to be around 13.483% (72 out of 534).

Figure 11 COVID-19 – Recovered cases v/s death cases



The majority of the COVID-19 deaths were seen during the month of May as it was the peak of the second wave as reflected in the COVID-19 related deaths in India was also highest during the month of May. As seen in the pie chart below 65% of the mortality occurred during the month of May, followed by 21% in April and by June the total active cases, as well as mortality, started reducing marking the decline of the second wave.

Figure 12: Month-wise analysis of COVID-19 deaths

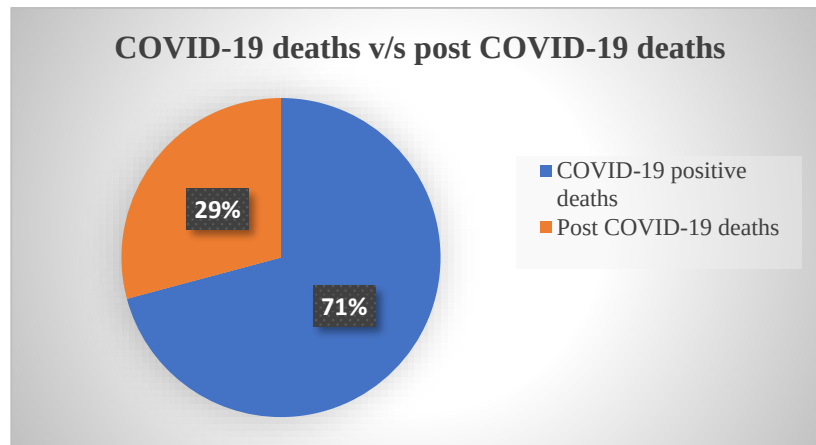


The higher mortality rate can be attributed to the following reasons –

- 1) Due to triaging of the patients for admission, only the severely ill patients were admitted and were given preference. Thus, these patients already had a lower chance of survival compared to patients who presented with minimal symptoms.
- 2) The majority of the patients came with co-morbidities. Many had uncontrolled risk factors like T2DM and HTN. Some patients already came with a history of cardiac or renal events for which they already underwent treatment.
- 3) Many patients presented late even when the guidelines stated that patients should come to the hospital when the SpO₂ falls below 94% in RA.
- 4) A good proportion of patients were elderly population.

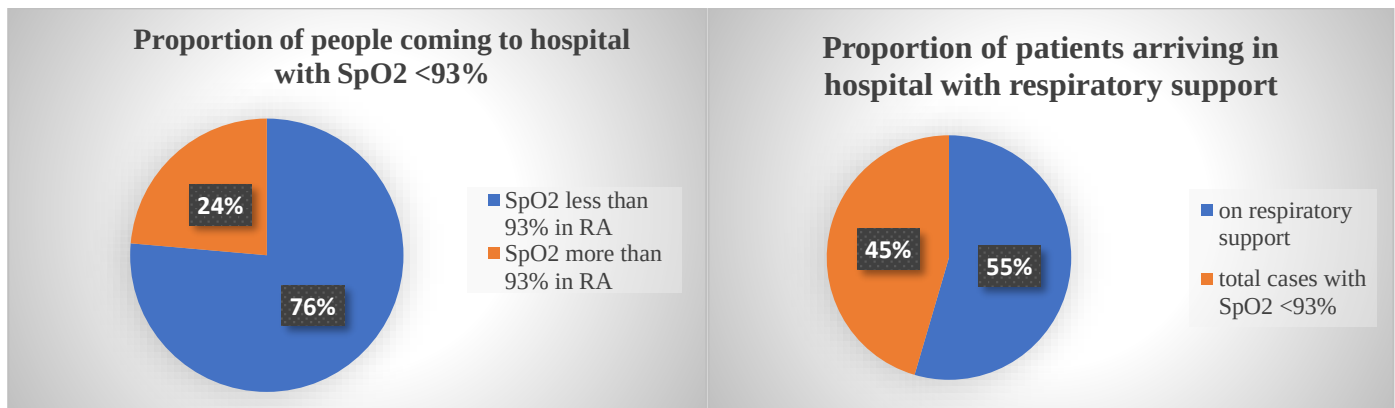
Out of the total COVID-19 patients taken in the study, 71% of the cases were directly related to COVID-19 deaths. About 20% of the patients suffered from post-COVID-19 complications like pneumonia, lung fibrosis leading to respiratory failure or kidney disease, or cardiac condition. Studies showed that multiple organs were involved during the disease. Though a majority of the cases presented with respiratory symptoms, the disease was not limited to the respiratory system. It also affected the cardiovascular, renal, and gastrointestinal either in the later stage of the disease as it progressed further or in the early-stage people had comorbidities associated with other systems which got aggravated as the disease progressed. Some of the most common causes of death were lung fibrosis, post-COVID-19 pneumonia, renal failure, cardiac failure, or multi-organ failure seen where multiple organ damage was seen.

Figure 13: COVID-19 death v/s Post COVID-19 deaths



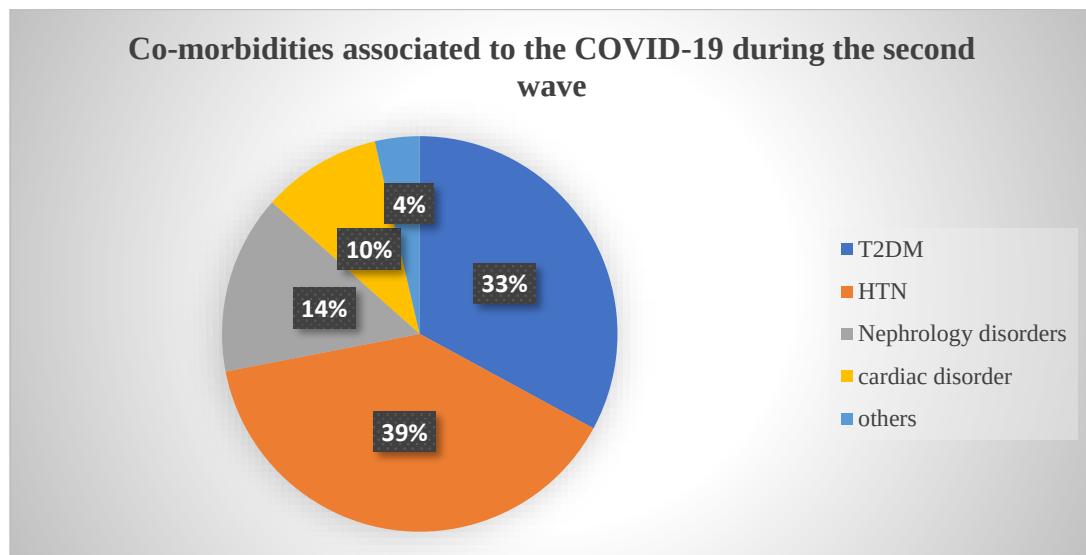
About 76% of the COVID-19 casualties have come to the hospital with less than 93% had SpO₂. Among these patients, 55% of the patients were already under non-invasive or invasive ventilation.

Figure 14: Respiratory Condition of patients on arrival in hospital



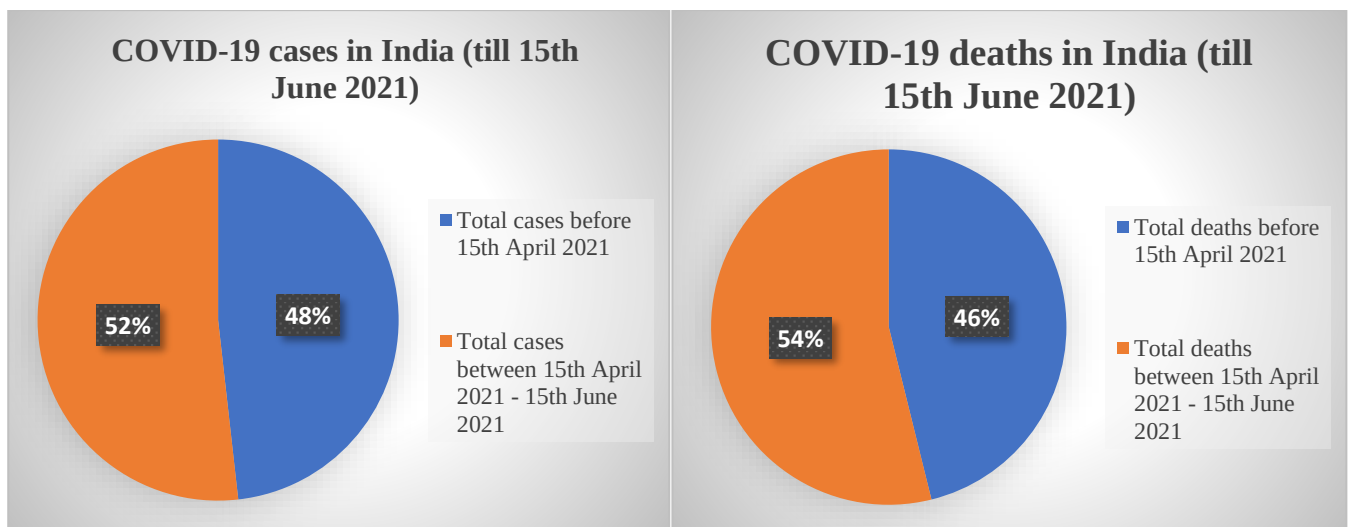
Among the COVID-19 mortalities majority of the patients had Type II diabetes mellitus or hypertension, associated with 72% of the cases. In India, a large proportion of the population suffers from these two above-mentioned diseases. Some hospitals even organize a separate diabetic and hypertension OPD because of the huge of patients who come to the hospital either for check-ups or for follow-up with these diseases. About 14% and 10% of the cases suffered from nephrology and cardiac disorders which further reduced the chances of survival in these patients. The 4% that is attributed to others comprise cerebrovascular injuries and gastrointestinal disorders like oesophageal candidiasis.

Figure 15: Co-morbidities has commonly seen in COVID-19 patients



In India, the total reported COVID-19 cases till 15th June 2021 were around 2.97 Crores. Among the total cases, 54% percent of the cases diagnosed were during the period of 15th April 2021 to 15th June 2021. The COVID-19 deaths were also higher. 46% of the deaths occurred due to COVID-19 before 15th April compared to that 54% of the deaths occurred between 15th April to 15th June 2021.

Figure 16 Comparative representation of total cases and mortality in India (till 15th June 2021)



Discussion

The second wave of COVID-19 has taught us multiple ways to fight the pandemic. The shorter span of the wave with a very high peak has led to a very high mortality rates during the month of April and May 2021. With the overburdened hospital setup, proper protocols and guidelines can assure an efficient and smooth function of the hospitals. Development of guidelines for when to get treatment due to COVID-19 is very important. But educating the population when to get professional medical care is very important. More male patients were seen as compared to the female patients. Male patients comprised of 78% of the death cases. On the basis of age,

65% of the individuals were above the age of 60 years but 35 percent of the people were below 60 years. The proportion of younger population getting affected is also considerable amount. As it is seen approximately 55 percent of the patients in Fortis Hospital, Anandapur has come for medical help when they are already on oxygen support. In those situations, there has already been significant lung damage, and in many cases already other organs had been involved by the time the patient arrived in the hospital. It has led to increase in the mortality rate in the hospital. About 30 percent of the patients who died due to COVID-19 were due to post-COVID-19 complication arising due to involvement of other organs or due severe co-morbidities.

The delay in seeking medical attention may be attributed to the lack of knowledge among the population about protocols set by the government and when approach the hospital. It can also attribute to the lack of hospital beds. And short supply of the medical oxygen in the local hospitals.

The infectivity of the virus was much higher as compared to the first wave. It can also attribute to increasing testing during the second wave.

Since the country been hit by the second wave, in the 2 months since 15th April 2021, 52% of cases have been reported as compared to 48% in 15 months duration of the pandemic before 15th April 2021. Total deaths were also higher compared to the second wave. Almost doubling the Covid-19 death tally in just 2 months. The alarming rate of increase in active cases around the month of April and May put a lot of stress on the healthcare sector in India. The mortality rate in Fortis healthcare, Anandapur was 13%. Even though the counts may seem higher but triaging of patients and admitting severely ill patients had been the priority of the hospital. Which became apparent as many COVID-19 recovered patients came with post-Covid-19 complications with multiple organ involvement.

Comorbidities have always been an important factor in the outcome this disease. T2DM, HTN have been the most commonly associated comorbidities. People with nephrology and cardiac disorders were also severely affected.

Recommendations –

Hospitals should have a team of nurses who will regularly check up on the patients who are advised for home isolation. Continuous monitoring of the daily progress and keeping a record of their vital signs, will help get an idea about the progression of the disease. In case of any deterioration of the condition of the patient the consulting physician can be informed, and proper follow-up can be done in time based on the investigations and treatments advised by the physician.

Limitations –

- This hospital-based study included the patients who died due to COVID-19 and does not have the clinical presentation of the patients who were discharge.
- The final outcome of the patients who were alive during the study period is not known.
- It cannot be generalised to the population since this is hospital-based study.

- Severity of co-morbidities not related to COVID-19 may have influenced the study data.

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