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Prescription Pattern of Drugs and Evaluation of Their Effectiveness in The Management of Admitted Covid-19 Patients in A Tertiary Care Hospital - A Retrospective Observational Study

[1]Dr. Balu P Anil, Final Year PG Student, Department of Pharmacology, K H Patil Institute of Medical Sciences, Gadag, Karnataka

[2]Dr. Suneel I Majagi, Professor & Head, Department of Pharmacology, K H Patil Institute of Medical Sciences, Gadag, Karnataka

Corresponding Author: Dr. Suneel I Majagi, Professor & Head, Department of Pharmacology, K H Patil Institute of Medical Sciences, Gadag, Karnataka

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Abstract

Corona virus can infect humans periodically due to high prevalence, distribution, mutant variants etc. Present study evaluated the prescription pattern and effectiveness of drugs used in COVID-19 inpatients of a tertiary care hospital. Present retrospective observational study included 1339 COVID-19 inpatients.

In overall drugs, average number of drugs per encounter, prescription of brand name drugs and antibiotics whereas in COVID-19 drugs, generic name drugs, injections outnumbered when compared to alternative group. Ongoing COVID-19 management guidelines were followed. Males during waves 1,2 and females during wave 3 while patients aged 21-70, 31-70 and 21-30 years during waves 1, 2 and 3 respectively were affected more.

Third wave witnessed more infants and younger patients. Breathlessness, primary contact, cough and fever were major reasons for conducting screening tests. Leading new symptoms included Pneumonia, cough and fever. Serum creatinine, C-reactive proteins and random blood sugar estimation were conducted in more patients. Most of X-ray and computerized tomography investigations revealed positive findings. Mild form during waves 1, 2 whereas mild and severe forms during wave 2 outnumbered.

Average number of days stayed in hospital was more in males and patients with comorbidities during all waves. Percentage of patients admitted to Intensive care unit and requiring oxygen therapy was more with: males during waves 1, 3, females during wave 2 and with patients having comorbidities during waves 1 and 2 (>

50%). Details regarding adverse drug reactions, types of oxygen therapy, COVID-19 vaccination and advise on discharge were not mentioned in case records.

During waves 1 (90%) and 3 (95%) large while during wave 2 (48%) less number of COVID-19 patients recovered.

Keywords: COVID-19, Drugs, Effectiveness, Pattern, Prescription

Introduction

Novel corona virus (2019-nCoV) infection was first detected in Wuhan, China in December 2019.[1] Corona virus disease 2019 (COVID-19) has affected various countries in different magnitudes.[2,3] First wave of COVID-19 affected India from March 2020 to February 2021 and incidence of about 10.9 million cases and 150,000 deaths were reported.[4,5] Second wave of COVID-19 in India began in March 2021 which ended in September 2021 and incidence of about 22 million cases and 289,000 deaths were reported.[6] Third wave of COVID-19 affected India from December 2021 to March 2022 and incidence of over 8.2 million cases and 36,000 deaths were reported.[4-7]

From the beginning of pandemic (December 2019) to till March 2023, there were incidence of more than 761 million cases and 6.8 million deaths have occurred in the world where as incidence of over 4.4 million cases and 0.5 million deaths were reported from India.[3,7]

Several drugs like Ritonavir with Nirmatrelvir, Remdesivir, Molnupiravir, Heparin, Dexamethasone, Baricitinib, Tofacitinib, Tocilizumab, Sarilumab etc and drugs used in symptomatic management (antipyretics etc) as well as supportive care (Oxygen supplementation) were used for the management of COVID-19 in different countries.[8] In India, COVID-19 management guidelines were released by Ministry of Health and Family Welfare (MOHFW) in correspondence with All India Institute of Medical Sciences (AIIMS) and Indian Council of Medical Research (ICMR) during each wave of COVID-19.[9-11] Literature review indicates that there are controversies regarding effectiveness of drugs used in COVID-19 like Hydroxychloroquine, Ivermectin, Corticosteroids, Remdesivir, Tocilizumab, Heparin etc. [12-20]

Given the high prevalence and high distribution of corona viruses, large genetic diversity and frequent recombination of their genomes, increasing human-animal interface activities leading to frequent cross species infections, mutant variants of corona viruses are likely to infect humans periodically.[1]

Prescription pattern monitoring studies (PPMS) are the drug utilization studies with main focus on prescription, dispensing and administration of drugs.[21] PPMS can guide and support prescribers, dispensers and the general public regarding appropriate use of drugs, collaborate and develop working relationship with other key organizations to achieve the goal of rational use of drugs. [21,22] According to the World Health Organization (WHO) guidelines, there is a need to conduct prescription audit and feedback in order to promote rational use of medicines.[23] Similar requirement to promote rational use of drugs by utilizing the data generated by prescription pattern studies is stressed.[21]

Hence the present study was planned with objectives to assess the prescription pattern of drugs used in COVID-19 patients according to the WHO indicators as well as to evaluate the effectiveness of drugs used in the management of COVID-19 patients who were admitted to Gadag Institute of Medical Sciences (GIMS), Gadag - a tertiary care hospital.

Methodology

Present study was a cross-sectional retrospective observational study. Present study included universal sampling. Data for the study was obtained from all the available case records of COVID-19 In-patients from March 2020 to March 2023 from the Department of Medical Records of GIMS Hospital. The study was conducted over a period of 2 years (June 2023 - May 2025).

COVID patients of both the genders who were admitted in GIMS Hospital, Gadag from March 2020 to March 2023 were included in the present study. Patients: who were already taking systemic steroids and other immuno-suppressants, suffering with HIV infection, who were severely ill and died within 24 hours of hospital admission, who were admitted primarily for undergoing surgery but tested positive for COVID were excluded from the study. Patients who had discharged against medical advice in between the treatment as well as who had incomplete case records were excluded from the study.

According to computer databases of Medical Records Department of GIMS hospital, 4862 COVID-19 Positive patients were admitted in different departments of GIMS, Gadag from March 2020 to March 2023. Sample size for the present study was 1339 COVID patients who satisfied the inclusion and exclusion criteria of the study.

Data regarding prescription pattern of the drugs was collected according to the WHO indicators viz, prescribing indicators (average number of drugs per encounter, drugs with brand names, drugs with generic names, antibiotics, injections and essential drug list), patient care indicators (actually dispensed drugs) and health facility indicators (availability of essential drug list and key drugs). Data about COVID-19 patients like gender, age, co-morbid illnesses, investigation reports, prognosis etc were obtained. Data regarding drugs used in the management of COVID-19 patients was also obtained.

After collection, the data was used to assess the prescription pattern of drugs used in COVID-19 patients according to the WHO indicators. The data was also used to evaluate effectiveness of drugs in the management of COVID-19. Effectiveness of the drugs were measured according to the prognosis of the disease like, whether the patient has improved and discharged as per the discharge guidelines for COVID-19.[24] Discharge guidelines included conditions like: no fever (without antipyretics), maintenance of oxygen saturation, resolution of breathlessness, resolution of clinical signs/ symptoms and negative reports of RT-PCR test.[11]

The data was entered in Microsoft Excel and analyzed by using SPSS statistical software. Descriptive statistics such as frequency, percentage and mean were used. The study was approved by the institutional ethical committee (IEC) of GIMS.

Results and Discussion

In the present study, the data was obtained from 1339 COVID-19 patients admitted to the tertiary care hospital during different COVID-19 waves. Overall 11054 drugs were prescribed to admitted COVID-19 patients. A total of 8797 Non-COVID-19 drugs and a total of 2260 COVID-19 specific drugs were prescribed.

Prescription pattern of the drugs were assessed as per WHO guidelines. Average number of drugs per encounter was 8.26 in overall drugs which was more than that of 1.68 of COVID-19 specific drugs. Prescriptions of generic drugs were more with COVID-19 specific drugs (80.70%) when compared to that of overall drugs (68.82%). Remaining 19.29% and 31.17%

of drugs included brand names in COVID-19 specific and overall drugs category respectively. In COVID-19 specific drugs, more number of injections were used as compared to oral drugs. Whereas less number of injections were used as compared to oral drugs in overall category. As the COVID-19 was caused by corona virus, prescriptions of antibiotics were only found in overall drugs [Table I]. Almost equal number of overall (81.80%) and COVID-19 specific (75.39%) drugs were prescribed form the essential drug list. Most of the prescribed drugs were actually dispensed both in overall and COVID-19 specific drugs category [Table I]. Data regarding average consulting time, average dispensing time, adequately labelled drugs and patients' knowledge of correct dosage were not available because the data was collected from the medical records of admitted COVID-19 inpatients. From the essential drugs list, more number of COVID-19 specific drugs were available compared to that of overall drugs. Most of the key drugs were available in both overall and COVID-19 specific drugs category [Table I].

Out of total 1339 COVID-19 patients, 986 patients belonged to wave 1, 312 patients belonged to wave 2 whereas 41 patients belonged to wave 3. Analysis of demographic characteristics of COVID-19 patients revealed that more number of males were affected by the virus as compared to the number of females during wave 1 and wave 2 [Fig. 1]. Another study has reported similar findings.[25] But during third wave of COVID-19, female patients were more as compared to male patients. Together during all the three waves of COVID-19, male patients outnumbered female patients [Fig. 1].

Analysis of COVID-19 patients according to different age groups revealed that during wave 1, most of the COVID-19 patients belonged to 21 to 70 years of age. During wave 2 most of the COVID-19 patients belonged to 31 to 70 years age. Whereas during wave 3, more number of patients belonged to 21 to 30 years of age indicating involvement of younger age group. During wave 3, more number of infants were affected by the COVID-19 as compared to that of wave 1 and wave 2. When all the 3 waves combined, more number of COVID-19 patients were found to be belonging to 21 to 70 years age group [Table II]. A study has reported similar findings. [26]

Analysis of COVID-19 patients revealed that many patients had other comorbid illnesses along with the COVID-19 disease. A total of 149, 45, 20 and 214 COVID-19 patients had comorbid diseases during wave 1, wave 2, wave 3 and altogether respectively [Fig. 2]. Analysis of comorbid conditions revealed that large number of COVID-19 patients had hypertension, diabetes mellites during different COVID-19 waves. Some of the other studies have also reported similar findings.[26, 27] Present study indicates that more number of pregnant women were also affected by the COVID-19 disease during different waves. Nearly 25% of the admitted COVID-19 patients were pregnant during 3rd wave. Other comorbidities like Coronary Artery Disease (CAD), Ischemic Heart Disease (IHD), Hepatitis B, Dyslipidemia etc. were found in lesser number of COVID-19 patients during different waves [Table III].

COVID-19 diagnosis involves clinical assessment, laboratory tests and imaging studies. Symptoms like fever, cough, shortness of breath, and loss of taste or smell, along with patient history, help in initial evaluation.[28] All the patients were subjected to COVID-19 screening tests like Reverse Transcriptase Polymerized Chain Reaction (RTPCR) test and Rapid Antigen Test (RAT) before admitting to hospital under

COVID-19 category. RTPCR is a standard test for screening COVID-19.[29] Screening tests were conducted because of different reasons viz, presenting complaints, travel history etc. Among these, larger number of patients presented with breathlessness, history of primary contact with COVID-19 patients, cough and fever in the decreasing order. Screening test was also conducted in notable number of asymptomatic patients. Sore throat, long distance travel, chest pain, cold, generalized weakness, myalgia etc, were the other reasons for conducting screening tests. A study has reported fever and cough as the commonest symptoms [30] while another study has reported high incidence of fever, cough and breathlessness in COVID-19 patients [27] [Fig. 3].

Some new symptoms appeared in many of the hospital admitted COVID-19 patients. Pneumonia, cough and fever were found in larger number of patients followed by septicemic shock, Acute Respiratory Distress Syndrome (ARDS), sore throat, cardiac arrest, generalized weakness, cold, anosmia, loose stools, breathlessness etc [Fig. 4].

Hospital admitted COVID-19 patients were subjected to many laboratory investigations. During all the COVID-19 waves, more number of patients underwent laboratory investigations like serum creatinine, C-reactive protein (CRP) followed by Random Blood Sugar (RBS) estimation in the decreasing order. Other investigations like X-Ray chest, serum ferritin, D-dimer, Lactate Dehydrogenase (LDH) and Troponin-I (Trop-I) estimation was advised in lesser number of COVID-19 patients. COVID-19 positive findings were found in most of the patients who were subjected for X-Ray chest and CT chest investigations. Other laboratory investigations showed mixed results (increased or normal values) [Fig. 5]. The RT-PCR test is considered as gold standard, which detects viral RNA with high accuracy, while RATs offer quicker but less sensitive results.[28] Serology tests detect past infections by identifying antibodies but are not useful for the active cases.[28] In moderate to severe cases, chest X-rays or CT scans help to assess lung involvement, showing characteristic patterns like ground-glass opacities and pneumonia. [28]

Assessment of severity of COVID-19 patients revealed that mild form of COVID-19 disease appeared in larger number of patients followed by severe and moderate form of disease in the decreasing order during the wave 1 and wave 3 of COVID-19. Whereas COVID-19 wave 2 witnessed larger number of patients suffering from severe form followed by mild and moderate forms of COVID-19 disease in the decreasing order. Together during all the COVID-19 waves, mild, severe and moderate form of COVID-19 disease appeared in different number of patients in the decreasing order [Fig. 6]. According to the Centers for Disease Control and Prevention (CDC), USA, the conclusive higher risk factors for severe illness from COVID-19 include: Old age, Coronary artery disease, Cerebrovascular disease, Chronic liver disease, Chronic kidney disease, Chronic lung diseases, TB, Diabetes mellitus, Pulmonary hypertension, etc. [31]

Evaluation of prescription of COVID-19 drugs during different waves revealed that most of the drugs were prescribed according to the ongoing COVID-19 management guidelines recommended by the ICMR and AIIMS.[8-10] Polypharmacy was found with every prescription of 1329 patients while only 10 patients had monotherapy of drugs. A total of 1236, 991 and 33 COVID-19 specific drugs were prescribed during wave

1, wave 2 and wave 3 respectively. During wave 1, prescription of COVID-19 drugs contained larger number of hydroxychloroquine (HCQ) followed by dexamethasone, enoxaparin, remdesivir and methylprednisolone in the decreasing order. Very few patients were prescribed with Clexane (enoxaparin brand), ivermectin, budesonide and heparin. During the second wave, prescription of COVID-19 drugs contained larger number of enoxaparin followed by remdesivir, ivermectin, methylprednisolone and dexamethasone in the decreasing order. During the third wave, prescription of COVID-19 drugs contained larger number of enoxaparin followed by remdesivir, methylprednisolone and dexamethasone in the decreasing order. Very few patients were prescribed with ivermectin, heparin and budesonide [Table IV].

Assessment of non-COVID-19 drugs revealed that a total of 6079, 2445 and 270 non-COVID-19 drugs were prescribed during wave 1, wave 2 and wave 3 of COVID-19 respectively. Larger number of vitamins/ minerals & supplements were prescribed followed by antibiotics, Gastro Intestinal Tract (GIT) drugs, antiviral drugs in the decreasing order during wave 1, wave 2 and wave 3. Drugs used in fever, respiratory tract disorders, hypertension, diabetes mellitus were also prescribed in some of the patients. Drugs like anti-coagulants, anti-histamines, steroids, statins etc. were prescribed in very few patients. Many of the COVID-19 patients received non-COVID-19 drugs because of their comorbid illnesses [Table V]. A different study has reported vitamins/ minerals, GIT drugs and antibiotics as the most prescribed drugs in COVID-19 patients. [32]

Average number of days stayed in hospital was more during wave 1 followed by wave 2 and wave 3 in the decreasing order. During COVID-19 wave 2, more than 50% of COVID-19 patients required admission to Intensive Care Unit (ICU) as well as oxygen therapy. About 11% (each) of COVID-19 patients required admission to ICU whereas 15% and 22% of COVID-19 patients required oxygen therapy during wave 1 and wave 3 respectively [Fig. 7]. Present study differs from findings of another study with 78% and 94% ICU admission in wave 1 and wave 2 respectively [25]. A study has reported less hospital stay (days) when compared to the present study during wave 1. [27]

Average number of days stayed in hospital was slightly more in male COVID-19 patients as compared to that of females during all the three waves. More percentage of male patients required ICU admission and oxygen therapy compared to that of female patients both during wave 1 and wave 3 of COVID-19. Whereas more percentage of female COVID-19 patients were admitted in ICU and given oxygen therapy as compared to male COVID-19 patients during wave 2. When all three waves added together, ICU admission and oxygen therapy were required by male and female patients in near equal percentage [Fig. 8].

Analysis of COVID-19 patients according to different age groups, revealed that average number of days stayed in hospital was more during wave 1, wave2 and wave 3 in the decreasing order. Percentage of patients admitted in ICU and percentage of patients required oxygen therapy was more during wave 2 followed by wave 1 and wave 3 respectively [Table VI].

Average number of days stayed in hospital was more for COVID-19 patients with existing comorbidities during all the different COVID-19 waves. More percentage of COVID-19 patients having comorbidities were admitted to ICU as well as given oxygen therapy as compared to that of COVID-19 patients without comorbidities during

wave 1 and wave 2. Surprisingly during wave 3, more percentage of COVID-19 patients without comorbidities required admission to ICU as well as oxygen therapy when compared to that of COVID-19 patients with comorbidities [Fig. 9].

A robust vaccination campaign was initiated earlier in the year 2021 throughout the world and in India.[5,7,33,34] More than 13 billion and 2.2 billion of COVID-19 vaccines have been administered to people throughout the world and in India respectively till March 2023.[11] In the present study, details of vaccination history were not found in the case records.

Assessment of outcome of COVID-19 management revealed that 90% and 95% of COVID-19 patients recovered and discharged from the hospital during COVID-19 wave 1 and wave 3 respectively. Whereas only 48% of COVID-19 patients recovered and discharged from the hospital during COVID-19 wave 2 [Table VII]. Studies have reported more mortality during wave 2.[35, 36] Another study has reported fivefold increase in death rate during wave 2 when compared to wave 1.[37] More deaths occurred because of virulent strains, higher burden of admission, unavailability of oxygen and opportunistic fungal infections due to use of immunomodulators.[36,37] In the present study also, increased use of immunosuppressants like corticosteroids has been noted during second wave [Table IV]. Percentage of recovery from COVID-19 and discharge from the hospital was more in female patients when compared to that of male patients during wave 1 and wave 3 whereas it was vice versa during wave 2 [Fig. 10]. Recovery pattern of patients belonging to different age groups during wave 1, wave 2 and wave 3 respectively were proportionate (comparable) with the overall pattern of recovery [Table VIII].

Percentage of recovery from COVID-19 was almost equal in COVID-19 patients with or without comorbidities during wave 1 and wave 3. Surprisingly during wave 2, the percentage of recovery from COVID-19 disease was more in patients without comorbidity as compared to those with comorbidity [Fig. 11]. Present study findings differ from an earlier report stating increased risk of COVID-19 mortality associated with pre-existing comorbidities during wave 2.[26]

Details of Adverse Drug Reactions (ADRs) regarding both COVID-19 specific and non-COVID-19 drugs were not mentioned in the case records. Other details like use of different types of oxygen therapy (High Flow Nasal Canula [HFNC], Non-invasive ventilation [NIV] etc.) and advise on discharge were not mentioned in the case records.

Figures and Tables

Table 1: Prescription pattern of drugs according to Prescribing, Patient Care & Health Facility Indicators

Total No. Of Drugs	Average Number Of Drugs Per Encounter	Drugs With Brand Name	Drugs With Generic Name	Antibiotic	Injections	Drugs From Essential Drug List	Actual Dispensed Drugs	Availability Of Essential Drug List	Availability Of Key Drugs
Overall Drugs (11054)	8.26	3446 (31.17%)	7608 (68.82%)	2236 (20.22%)	3864 (34.95%)	9043 (81.80%)	10980 (99.36%)	YES	YES
								$\frac{\text{Total Essential drugs available (178)}}{\text{Total Essential drugs in the list (376)}} \times 100$	$\frac{\text{Total drugs in stock (692)}}{\text{Total drugs in list (751)}} \times 100$
								47.34%	92.14%

COVID Drugs (2260)	1.68	436 (19.29%)	1824 (80.70%)	--	1582 (70.00%)	1704 (75.39%)	2247 (99.42%)	Total Essential COVID drugs available (5) / Total Essential COVID drugs in the list (6) X 100	Total COVID drugs in stock (7) / Total COVID drugs in list (8) X 100
								83.33%	87.50%

Note:

1. Total number of COVID-19 patients (n) = 1339
2. Percentage is calculated as compared to corresponding total number of drugs

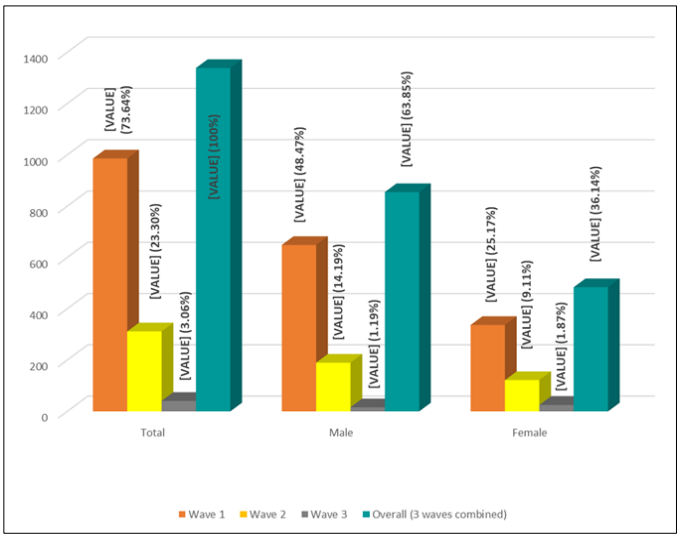

Fig. 1: Demographic characteristics during different COVID-19 waves - Gender

Note: Percentage is calculated as compared to total number of COVID-19 patients (n) = 1339

Table 2: Demographic characteristics during different COVID-19 waves - Age groups

Age groups in years	WAVE 1 (986 Patients)			WAVE 2 (312 Patients)			WAVE 3 (41 Patients)			GRAND TOTAL (1339 Patients)		
	No. of patients	Percentage (%)		No. of patients	Percentage (%)		No. of patients	Percentage (%)		No. of patients	Percentage (%)	
		I	II		I	II		I	II		I	II
< 1 (Infants)	1	0.10	0.07	2	0.64	0.15	4	9.76	0.30	7	0.52	
1-10	34	3.45	2.54	2	0.64	0.15	3	7.32	0.22	39	2.91	
11-20	51	5.17	3.81	3	0.96	0.22	2	4.88	0.15	56	4.18	
21-30	181	18.36	13.52	21	6.73	1.57	13	31.71	0.97	215	16.06	
31-40	184	18.66	13.74	49	15.71	3.66	3	7.32	0.22	236	17.63	
41-50	156	15.82	11.65	62	19.87	4.63	3	7.32	0.22	221	16.50	
51-60	170	17.24	12.70	58	18.59	4.33	4	9.76	0.30	232	17.33	
61-70	133	13.49	9.93	70	22.44	5.23	4	9.76	0.30	207	15.46	
71-80	60	6.09	4.48	31	9.94	2.32	2	4.88	0.15	93	6.95	
81-90	16	1.62	1.19	13	4.17	0.97	1	2.44	0.07	30	2.24	
91-100	0	0.00	0.00	1	0.32	0.07	2	4.88	0.15	3	0.22	
Total	986	100	73.64	312	100.00	23.30	41	100.00	3.06	1339	100	

Note:

1. Percentage I is calculated as compared to total number of patients admitted during the corresponding COVID-19 wave
2. Percentage II is calculated as compared to total number of COVID-19 patients (n) = 1339

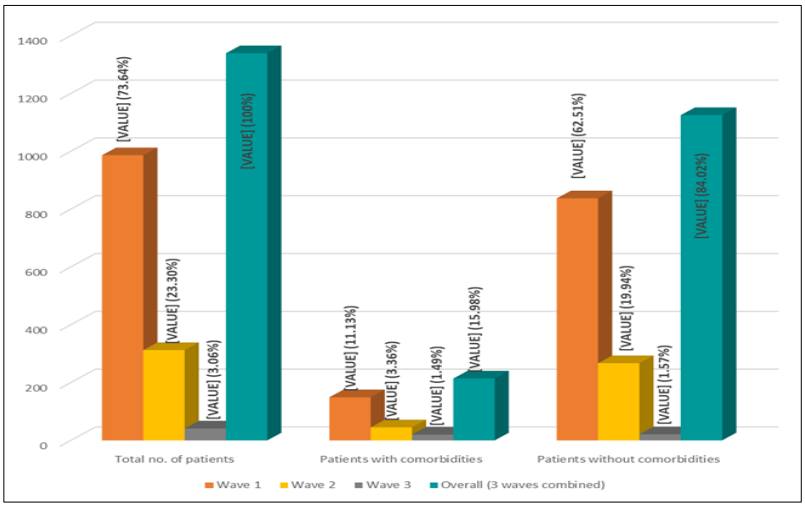

Fig. 2: Details of associated comorbidities during different COVID-19 waves

Note: Percentage is calculated as compared to total number of COVID-19 patients (n) = 1339

Table 3: Distribution of co-morbidities among different waves of COVID-19

Sn.	Comorbidity Conditions	WAVE 1 (986 Patients)			WAVE 2 (312 Patients)			WAVE 3 (41 Patients)			GRAND TOTAL (1339 Patients)		
		No. of comorbidities	Percentage(%)		No. of comorbidities	Percentage(%)		No. of comorbidities	Percentage (%)		No. of comorbidities	Percentage (%)	
			I	II		I	II		I	II		I	II
1.	Hypertension	77	40.96	7.81	26	42.62	8.33	5	25.00	12.20	108	40.15	8.07
2.	Diabetes Mellitus	57	30.32	5.78	24	39.34	7.69	0	0.00	0.00	81	30.11	6.05
3.	Pregnant	15	7.98	1.52	1	1.64	0.32	10	50.00	24.39	26	9.67	1.94
4.	Coronary Artery Disease	6	3.19	0.61	3	4.92	0.96	3	15.00	7.32	12	4.46	0.90
5.	Ischemic Heart Disease	8	4.26	0.81	0	0.00	0.00	0	0.00	0.00	8	2.97	0.60
6.	Hepatitis B	5	2.66	0.51	2	3.28	0.64	1	5.00	2.44	8	2.97	0.60
7.	Dyslipidemia	1	0.53	0.10	5	8.20	1.60	0	0.00	0.00	6	2.23	0.45
8.	Hypothyroidism	5	2.66	0.51	0	0.00	0.00	0	0.00	0.00	5	1.86	0.37
9.	Asthma	2	1.06	0.20	0	0.00	0.00	1	5.00	2.44	3	1.12	0.22
10.	Patient on Dialysis	2	1.06	0.20	0	0.00	0.00	0	0.00	0.00	2	0.74	0.15
11.	Anemia	2	1.06	0.20	0	0.00	0.00	0	0.00	0.00	2	0.74	0.15
12.	Chronic Obstructive Pulmonary Disease	2	1.06	0.20	0	0.00	0.00	0	0.00	0.00	2	0.74	0.15
13.	Epilepsy	2	1.06	0.20	0	0.00	0.00	0	0.00	0.00	2	0.74	0.15
14.	Bilateral Hydronephrosis	1	0.53	0.10	0	0.00	0.00	0	0.00	0.00	1	0.37	0.07
15.	Typhoid	1	0.53	0.10	0	0.00	0.00	0	0.00	0.00	1	0.37	0.07
16.	Tuberculosis	1	0.53	0.10	0	0.00	0.00	0	0.00	0.00	1	0.37	0.07
17.	Multi Bacillary Leprosy	1	0.53	0.10	0	0.00	0.00	0	0.00	0.00	1	0.37	0.07
TOTAL		188	100	19.07	61	100	19.55	20	100	48.78	269	100	20.09

Note:

1. Total number of COVID-19 patients = 1339
2. Total number of patients with at least one documented co-morbidity = 214

3. Percentage I is calculated as compared to total number of documented co-morbidities during corresponding COVID-19 wave
4. Percentage II is calculated as compared to total number of patients during corresponding COVID-19 wave

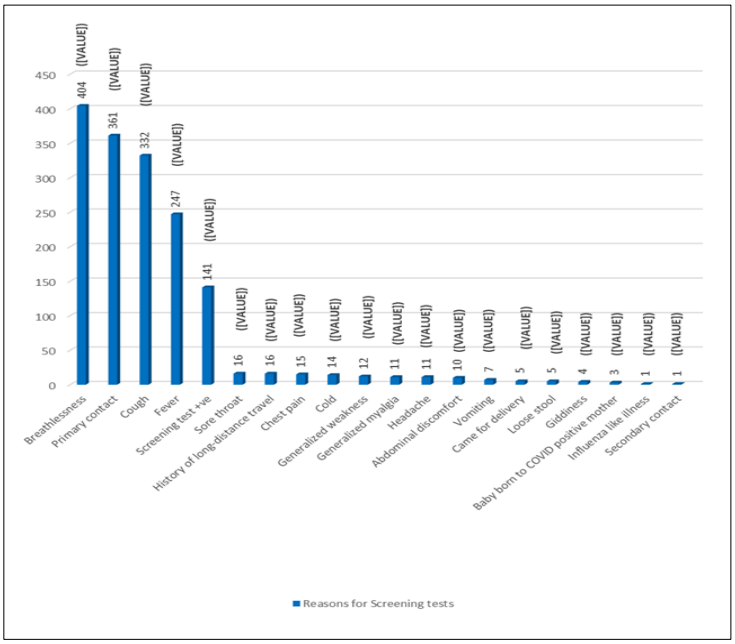

Fig. 3: Reasons for conducting COVID-19 screening tests

Note:

1. Screening tests included RTPCR/ RAT
2. Percentage is calculated as compared to total number of COVID-19 patients (n) = 1339

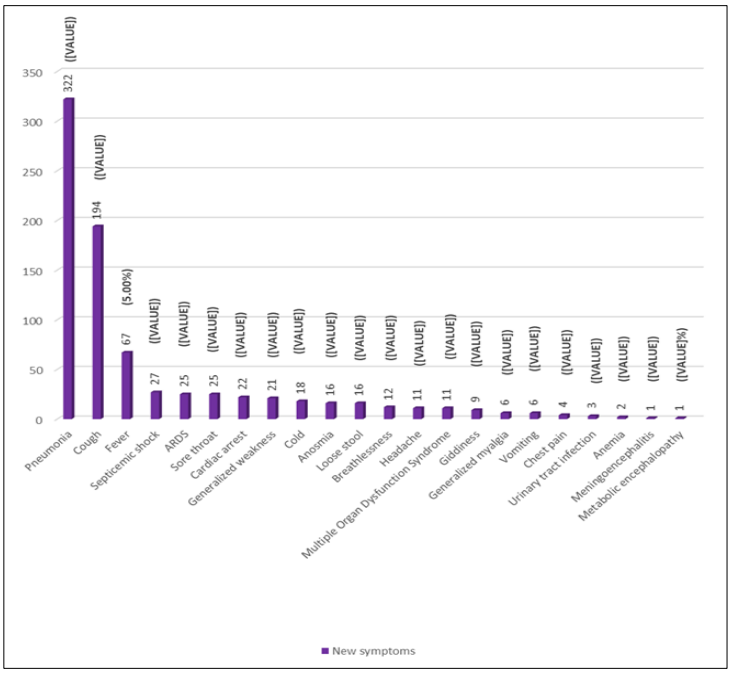

Fig. 4: New symptoms appeared in admitted COVID-19 patients during hospital stay

Note: Percentage is calculated as compared to total number of COVID-19 patients (n) = 1339

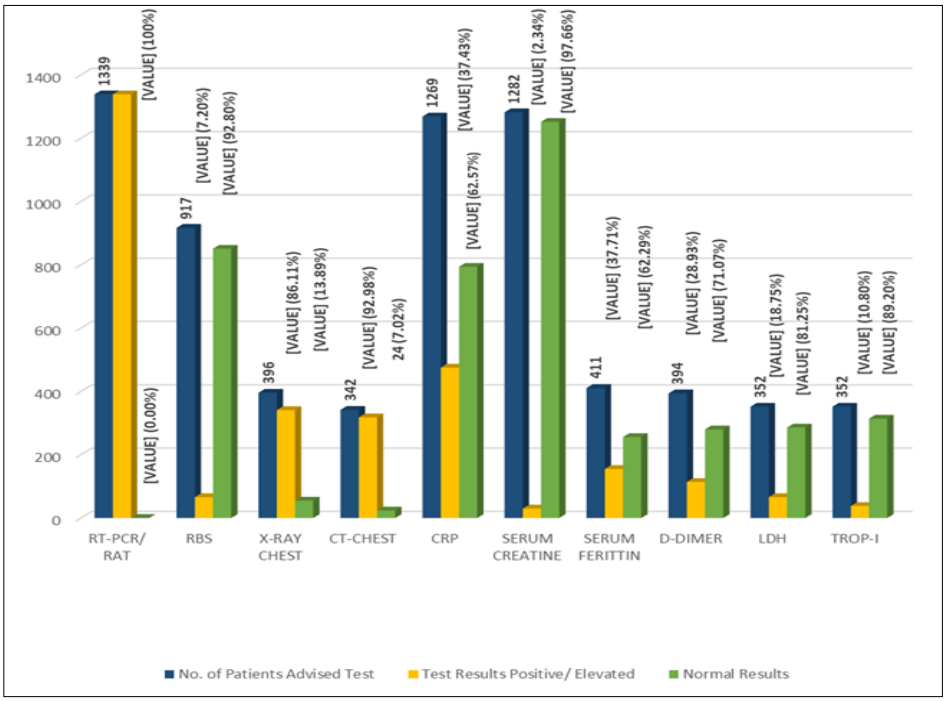

Fig. 5: Details of laboratory investigations conducted

Note:

1. Total number of COVID-19 patients (n) = 1339
2. Percentage is calculated as compared to total number of patients who underwent the corresponding investigation respectively

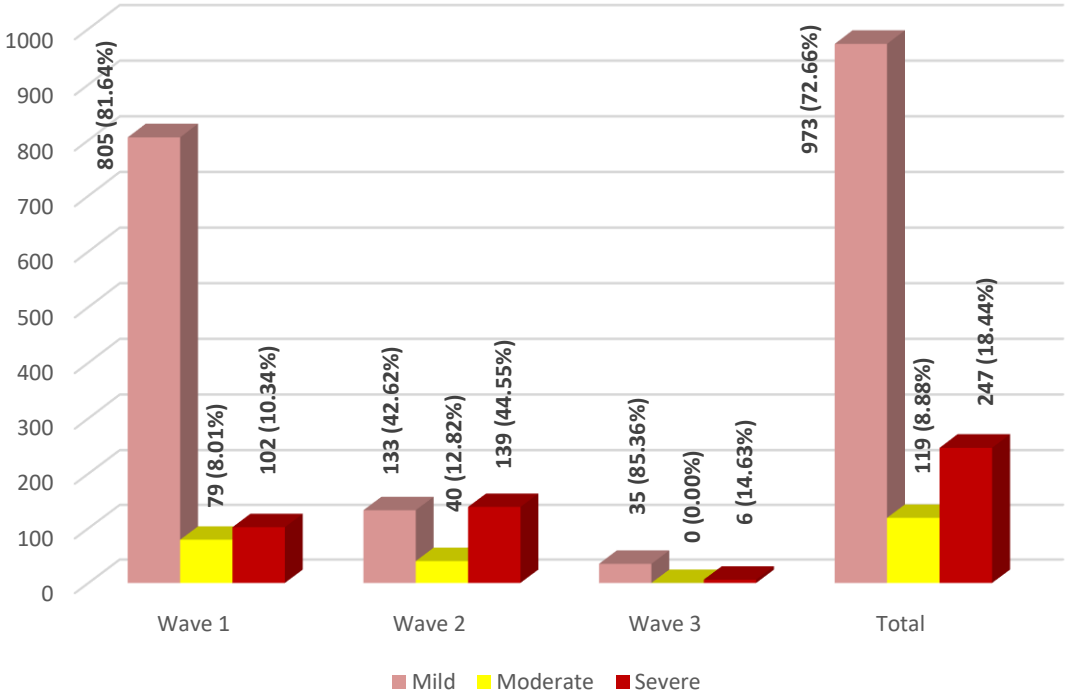

Fig. 6: Classification of patients admitted during different COVID-19 waves

Note:

1. Mild COVID = If SpO2 ≥ 94% and RR ≤ 23 bpm
2. Moderate COVID = If SpO2 ≤ 93% or RR ≥ 24 bpm
3. Severe COVID = If SpO2 ≤ 89% or RR ≥ 31 bpm
4. Percentage is calculated as compared to total number of COVID-19 patients during the corresponding wave (ie, wave 1 = 986, wave 2 = 312, wave 3 = 41 & total = 1339)

Table 4: Pattern of COVID drugs prescribed during different COVID-19 waves

Total Number Of Patients	Total Number Of Covid-19 Drugs	Enoxaparin	HCQ	Dexamethasone	Remdesivir	Methyl Prednisolone	Ivermectin	Clexane	Heparin	Budesonide
WAVE 1 (986)	1236	279	489	281	136	35	5	7	1	3
Percentage (%)	100	22.57	39.56	22.73	11.00	2.83	0.40	0.57	0.08	0.24
WAVE 2(312)	991	282	0	145	227	154	178	0	5	0
Percentage (%)	100	28.46	0.00	14.63	22.91	15.54	17.96	0.00	0.50	0.00
WAVE 3(41)	33	10	0	3	8	8	2	0	1	1
Percentage (%)	100	30.30	0.00	9.09	24.24	24.24	6.06	0.00	3.03	3.03
Grand Total (1339)	2260	571	489	429	371	197	185	7	7	4
Percentage (%)	100	22.27	21.64	18.98	16.42	8.72	8.19	0.31	0.31	0.18

Note: Percentage is calculated as compared to total number of COVID-19 drugs prescribed during the corresponding wave respectively

Table 5: Pattern of Non-COVID drugs prescribed during different COVID-19 waves

SI No	Non-Covid-19 Drugs	WAVE 1		WAVE 2		WAVE 3		Grand Total	
		No. Of Drugs	Percentage (%)	No. Of Drugs	Percentage (%)	No. Of Drugs	Percentage (%)	No. Of Drugs	Percentage (%)
1	Vitamins, Minerals & Supplements	1851	30.45	585	23.93	50	18.52	2486	28.27
2	Antibiotic	1473	24.23	699	28.59	64	23.70	2236	25.43
3	GIT Support	1048	17.24	605	24.74	60	22.22	1713	19.48
4	Antiviral	938	15.43	112	4.58	6	2.22	1056	12.01
5	Antipyretic	293	4.82	129	5.28	19	7.04	441	5.01
6	Respiratory tract support	123	2.02	156	6.38	27	10.00	306	3.48
7	Antihypertensives	131	2.15	48	1.96	16	5.93	195	2.22
8	Antidiabetic drugs	100	1.65	63	2.58	1	0.37	164	1.86

9	Anticoagulants	37	0.61	21	0.86	12	4.44	70	0.80
10	Antihistamine	36	0.59	7	0.29	11	4.07	54	0.61
11	Steroids	17	0.28	8	0.33	1	0.37	26	0.30
12	Statins	8	0.13	7	0.29	2	0.74	17	0.19
13	CNS/Anti-epileptics	10	0.16	4	0.16	1	0.37	15	0.17
14	Cardiac Drugs	9	0.15	1	0.04	0	0.00	10	0.11
15	Thyroid drug	5	0.08	0	0.00	0	0.00	5	0.06
Total No. Of Non-Covid Drugs		6079	100	2445	100	270	100	8794	100

Note:

1. Total number of COVID-19 patients in Wave 1 = 986, Wave 2 = 312, Wave 3 = 41 & Total = 1339
2. Percentage is calculated as compared to total number of Non-COVID-19 drugs prescribed during the corresponding wave respectively

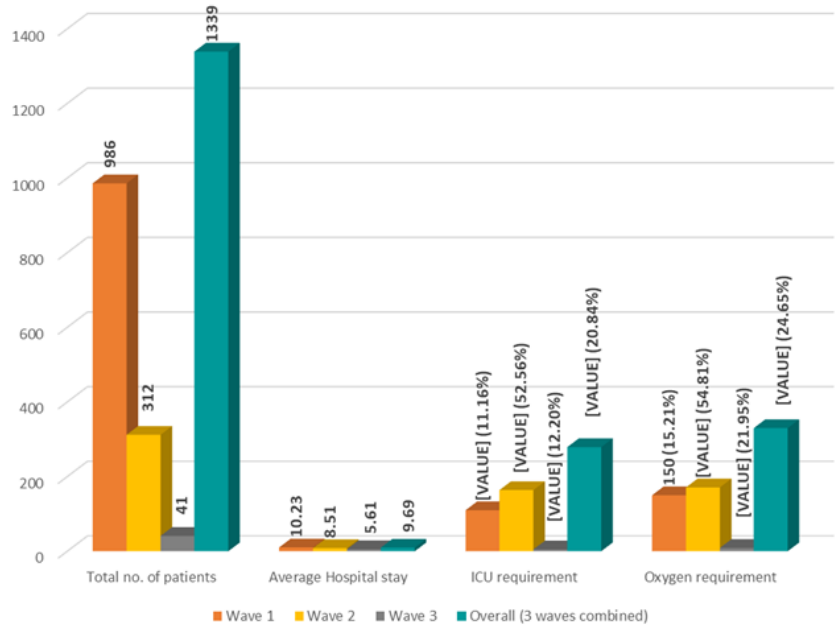

Fig. 7: Details of Hospital stay, ICU and Oxygen requirement in patients admitted during different COVID-19 waves

Note:

1. Total number of patients admitted (n= 1339)
2. Percentage is calculated as compared to total number of patients admitted during the corresponding COVID-19 wave

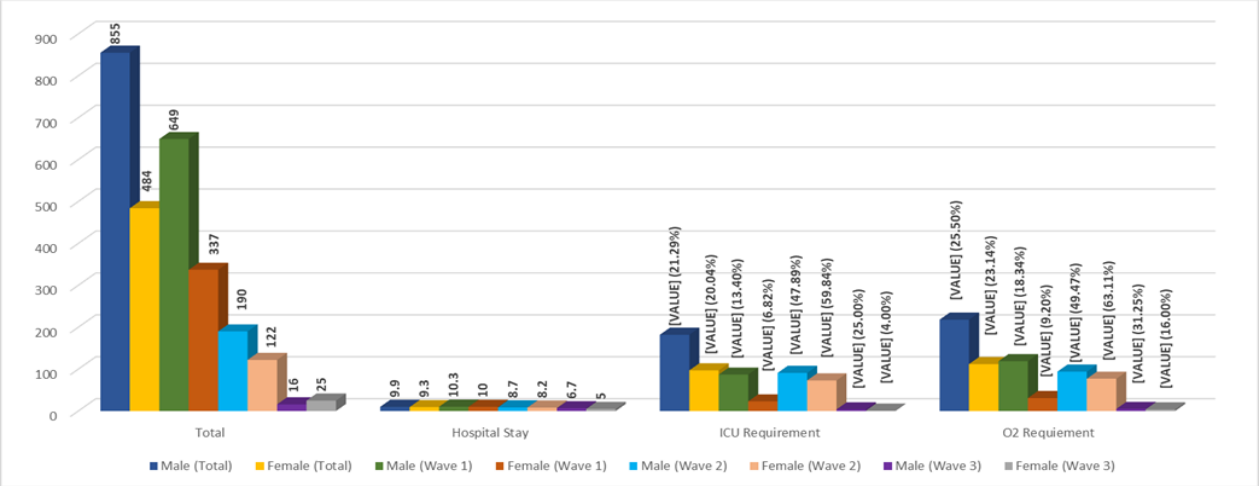

Fig. 8: Gender wise Hospital stay, ICU and Oxygen requirement during different COVID-19 waves

Note:

1. Total number of patients admitted (n = 1339)
2. Percentage is calculated as compared to total number of male and female patients respectively during the corresponding wave

Table 6: Age wise Hospital stay, ICU and Oxygen requirement during different COVID-19 waves

Age groups in years	Total Patients				Hospital Stay				ICU Requirement				O_2 Requirement			
	Total	W1	W2	W3	Total	W1	W2	W3	Total	W1	W2	W3	Total	W1	W2	W3
< 1 (Infants)	7	1	2	4	5.86	12.00	4.50	5.00	3 (42.86%)	0 (0.00%)	0 (0.00%)	3 (75.00%)	3 (42.86%)	0 (0.00%)	0 (0.00%)	3 (75.00%)
1-10	39	34	2	3	9.59	10.21	3.50	6.67	1 (2.56%)	1 (2.94%)	0 (0.00%)	0 (0.00%)	1 (2.56%)	1 (2.94%)	0 (0.00%)	0 (0.00%)
11-20	56	51	3	2	9.70	10.20	4.67	4.50	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
21-30	215	181	21	13	9.03	9.65	6.62	4.31	2 (0.93%)	1 (0.55%)	1 (4.76%)	0 (0.00%)	7 (3.26%)	6 (3.31%)	1 (4.76%)	0 (0.00%)
31-40	236	184	49	3	9.90	10.27	8.69	7.00	26 (11.02%)	7 (3.80%)	19 (38.78%)	0 (0.00%)	31 (13.14%)	11 (5.98%)	20 (40.82%)	0 (0.00%)
41-50	221	156	62	3	10.21	10.57	9.40	8.00	41 (18.55%)	10 (6.41%)	31 (50.00%)	0 (0.00%)	53 (23.98%)	20 (12.82%)	33 (53.23%)	0 (0.00%)
51-60	232	170	58	4	10.03	10.57	8.72	5.75	66 (28.45%)	30 (17.65%)	36 (62.07%)	0 (0.00%)	78 (33.62%)	39 (22.94%)	39 (67.24%)	0 (0.00%)
61-70	207	133	70	4	9.70	10.45	8.53	5.00	83 (40.10%)	39 (29.32%)	43 (61.43%)	1 (25.00%)	94 (45.41%)	47 (35.34%)	44 (62.86%)	3 (75.00%)
71-80	93	60	731	2	9.30	9.98	8.23	5.50	40 (43.01%)	15 (25.00%)	24 (77.42%)	1 (50.00%)	43 (46.24%)	18 (30.00%)	24 (77.42%)	1 (50.00%)
81-90	30	16	13	1	8.27	8.50	8.23	5.00	17 (56.67%)	7 (43.75%)	10 (76.92%)	0 (0.00%)	18 (60.00%)	8 (50.00%)	10 (76.92%)	0 (0.00%)
91-100	3	0	1	2	11.00	--	12.00	10.50	0 (0.00%)	--	0 (0.00%)	0 (0.00%)	2 (66.67%)	--	0 (0.00%)	2 (100%)
Average	121.7	89.6	92.0	3.7	9.3	10.2	7.6	6.1	25.4	11.0	14.9	0.5	30.0	15.0	15.5	0.8

Note:

1. Total number of patients admitted (n = 1339), W1 = Wave 1, W2 = Wave 2, W3 = Wave 3
2. Percentage is calculated as compared to total number of patients belonging to corresponding wave and age group

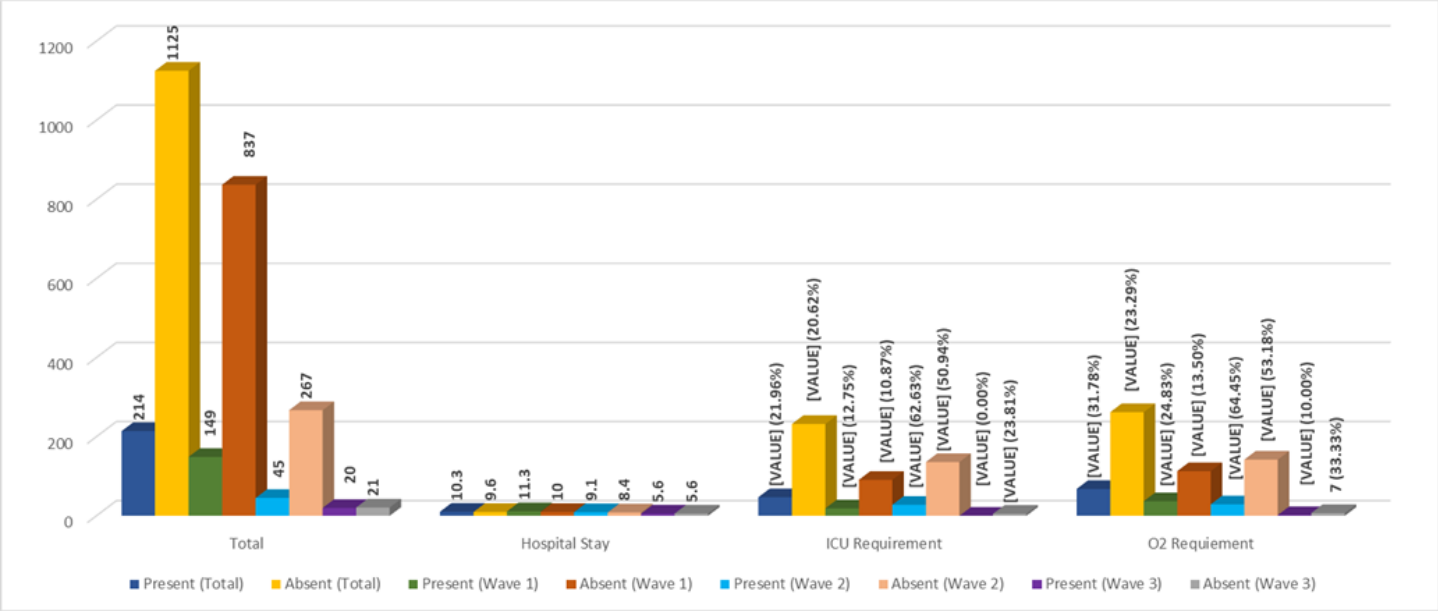

Fig. 9: Comorbidity wise Hospital stay, ICU and Oxygen requirement during different COVID-19 waves

Note:

1. Total number of patients admitted (n = 1339)
2. Percentage is calculated as compared to total number of patients with or without comorbidities respectively during each wave

Table 7: Outcome of COVID-19 management during different waves

Categories	Total Number of Patients	No. of Patients Recovered	No. of Patients Expired
WAVE 1	986	889 (90.16%)	97 (9.84%)
WAVE 2	312	149 (47.76%)	163 (52.24%)
WAVE 3	41	39 (95.12%)	2 (4.88%)
Grand Total	1339	1077 (80.43%)	262 (19.57%)

Note:

1. Total number of patients admitted (n = 1339)
2. Percentage is calculated as compared to total number of patients admitted during the corresponding COVID-19 wave

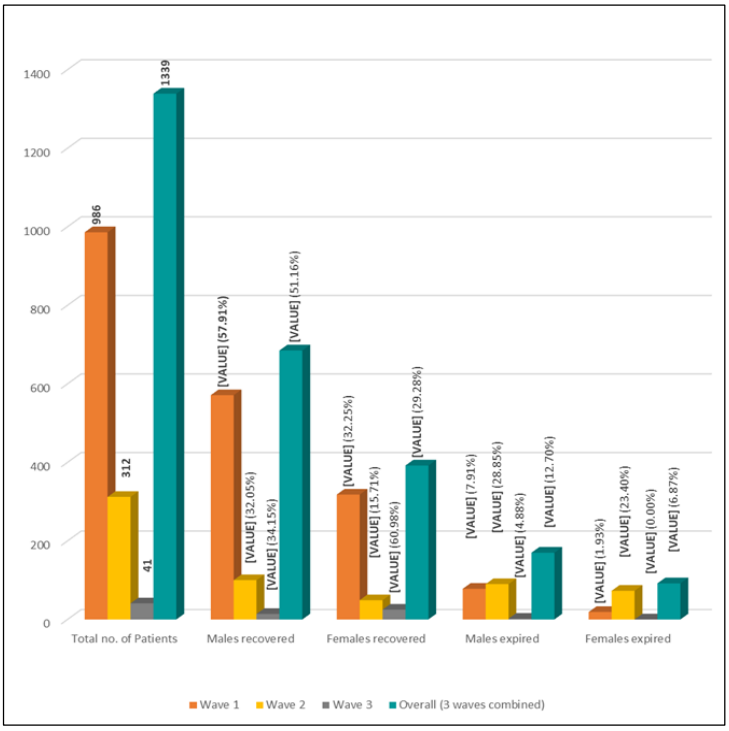

Fig. 10: Outcome of COVID-19 management during different waves according to gender

Note: Percentage is calculated as compared to total number of patients admitted during the corresponding COVID-19 wave

Table 8: Outcome of COVID-19 management during different waves according to various age groups

Age Groups In Years	WAVE 1			WAVE 2			WAVE 3			Grand Total		
	No. Of Patients Admitted	No. Of Patients Recovered	No. Of Patients Expired	No. Of Patients Admitted	No. Of Patients Recovered	No. Of Patients Expired	No. Of Patients Admitted	No. Of Patients Recovered	No. Of Patients Expired	No. Of Patients Admitted	No. Of Patients Recovered	No. Of Patients Expired
< 1 [Infants] (PI%, PII%)	1	1 (100, 0.1)	0 (0, 0)	2	2 (100, 0.6)	0 (0, 0)	4	4 (100, 10)	0 (0, 0)	7	7 (100, 0.5)	0 (0, 0)
1-10 (PI%, PII%)	34	33 (97, 3)	1 (3, 0.1)	2	2 (100, 0.6)	0 (0, 0)	3	3 (100, 7)	0 (0, 0)	39	38 (97, 3)	1 (3, 0.1)
11-20 (PI%, PII%)	51	51 (100, 5)	0 (0, 0)	3	3 (100, 1)	0 (0, 0)	2	2 (100, 5)	0 (0, 0)	56	56 (100, 4)	0 (0, 0)
21-30 (PI%, PII%)	181	180 (99, 18)	1 (0.6, 0.1)	21	20 (95, 6)	1 (5, 0.3)	13	13 (100, 32)	0 (0, 0)	215	213 (99, 16)	2 (1, 0.2)
31-40 (PI%, PII%)	184	178 (97, 18)	6 (3, 0.6)	49	30 (61, 10)	19 (39, 6)	3	3 (100, 7)	0 ((0, 0)	236	211 (89, 16)	25 (11, 2)
41-50 (PI%, PII%)	156	147 (94, 15)	9 (6, 0.9)	62	31 (50, 10)	31 (50, 10)	3	3 (100, 7)	0 (0, 0)	221	181 (82, 14)	40 (18, 3)
51-60 (PI%, PII%)	170	147 (86, 15)	23 (14, 2)	58	22 (38, 7)	36 (62, 12)	4	4 (100, 10)	0 (0, 0)	232	173 (75, 13)	59 (25, 4)

61-70 (PI%, PII%)	133	98 (74, 10)	35 (26, 4)	70	27 (39, 9)	43 (61, 14)	4	3 (75, 7)	1 (25, 2)	207	128 (62, 10)	79 (38, 6)
71-80 (PI%, PII%)	60	45 (75, 5)	15 (25, 2)	31	8 (29, 3)	23 (74, 7)	2	1 (50, 2)	1 (50, 2)	93	54 (58, 4)	39 (42, 3)
81-90 (PI%, PII%)	16	9 (56, 0.9)	7 (44, 0.7)	13	3 (23, 1)	10 (77, 3)	1	1 (100, 2)	0 (0, 0)	90	13 (43, 1)	17 (57, 1)
91-100 (PI%, PII%)	0	--	--	1	1 (100, 0.3)	0 (0, 0)	2	2 (100, 5)	0 (0, 0)	3	3 (100, 0.2)	0 (0, 0)
Total (PI%, PII%)	986	889 (90, 90)	97 (10, 10)	312	149 (48, 48)	163 (52, 52)	41	39 (95, 95)	2 (5, 5)	1339	1077 (80, 80)	262 (20, 20)

Note:

1. Percentage I (PI%) is calculated as compared to total number of patients in the corresponding age group
2. Percentage II (PII%) is calculated as compared to total number of patients admitted during the corresponding COVID-19 wave

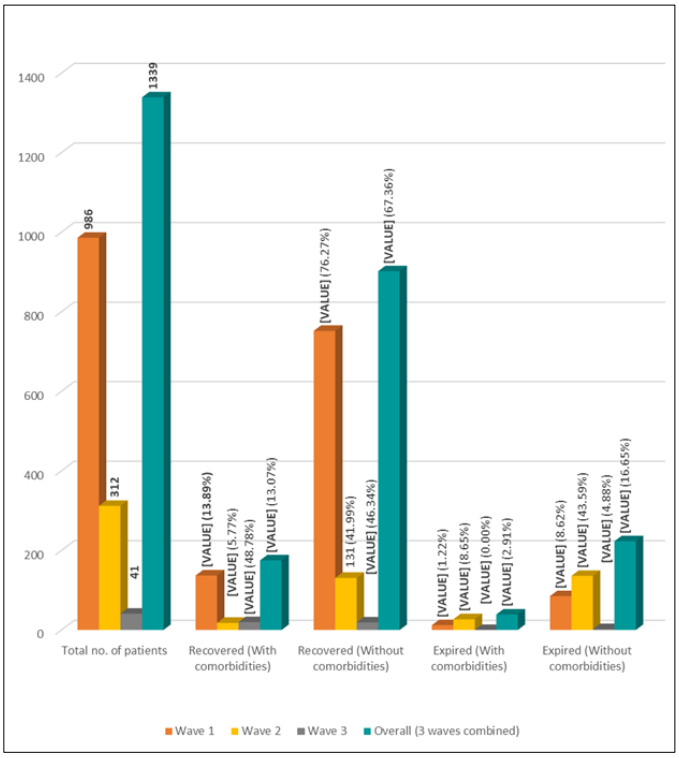

Fig. 11: Outcome of COVID-19 management during different waves in relation with associated comorbidities

Note: Percentage is calculated as compared to total number of patients admitted during the corresponding COVID-19 wave

Conclusion

Most of the prescriptions followed WHO indicators as well as the corresponding ongoing guidelines. Larger number of COVID-19 patients recovered during wave 1 and wave 3 whereas lesser number of COVID-19 patients recovered during wave 2.

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