

Characteristics and outcomes of COVID-19 patients with obesity: results of an international network study

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Abstract

We aimed to describe and compare the demographics, comorbidities, and outcomes of obese patients with COVID-19 to those of non-obese patients with COVID-19, or obese patients with seasonal influenza. We conducted a cohort study from December 2019 to May 2020 based on 5 primary care, hospital and claims databases standardized to the OMOP-CDM from Spain, UK and the US. We reported the relative frequency of sociodemographic characteristics, comorbidities, and outcomes (hospitalization, requirement of intensive services and death) for each database. Our findings showed that obese patients with COVID-19 are more likely to be hospitalized than non-obese COVID-19 cases, a higher proportion of which are women. Despite differences in the frequency of prior comorbidities, obese patients with COVID-19 have more severe outcomes than obese patients with influenza across cohorts and databases.

Research Category: clinical characterization

Background

COVID-19 may differentially impact people with obesity. We aimed to describe and compare the demographics, comorbidities, and outcomes of obese patients with COVID-19 to those of non-obese patients with COVID-19, or obese patients with seasonal influenza.

Methods

We conducted a multinational cohort study from December 2019 to May 2020 based on primary care, hospital and claims data from Spain, UK and the US. Five databases (CPRD, SIDIAP, CUIMC, STARR-OMOP, and IQVIA-OpenClaims) standardized to the Observational and Medical Outcomes Partnerships (OMOP) common data model (CDM) were used. We included two cohorts of COVID-19 cases: 1) all patients *diagnosed* with COVID-19 (clinical diagnosis and/or positive test for SARS-CoV-2), and, 2) all patients *hospitalized* with a COVID-19 diagnosis. In the *diagnosed* cohort, index date was defined as the earliest of clinical diagnosis or positive test whereas in the *hospitalized* cohort, index date was the day of hospitalization. Patients were followed from the index date to the earliest of death, end of the observation period, or 30 days. Analogous cohorts were generated for patients diagnosed with influenza in the season 2017-2018. All cohorts were stratified by obesity status.

We reported the relative frequency of sociodemographic characteristics, comorbidities, and outcomes (hospitalization, requirement of intensive services and death) for each database. All analyses were performed using a code developed for the OHDSI Methods library (available at <https://github.com/ohdsi-studies/Covid19CharacterizationCharybdis>).

Results

We included 604,432 diagnosed COVID-19 cases of which 196,313 (32%) were obese and 154,503 hospitalized COVID-19 cases of which 60,948 (39%) were obese. We also included 4,510,533 (15% obese) individuals diagnosed and 230,199 (27% obese) hospitalized with influenza. More results are available at <https://www.medrxiv.org/content/10.1101/2020.09.02.20185173v1>.

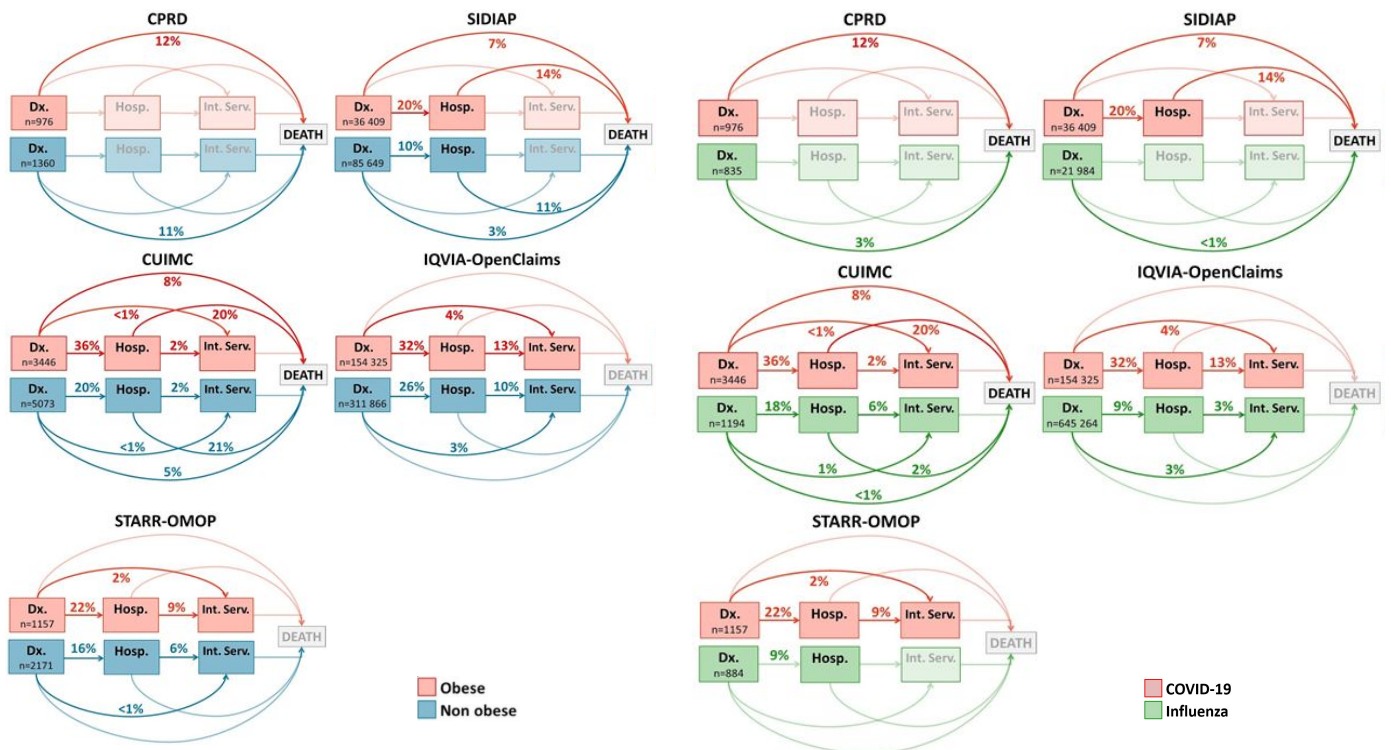
In the diagnosed cohort, sex and age were similarly distributed among obese and non-obese COVID-19 cases. However, in the hospitalized cohort women sex predominated among obese patients (ranging from 51% to 55% across all databases), contrary to non-obese patients (40% to 50%). Obese patients were younger than non-obese with a proportion of patients above 65 years old ranging from 36% to 63% for obese vs 43% to 73% for non-obese. In the diagnosed and hospitalized cohorts, comorbidities were more common among obese patients, although differences were attenuated among those hospitalized. Figure 1 A shows hospitalization was higher for diagnosed obese patients (in red) compared to non-obese (in blue). We did not observe remarkable differences in mortality in none of

the cohorts, nor in the requirement of intensive services in the hospitalized cohorts. Obese individuals with COVID-19 and obese patients with influenza had an overall similar sex distribution in the two cohorts, with a majority of women in both. Individuals aged between 19 and 64 years predominated in the diagnosed cohorts whereas individuals older than 65 years predominated in the hospitalized cohorts. Influenza patients had more comorbidities than obese COVID-19 patients in the hospitalized cohorts in all databases (e.g., in CUIMC 59% of patients with COVID-19 and 80% with influenza had heart disease). Figure 1 B shows obese patients with COVID-19 (in red) were more likely to have adverse outcomes than those with influenza (in green), in both cohorts.

Figure 1: Main outcomes: comparing obese patients with COVID-19 to non-obese patients with COVID-19 and obese patients with influenza

A. Obese and non-obese COVID-19 patients

B. Obese COVID-19 and obese influenza patients



Note: Lighter colours mean data was not available for that database. Full-size images can be consulted at <https://www.medrxiv.org/content/10.1101/2020.09.02.20185173v1>.

Discussion and Conclusion

The use of the OMOP CDM allowed us to characterize obese patients with COVID-19 and to compare them to non-obese COVID-19 cases and to obese patients with influenza. A code developed for the OHDSI Methods library facilitated the comparison across 5 databases from 3 different countries. Our findings showed that diagnosed obese COVID-19 patients are more likely to have comorbidities and to be hospitalized compared to non-obese patients as well as to have adverse outcomes compared to obese influenza cases. Obese hospitalized patients with COVID-19 are younger and, contrary to non-obese, more frequently female. Furthermore, COVID-19 hospitalized patients have worse outcomes than patients with influenza, albeit having less comorbidities. Although further research is needed to confirm our findings, our results could inform prevention strategies for obese individuals.