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Assessing the Patient Demographics and Clinical Characteristics of Mechanically Ventilated Patients with COVID-19 at Lehigh Valley Health Network (LVHN)

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Background

- **COVID-19 presents as the common cold originally (sore throat, cough, etc.)**
 - Can eventually progress to acute respiratory distress syndrome (ARDS)
 - Patients with COVID-19 who develop ARDS often required mechanical ventilation
- **COVID-19 patients who required mechanical ventilation outcomes during the time span from March 1, 2020 to June 31, 2022 were analyzed**
 - Patients were stratified into four groups based on the different surges of COVID-19 cases
 - 3/1/2020 to 10/31/2020
 - 11/1/2020 to 8/31/2021
 - 9/1/2021 to 1/31/2022
 - 2/1/2022 to 6/30/2022
- **The key objectives** was to identify clinical characteristics and patient demographics that contributed to a COVID-19 patient on mechanical ventilation surviving or dying

Methods

The following data was collected on patients who were mechanically ventilated including:

- Patient demographics (age, gender, ethnicity)
- Ventilator Parameters (PEEP, FiO₂, Tidal Volume, Initial Static Compliance (Cstat), cc/kg ideal body weight (IBW))
- BMI
- Vaccine Record
- Blood Type

Data Analysis

- Data was analyzed using basic statistics such as mean, median, and mode
- Data was stratified into specific groups where COVID-19 cases were at their peak

Results

COVID-19 Surge Date	# of Patients	Percent Survived	Percent Deceased	Percent Survived Vaccinated	Percent Survived Unvaccinated	Percent Deceased Vaccinated	Percent Deceased Unvaccinated
3/1/2020-10/31/2020	193*	48.7*	51.3*	*	*	*	*
11/1/2020-08/31/2021	411	33.1	66.9	42.5	57.5	7.23	92.8
9/1/2021-1/31/2022	321	23.7	76.3	30.4	69.6	16.9	83.1
02/1/2022-06/30/2022	50	60.0	40.0	32.1	67.9	33.3	66.7

Table 1: COVID-19 Ventilated Patient Surge Data for Percent Survived and Deceased Across All Campuses

COVID-19 Surge Date	Age	BMI	Tidal Volume	Cc/kg IBW	Initial PEEP	Initial Cstat	FiO ₂
3/1/2020-10/31/2020	64.3, 64.5	35.7, 33.7	439.3, 446	6.4, 6.7	11.9, 11.4	37.5, 35.4	85.4, 94
11/1/2020-08/31/2021	61.9, 63.9	34.5, 33.9	438.4, 446	7, 6.8	10.6, 10.4	27.5, 25.6	79.1, 80
9/1/2021-1/31/2022	55.1, 54.5	28.8, 28.7	427.9, 440	6.3, 6.4	10.1, 10	29.4, 27.7	70.2, 70
02/1/2022-06/30/2022	66.5, 67.8	34.1, 33.2	390.4, 390	6.6, 6.8	7.6, 7.4	38.1, 35.8	54.4, 52

Table 2: COVID-19 Ventilated Patient Basic Statistics for Survivors including Mean and Median in Different Surges Across All Campuses

COVID-19 Surge Date	Age	BMI	Tidal Volume	Cc/kg IBW	Initial PEEP	Initial Cstat	FiO ₂
3/1/2020-10/31/2020	68.7, 68.5	32.6, 31.3	449.1, 436	5.9, 6.8	11.1, 11.2	31.3, 29	80.5, 87.5
11/1/2020-08/31/2021	69.7, 70.7	31.9, 30.9	423.6, 423	6.6, 6.6	11.2, 10.8	26.7, 25	87.5, 94
9/1/2021-1/31/2022	64, 64.3	32.9, 31.8	405.6, 409	6.1, 6.2	11.4, 11.2	24.3, 23.6	91.2, 100
02/1/2022-06/30/2022	71.9, 72.3	34.3, 29.9	385.5, 378.3	7.0, 6.7	9.2, 9.3	28.7, 28.8	63.2, 65

Table 3: COVID-19 Ventilated Patient Basic Statistics for Deceased including Mean and Median in Different Surges Across All Campuses

Conclusions

- **Survival and Deceased Rates**
 - For the first three surges of COVID-19, the percentage that survived decreased and the percentage that died increased
 - For the last surge of COVID-19, the percentage that survived increased and the percentage that died decreased
 - This could be due to the different variants (alpha, beta, gamma, delta, and omicron) with delta being the deadliest
- **Vaccination Rates**
 - Overall, survivors had higher vaccination rates and deceased patients had lower vaccination rates
 - The second COVID-19 surge had the highest difference between vaccinated survivors and deceased
 - The last COVID-19 surge had the lowest difference between vaccinated survivors and deceased
 - Vaccinated patients who died were also seen to have worse comorbidities (see QRS for data)
- **Basic Statistics for Survivors and Deceased Patients**
 - **1st COVID-19 Surge (3/1/2020 – 10/31/2020)**
 - The greatest mean percent difference between survivors and deceased patients was for initial static compliance which was 18% (p value < 0.05)
 - **2nd COVID-19 Surge (11/1/2020 – 8/31/2021)**
 - The greatest mean percent difference between survivors and deceased patients was for age which was 11.1% (p value < 0.05)
 - **3rd COVID-19 Surge (9/1/2021 – 1/31/2022)**
 - The greatest mean percent difference between survivors and deceased patients was for initial static compliance and FiO₂ levels which was 19% (p value < 0.05)
 - Age, BMI, and initial PEEP also had significant percent differences as 14.9%, 13.3%, and 12.1% (p < 0.05)
 - **4th COVID-19 Surge (2/1/2022 – 06/30/2022)**
 - The greatest mean percent difference between survivors and deceased patients was for initial static compliance which was 28.1% (p value < 0.05)
 - Initial PEEP and FiO₂ also had a significant percent difference as 19% and 15% (p value < 0.05)
- **Gender and Ethnicity**
 - There was no significant differences in gender and ethnicity seen in the data
- **Blood Type**
 - There was no significant difference in blood type seen in the data

Future Directions

- Encourage LVHN patients to become vaccinated in order to protect against COVID-19
- Identify co-morbidities amongst deceased patients to see if that could have contributed to them dying

* = The vaccine was not available during this COVID-19 surge



Please use the QR code to access additional research data including individualized data