Preparedness & Experience of a Tertiary Care Teaching Hospital during Covid-19 Pandemic

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ABSTRACT

A novel coronavirus (CoV) named '2019-nCoV' or '2019 novel coronavirus' or 'COVID-19' by the World Health Organization (WHO) is in charge of the current outbreak of pneumonia that began at the beginning of December 2019 Like several parts of the world, especially Europe, India has been experiencing a massive surge of COVID-19 cases and deaths. The first cases of COVID-19 in India were reported on 30 January 2020 in three towns of Kerala, The covid-19 in Kashmir started in March 2020 when first positive case was reported by Sheri-kashmir Institute of Medical Sciences, a tertiary care teaching hospital. SKIMS played a critical role in response to Covid-19 emergency .The hospital rapidly adopted various guidelines and addressed hospital preparedness and response for the pandemic tailored to local population, societal influences, political factors within existing infrastructure and work force. The Process of covid management during two yeears of pandemic (2020-21)was studied prospectively and role of all concerned sections was recorded.

Keywords: Covid-19 Pandemic, Preparedness & Experience during Covid-19

INTRODUCTION

A novel coronavirus (CoV) named '2019-nCoV' or '2019 novel coronavirus' or 'COVID-19' by the World Health Organization (WHO) is in charge of the current outbreak of pneumonia that began at the beginning of December 2019 near in Wuhan City, Hubei Province, China.[1–4] Coronaviruses mostly cause respiratory and gastrointestinal tract infections and are inherently categorized into four major types: Gamma coronavirus, Delta coronavirus, Beta coronavirus and Alpha coronavirus.[5–7] The first two types mainly infect birds, while the last two mostly infect mammals. Six types of human CoVs have been formally recognized. These comprise HCoVHKU1, HCoV-OC43, Middle East Respiratory Syndrome coronavirus (MERS-CoV), Severe Acute Respiratory Syndrome coronavirus (SARS-CoV) which is the type of the Beta coronavirus, HCoV229E and HCoV-NL63, which are the member of the Alpha coronavirus. Coronaviruses did not draw global concern until the 2003 SARS pandemic,[8–10] followed by the 2012 MERS[11–13] and most recently by the COVID-19 outbreaks. SARS-CoV and MERS-CoV are known to be extremely pathogenic and spread from bats to palm civets or dromedary camels and eventually to humans.

Like several parts of the world, especially Europe, India has been experiencing a massive surge of COVID-19 cases and deaths. The COVID-19 pandemic in India is a part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). As of 13 Feb 2022, according to official figures, India has the second-highest number of confirmed cases in the world (after the United States of America) with 42,631,421 reported cases of COVID-19 infection and the third-highest number of COVID-19 deaths (after the United States and Brazil) at 508,665 deaths.[14,15,16,17]

The first cases of COVID-19 in India were reported on 30 January 2020 in three towns of Kerala, among three Indian medical students who had returned from Wuhan, the epicentre of the pandemic.[18,19,20] Lockdowns were announced in Kerala on 23 March 2020, and in the rest of the country on 25 March 20. On 10 June 2020, India's recoveries exceeded active cases for the first time.[21,22] Daily cases peaked mid-September with over 90,000 cases reported per-day, dropping to below 15,000 in January 2021.[23] A second wave beginning in March 2021 was much more devastating than the first, with shortages of vaccines, hospital beds, oxygen cylinders and other medical supplies in parts of the country.[23] By late April, India led the world in new and active cases. On 30 April 2021, it became the first country to report over 400,000 new cases in a 24-hour period.[24]

India began its vaccination programme on 16 January 2021 with AstraZeneca vaccine (Covishield) and the indigenous Covaxin. Later, Sputnik V and the Moderna vaccine was approved for emergency use too. On 21 October 2021, at 9:47 AM according to the Co-WIN portal, India crossed 100 crore (1 billion) doses.[25]

The covid-19 in Kashmir started in March 2020 when first positive case was reported by Sheri-kashmir Institute of Medical Sciences, a tertiary care teaching hospital. The Union Territory (UT) of Jammu & Kashmir witnessed lockdowns, restrictions and Govt of UT enforced strict covid restrictive measures during first and second wave respectively. Since the start of pandemic 446628 positive cases of coronavirus were reported and among them 424521 cases were recovered and discharged and 4715 expired till 06-02-22 according to official estimates.

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Tertiary level hospitals play a critical role in national & local responses to emergencies such as communicable disease epidemics. These hospitals should be able to rapidly adopt various guidelines and address hospital preparedness and response for the pandemic tailored to local population, societal influences, political factors within existing infrastructure and work force

In this context present article describes Preparedness and frontline experiences from " Sheri-Kashmir Institute of Medical sciences (SKIMS), a tertiary care teaching hospital in the Govt sector in Srinagar Kashmir during Covid-19 pandemic. SKIMS is a post graduate institute for training, research and patient care. SKIMS being deemed university and among premier medical centers of india with 1015 bed strength is engaged in providing quality patient care and need based biomedical research to provide patient care of highest order to the people of J&K by establishing a sound referral system conceived to emerge as an " island of excellence" providing an intellectual milieu where the young scientists from multiple disciplines while rendering human services to the sick, realize their creative ability through need oriented research and post graduate medical education.

EVOLUTION OF SKIMS AS A COVID CARE CENTRE

The COVID-19 was initially a challenge in Feb-March 2020 when the Government of UT of J&K started preparing itself for the Pandemic. SKIMS started managing COVID Suspects in February 2020 when no health facility in the UT of JK was in a position to face the onslaught of the coronoviral pandemic. SKIMS constituted a "Hospital Core Committee (HCC)" under the command of Director of the institute which included Medical superintendent, Heads of Departments from Medicine, Surgery, Anaesthesia, Microbiology & Hospital administration. The HCC drafted a comprehensive plan to counter the challenge of Covid-19 and within no time SKIMS Virology lab started functioning as a diagnostic centre by conducting RTPCR tests. Initially, SKIMS managed COVID-19 cases by arranging six (6) isolation beds including two dedicated ventilators. The Virology Lab of SKIMS was first in UT of J&K which received clearance from ICMR for RT-PCR testing. The first COVID Positive case in UT of J&K was diagnosed by SKIMS Lab when a 67-year-old female was tested positive who had an international travel history. The Government of UT of J&K deliberated the COVID scenario via virtual conferences where HCC of SKIMS under the leadership of Director represented the SKIMS and after mutual consultations policy was frequently reviewed keeping in view the World, National, and local scenario.

In order to broaden the spectrum of involvement, the HCC formulated an Advisory Committee under the chairmanship of Dean Medical faculty for Management of COVID-19 and included members from Hospital administration, clinical, Nursing, Engineering, Purchase, Supportive services and others. The role of Advisory committee was to assess the situation, review the decisions, and submit recommendations for better management of COVID-19 Cases to Hospital Core Committee (HCC). The discussions of Advisory committee include

- Preparation of SOP's as per WHO/ICMR guidelines and incorporating amendment's as and when released.
- Intensive training of healthcare workers
- Policy of Contact Tracing
- Logistics to scale up facility space and Equipment
- Setting up of a Covid-19 Clinic (sample collecting site)
- Respond to Government directives time to time.

The HCC nominated HOD Hospital Administration as a Nodal officer of Covid-19 from whom authorised information and the decisions taken by HCC and Advisory committee on the safety of patients, visitors, doctors , staff & students, circulars or guidelines arising from the government related to Covid-19 would be conveyed to the hospital staff from time to time.

SURGE CAPACITY

Surge capacity is a measurable representation of ability to manage a sudden influx of patients. With the rise in COVID-19 Infection Cases, the facilities were enhanced during the first wave in May-June 2020 after witnessing a huge inflow of high-risk patients suffering from life-threatening Co-morbidities like Cancers, Kidney diseases, Liver diseases, Heart diseases, diabetes, etc. requiring advanced/high-end care at SKIMS. The most important concern was having a medical space to create a new facility with reduced or no risk of Covid-19 transmission and to fill the gap, the State-of-the-Art Infectious Diseases Block (IDB) was created exclusively for the management of COVID-19 patients at SKIMS that was designated as Level-III COVID Management Hospital and to tackle the increasing number of sick patients, the existing Beds in Wards were temporarily converted for management of COVID-19 infected patients From "A" wing of the Hospital. A total of 260 beds (25% of total bed Capacity) were dedicated to COVID-19 patients which include 40 beds in IDB, 30 in Vet Lab, 35 in Surgical Observation Ward, and remaining beds in various designated wards. The Bed capacity was Enhanced to 370 (37% of total bed Capacity) during the second wave of Covid-19 in March April 2021.The Entry and Exit paths to COVID-19 areas were kept separate ensuring that no mixing of COVID and non-COVID patients takes place. The main emphasis was given to the prevention of the spread of infection within the hospital and staff was provided with suitable protective gear (PPE'S, N95 masks) round the clock as per ICMR guidelines. Besides the bed enhancement, more ventilators (invasive and Portable), High flow oxygen devices, and other related equipment were added for the better management of COVID-19 cases. (Table 1) Many tertiary care hospitals of Europe, Australia and Asia have also published their experiences in this regard.[26-29] Likewise Kenyan Govt also enhanced their capacity in terms of logistics.[30]

patients based on their symptoms, travel history etc. The COVID-19 clinic is a huge success in COVID-19 management at SKIMS as it envisages a two-pronged

strategy, Prevention of Spread (by filtering the Suspects &restricting the entry) and diagnosing of positive cases. The Clinic is still functioning 24x7 manned by doctors of General Medicine and Microbiology for clinical diagnosis and Covid-19 sample collection respectively. The Covid-19 Clinic registered 71707 Covid suspects till Nov 2021 with peak registrations seen during the months of July-Oct in 2020 (First Wave) & April to May in 2021(Second Wave) Fig 1

SKIMS kept its healthcare Excellence intact and managed COVID-19 Patients effectively and efficiently. The Team from all the Departments are on toes 24x7 since the beginning of Pandemic ensuring the best of the management at all levels of severity. The Teams from other allied Departments are also playing their role along with Supportive and other Auxiliary Services. The Active Surveillance of cases and regular reporting by Infection Control Committee increased during COVID Pandemic which helped in monitoring of healthcare environment, isolating and treating infected individuals to contain the spread. SKIMS has been the First Center in UT of J&K to Start Plasmapheresis for COVID Positive Patients. The Apheresis Machine was procured on Priority and all procedures are carried in coordination with Blood Bank. SKIMS performed 385 plasmapheresis/convalescent Plasma Exchanges on covid-19 positive patients till Nov 2021. In addition, all the Latest Guidelines viz a viz treatment are followed at SKIMS that includes Drug management with Remedsevir, favipiravir, Dexamethasone, and other related drugs. The Pharmacy section of SKIMS has supplied 1287 vials of inj Remdesivir free of cost to Covid positive patients admitted in SKIMS till Nov 2021 while 10249 vials were sold on discount rates from sales drug counter for Covid positive patients admitted within & outside till date. The dead body disposal of COVID-19 Positive Patients is carried out as per Guidelines and all SOP's are followed in letter and spirit in this regard. The Virology lab of the Microbiology Department has a dominant role in the overall scenario and carries out almost 2000-3000 tests per day. The Staff of the virology lab works 24x7 to ensure on time processing and testing. (Table 2)

Another arduous task at SKIMS was the Management of Non-COVID cases and despite the Covid-19 threat, the management of Non-COVID patients in SKIMS didn't suffer. SKIMS never stopped OPD'S and despite lockdown in the early months, the Out-Patient department has been carrying out its usual activity though the number of Non- COVID patients visiting was less than normal during the early phase of first wave but later on the OPD registrations began to pick up the normal pace (Fig 2) Cancer management is taken due care and all chemo and radiotherapies were ensured since the beginning of pandemic. (Fig 3 (a+b) SKIMS arranged Tele- Conferences in earlier months of lockdown for those Non-COVID patients who were unable to reach SKIMS. The concerned doctors continue to provide advice on phone and

S.No	Category	Total Number Available
1	PM Care	23
2	Air Liquide + Maquet	14
3	Transport Ventilators	20
4	Non Invasive Bipap	09
5	High Flow Devices	35
	Total	101

Table-1: Number of Ventilators/Devices Dedicated for Covid-19

S. No	Parameter	Total No
1	Total No of Covid-19 Suspects Registered at Covid-19 Clinic till Nov 2021	71707
2	Total No of Patients Registered at SKIMS OPD since the start of Pandemic till Nov 2021	397710
3	Total No of Chemotherapies given to Cancer Patients since the start of Pandemic till Nov 2021	34499
4	Total No of Radiotherapies given to Cancer Patients since the start of Pandemic till Nov 2021	4100
5	Total No of Plasma Pheresis/Convalescent plasma Exchanges performed on Covid-19 Positive Patients Nov 2021	385
6	Total No of Covid-19 Surgeries (Suspects/Positives) Performed in EOT from March 20 to May 21	257
7	Total No of Teleconferences Conducted from March 2020 till Nov 2021	200
8	Total no of Diets Served on Covid-19 Positive Patients from March 2020 till Nov 2021	57051
9	Total No of Inj Remdesivir sold free from Drug & Pharmacy to Covid Positive Patients till Nov 2021	1287
10	Total No of Inj Remdesivir sold on Discount rates from sales counter to Covid Positive Patients till Nov 2021	10249

Table-2: Covid Patient Care

S. No	Name	Technology	Capacity
1	Oxygen Plant 1	PSA Dedicated	750lit/min
2	Oxygen Plant 2	PSA Dedicated	1250lit/min
3	Oxygen Plant 3	PSA Dedicated	1250lit/min
4	Oxygen Plant 4	PSA Dedicated	1250lit/min
5	Oxygen Plant 5	PSA Dedicated	1250lit/min
6	Oxygen Plant 6 (Installed by DRDO)	PSA Dedicated	1000lit/min
	Total Capacity		6760lit/min (9720cum/24hrs)
Total Bulk Oxygen Cylinders			974

Table-3: Total Oxygen Availability in SKIMS at Present

Figure-1: Covid-19 Clinic Registrations during First & Second Wave

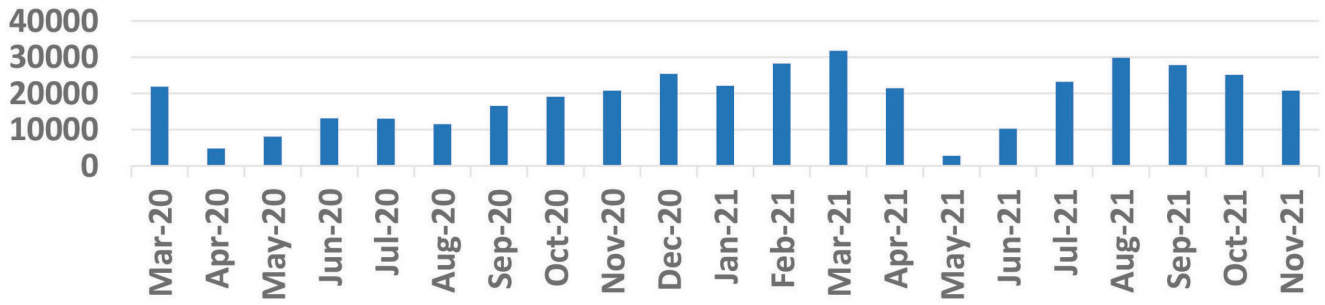

Figure-2: OPD Registrations During First & Second Wave of Covid-19

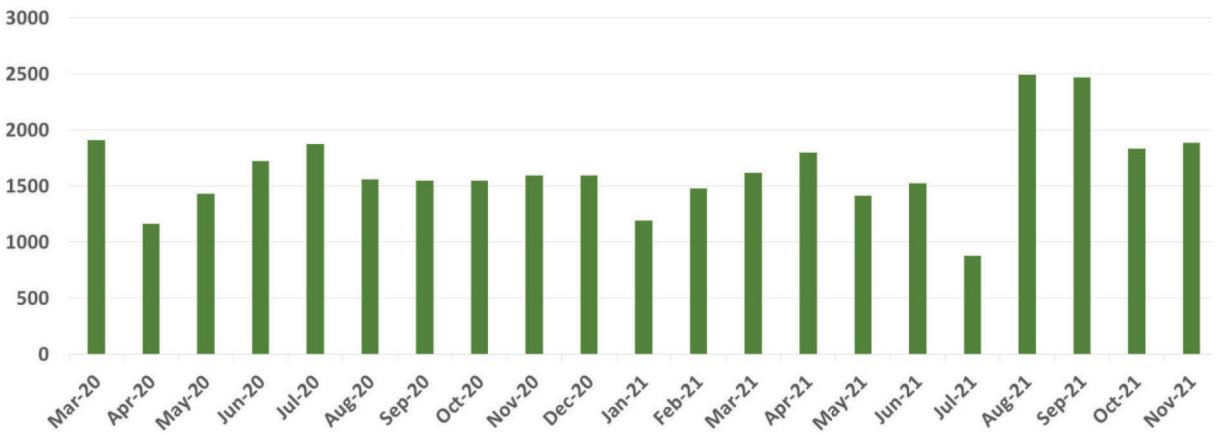

Figure-3a: Chemotherapies carried out During Covid-19 Crises

Figure-3b: Radiotherapies carried out During Covid-19 Crises

facility for the same was provided by the IT Department of SKIMS while running the virtual clinics as well as regular polyclinic as wells as specialized clinics. Also, Major and minor surgeries were carried out in SKIMS unabated and all efforts were made to ensure that no immediate surgical intervention or any other interventional procedure is delayed. The Operation Theatre Management of COVID and NON-COVID patients was done skilfully and no patient suffered on this account. All Emergency Surgeries, Cancer Surgeries, and those where surgical intervention was inevitable were performed in the Main operation theatre during the first & second wave of pandemic. To regulate the procedures three (3) theatres of Main OT were designated for Emergency surgeries while the rest of the theatres were utilized for Cancer and other procedures. The Emergency OT of the Hospital has been designated exclusively for COVID Patients who need an emergency surgical intervention. The Surgical teams are equipped with PPE's, Disposal Gloves, N95 masks, and Face Shields, and the availability of stocks round the clock is strictly ensured. Likewise, all invasive procedures in various Labs (Rescue operations & interventions in Cath lab, endoscopy lab, etc) are carried out with strict adherence to the segregation of COVID and NON-COVID entities. All

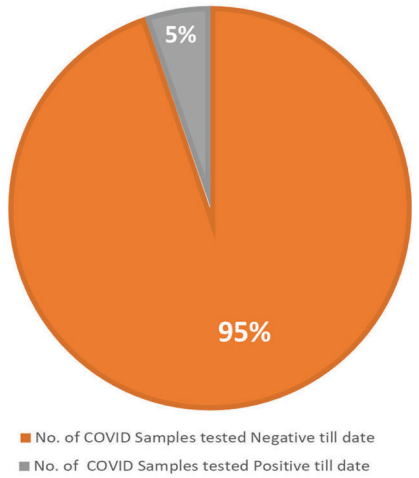

Figure-4: Covid Sample Statistics of Virology Lab

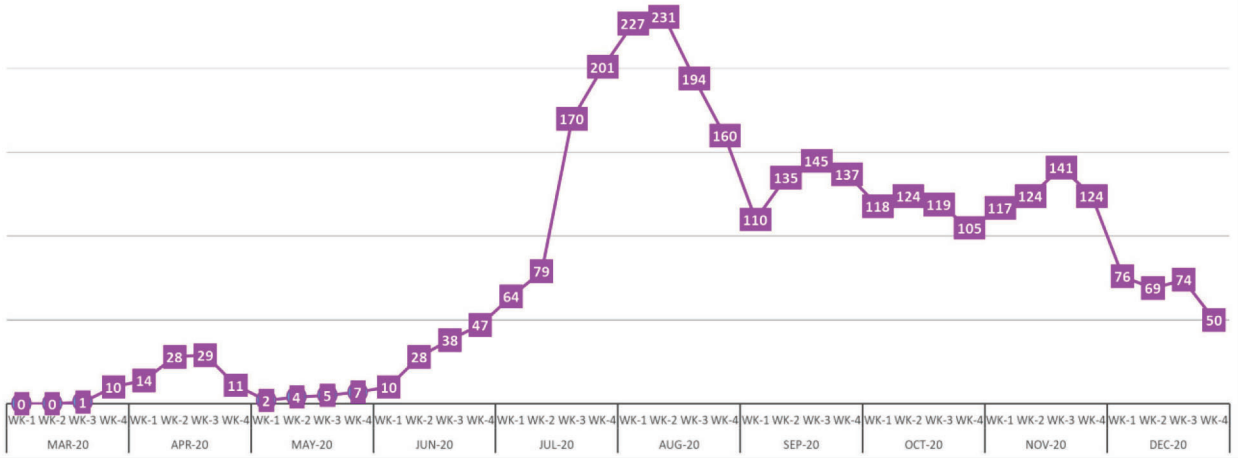

Figure-5: Covid Admissions During First Wave

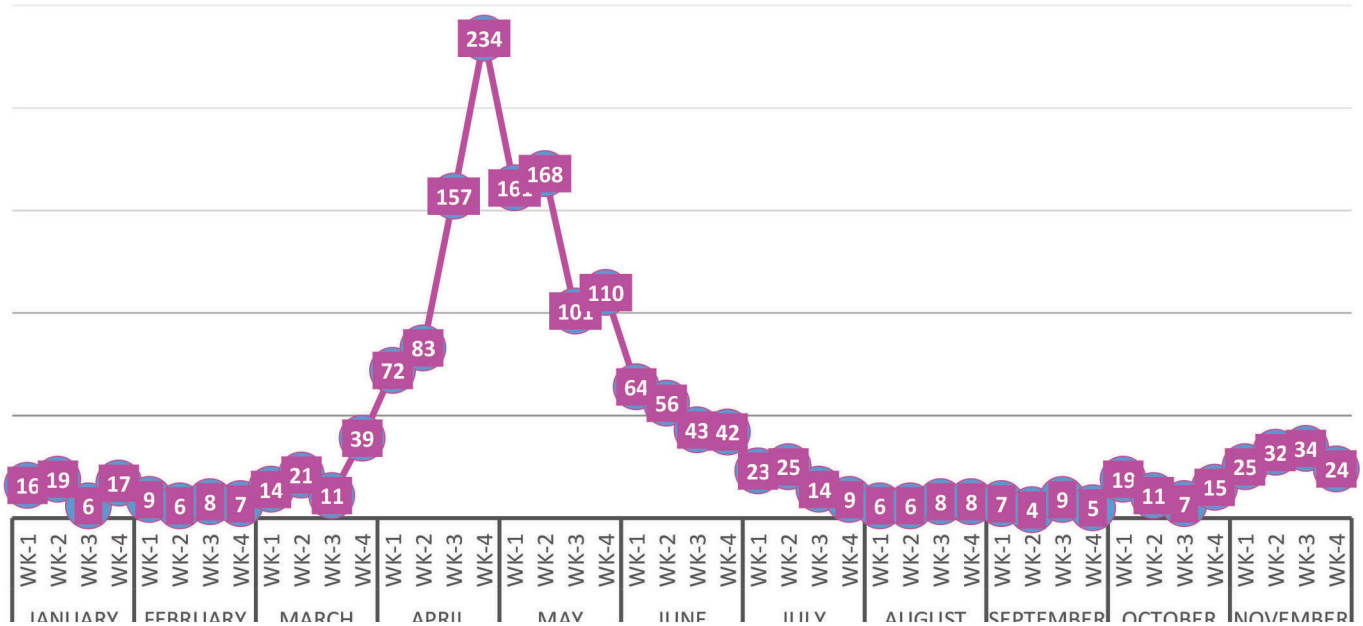

Figure-6: Covid Admissions During Second Wave

SOP's are followed in all theatres/labs in letter and spirit . The respective OT/lab teams during the time of extreme stress kept no stone unturned to ensure the highest quality care for COVID and NON-COVID patients.

The Maternity Hospital of SKIMS encountered more load of pregnant females after JLNM and SKIMS Medical College hospitals were designated as COVID Hospitals. The Maternity Hospital created Special Isolation units for COVID Suspect pregnant females who had to undergo emergency surgery. All SOP's are followed and strict compliance to sterilization and disinfection of theatres is ensured. All pregnant females were tested 24 hours before their EDD and if found positive are managed at SKIMS as per COVID Protocol. The Government of UT formed a committee of high officials to review the COVID management protocol of pregnant females and take appropriate decisions. It was decided that one of the main Hospitals of Valley (LD) hospital be designated as exclusive NON-COVID Hospital so that NON-COVID Pregnant females from all corners of the valley don't suffer.

HUMAN RESOURCE ACTIVITIES

The management of Human resource was a challenging task during this pandemic and ensuring availability of trained staff and continuity of services in response to increased demand was the need of hour. The Staff was mobilised and Manpower management was efficiently done by concerned coordinators with the COVID-19 pandemic management team and rosters were issued accordingly. The duty rosters were devised in such a way that demands were met throughout the period in an adequate manner. The medicines and other related supplies for COVID-19 patients were kept available 24x7. The Education and Awareness regarding the COVID-19 management including its updates and latest recommendations were continuously deliberated and discussed among staff in various committees, CME's and Webinars, and the same was given due publicity through electronic and print media as well as by my interactions and advisories with these media houses.

OXYGEN UTILIZATION

Uninterrupted Oxygen supplies 24x7 for COVID-19 patients was ensured throughout. Two Oxygen plants (every 1250 litres/min) were commissioned in 2020 and two more Oxygen Concentrator Plants (Each 1250 litres/min) were installed and commissioned in May 2021. Besides one Oxygen plant of 1000 litres/min capacity was installed in SKIMS by DRDO under PM cares fund which was formally commissioned by Hon'ble Lt Governor Shri Manoj Sinha during the e-commissioning of these plants by Hon'ble Prime Minister of India Shri Narinder Modi throughout the country on 07-10-21. Besides, 974 oxygen cylinders are utilized 24x7 as a supplemental back up as per need which are continuously being filled by two approved sources to maintain the supply chain to keep the flow of oxygen intact. To make Oxygen delivery smooth Oxygen monitoring committee was formed and a Nodal officer for oxygen monitoring for COVID was appointed. SKIMS has presently six (6) functional plants producing 6760 litres of oxygen/min. (Table 3)

COVID-19 SAMPLING

The Virology Lab of SKIMS has been rated the best by ICMR among top labs for its Exactness and Compactness on the basis of number of tests done per million of population. The Lab has conducted more than 800000 tests till now (With 5.4% Positivity) which include processing of samples of various Districts of UT, Security personnel, Tourists, healthcare workers, etc on daily basis without any pause. The Administration of SKIMS ensured that the Virology lab is Equipped with all Essential Equipment's Viz Real-Time PCR, Automatic RNA Extraction System, Biosafety Cabinets, Ultra-deep Freezers etc and also to other labs, with State of art " Cobas 6800"

FACILITY FOR COVID POSITIVE STAFF

SKIMS dedicated First Floor of IDB Exclusively for its Employees who tested Covid-19 Positive and all Facilities were kept available round the clock to Ensure Quality Management**.** SKIMS constituted a **Contact tracing team** under the supervision of HOD Community medicine which identified high-risk contacts and advised them accordingly. The Quarantine Facilities for Staff working in COVID-19 areas were arranged with the help of District authorities.

ROLE OF SUPPORTIVE SERVICES IN COVID MANAGEMENT

The Hospital administration, Engineering Section, Purchase Section, and IT Section came up to the expectations from the start of this crisis. Medical superintendent, HOD Hospital Administration (Nodal Officer), Chief Engineer, and Chief of Material Management are playing a vital role in the day to day management of COVID Crises. The Control Room of SKIMS Hospital Coordinates as a nerve center viz a viz COVID Management working 24x7 to ensure that no COVID patient suffers from any discrepancy. The Security and Sanitation services have been stretched beyond expectations, so is true of frontline COVID warriors from Internal Medicine and Allied services as well as Surgical division and lab service departments.

The Material Management team headed by CMM plays a pivotal role in arranging all logistic support, equipment, machinery, Drugs, Disposables, Consumables, etc ensuring 24x7 availability of PPE'S, all forms of Gloves, Sanitizers, and other accessories needed in the management of COVID cases. Table Likewise, the Engineering Section under the command of the Chief engineer worked round the clock to ensure that all Civil, Mechanical, and Electrical & Information technology works needed in COVID areas are completed in the shortest possible time. The Engineering division did a marvelous job in commissioning of State-of-the-art Infectious Disease Block.

The Information Technology Department & Telemedicine

of SKIMS provided a formidable platform for information and communication of COVID-related events. The Hospital Core Committee participated from Telemedicine SKIMS in a record number of video conferences with various Government functionaries since March 2020. Besides, Telemedicine arranges Zoom Conferences/Webinars and all these events help us to review and take policy decisions viz a viz COVID without going out of SKIMS.. The centre conducted more than 200 virtual events during these two years of which covid-19 management formed a major part. Table

DAILY COVID STATISTICS

The Daily COVID updates and weekly reviews are issued from the Public Relations office of SKIMS & all concerned Government functionaries and High officials of the Government of UT of J&K are regularly updated regarding the latest status of COVID patients and Lab tests. The Print and electronic media play a very vital role and publish and broadcast messages for common people viz a viz COVID management, Prevention and Cure.

SKIMS admitted 3976 COVID Positive Patients till Nov 2021among whom 3320(83.4%) recovered and were discharge and continued its "Exceptional" Performance in management of second wave of Covid-19 in 2021 by keeping Recovery and mortality rate comparable to international standards while braving up the third and even more lethal wave on date. SKIMS has been designated as a Level III Centre and very Sick patients are admitted in SKIMS who have Bilateral Pneumonia, Respiratory Failure with accompanying Comorbidities with Multiorgan Failure and unstable hemodynamics and deranged lab parameters including the patients who have malignancies, advanced age problems, terminal illness of varied nature and so on.

COVID-19 VACCINATION DRIVE

With the e-launch of massive Covid-19 vaccination Campaign by the Hon'ble Prime Minister, Shri Narendra Modi, on 16-01-21, the frontline healthcare workers at Sher-I-Kashmir Institute of Medical Sciences received first shot of the vaccine that included various Heads of the Departments lead by Director SKIMS, Prof. A.G Ahangar, who received the first shot of the vaccine thereby emphasizing the significance of immunization Programme world over to comprehensively combat the corona Pandemic.

SKIMS was one of the major vaccination sites identified in the U.T of J&K on the e-launch of the Nationwide Vaccination drive. The vaccination programme at SKIMS Srinagar was widely publicized and covered by the media platforms all across the country and the Union Territories, beamed world over – a moment of Pride for the Humanity for its survival.

Covid-19 Vaccination Statistics (Upto 15-11-21)			
Vaccine	**First Dose**	**Second Dose**	**Total Doses**
Covishield	8675	6043	14718
Covaxin	1781	1526	3307

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