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UNIVERSITY OF WISCONSIN–MADISON

UW Health

The COVID-19 Data Visualizer: Enabling Research and Clinical Decisions at the UW Madison CTSA

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Introduction

Discovering effective methods to prevent, track, and treat COVID-19 is an urgent priority in order to improve outcomes and save lives. We designed a registry to phenotype the cohort of COVID-19 patients from the EHR and developed a visualizer for inpatient data for researchers and clinical care teams. The main goals of the registry were to rapidly identify early risk factors; enable comparative effectiveness and outcome studies; facilitate machine learning and predictive analytics on treatment response and disease outcomes; and match patients to emerging clinical trials. Additionally, our registry helps researchers obtain clinically annotated biological specimens for research.

Methodology

Methods: We followed the National COVID Cohort Collaborative[1] (N3C) and CDC guidelines for defining the phenotype and electronically curating COVID-19 clinical data from our health system's Epic EHR. A team of researchers and informatics experts identified the data elements and visualizations of interest. The cohort included patients who were admitted to our hospital with a primary diagnosis of COVID-19. COVID-19 specific views were built on the Clarity reporting database and are refreshed nightly. The dashboard was built with Qlik Sense, and an automated data pipeline was built to load the data from the registry views into the Qlik Sense application, which keeps the dashboard up to date and responsive. We provided access to researchers and clinical providers taking care of COVID-19 patients. QA/QC methods were implemented to confirm the data consistency.

Results

We have successfully created dashboards displaying patient volumes with the ability to group by age, sex, race, ethnicity, comorbidities, maximum ventilation type, admission source, and discharge disposition. Heavily utilized charts display discharge disposition stratified by time on ventilator, medications, admission source, and comorbidities. Finally, individual patient level summary charts including risk factors, comorbidities, ventilation and medication records, and outcomes were developed to make patient comparisons easier and enable care teams to quickly learn and improve.

A total of 361 admissions (337 unique patients) who were admitted at our hospital in 2020 had positive COVID-19 diagnosis during their inpatient stay as of preparation of this poster (Figure 1).

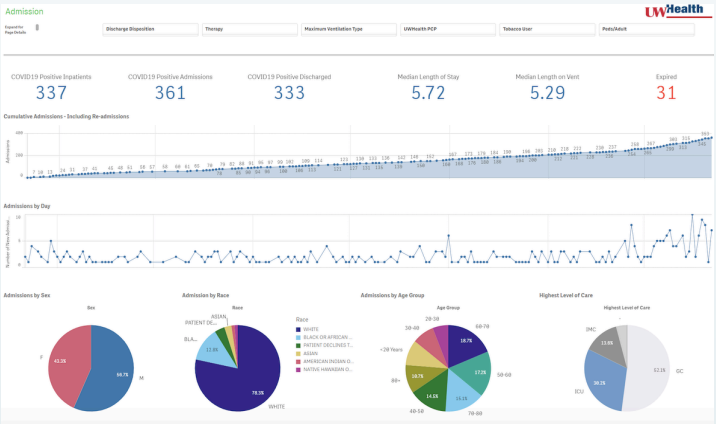

Figure 1. Summary Dashboard With Overall Descriptions
The death data presented is on patients who expired in the hospital

Admission Source	Count (N-361)	Percent
Home/Emergency	238	65.93%
Transfer From Another Health Care Facility	107	29.64%
Transfer From A Skilled Nursing Facility	13	3.60%
Other	≤10	≤3%
Discharge Disposition	**Count (N-361)**	**Percent**
Home	233	64.54%
Expired	31	8.59%
Skilled Nursing Facility	30	8.31%
Current Inpatient	28	7.76%
Assisted Living	15	4.16%
Other	24	6.7%

Table 1. Admission Sources and Discharge Dispositions of COVID-19 Positive Inpatients at UW Health.

Figure 2. Comorbidities

Comorbidities that are components of the Charlson Comorbidity Index between date of admission and two years prior were included in the charts. Discharge dispositions (2b) and patient level comorbidities (2c) were color coded with dynamic data descriptions presented on hover.

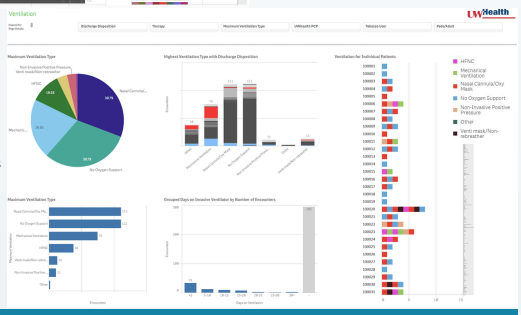

Figure 3. Ventilation Usage Dashboard

Max Ventilation represents the highest level of ventilation that a patient received during the encounter

Conclusion & Future Plans

Rapid development of a registry to identify COVID-19 cases provided our researchers and clinicians access to data visualization, efficient hypothesis generation, learning from the data, and informed clinical decision-making. The registry facilitated twelve research studies including biospecimen studies in 2020. Due to low inpatient COVID-19 patient volumes, initially the visualizations were done as univariate and bivariate graphical displays. Wisconsin has a significant increase in the COVID-19 positive cases over the last one month[2]. Advanced dashboards with statistical models and predictive analytics are increasingly possible as the pandemic continues. We are also working to implement FHIR[3] and OMOP[4] based data pipelines that integrate clinical data and imaging data into the registry which will help in easier and timely submission of data into the N3C repository.

Acknowledgements

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