Comorbidities Associated with All-Cause Readmission to the Same Hospital after Index COVID-19 Hospitalization: A Retrospective Cohort Study of 232,155 Patients in the United States

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Background

- Understanding comorbidities that drive all-cause readmission in patients hospitalized with coronavirus disease 2019 (COVID-19) can inform healthcare system capacity planning and improve post-discharge care.

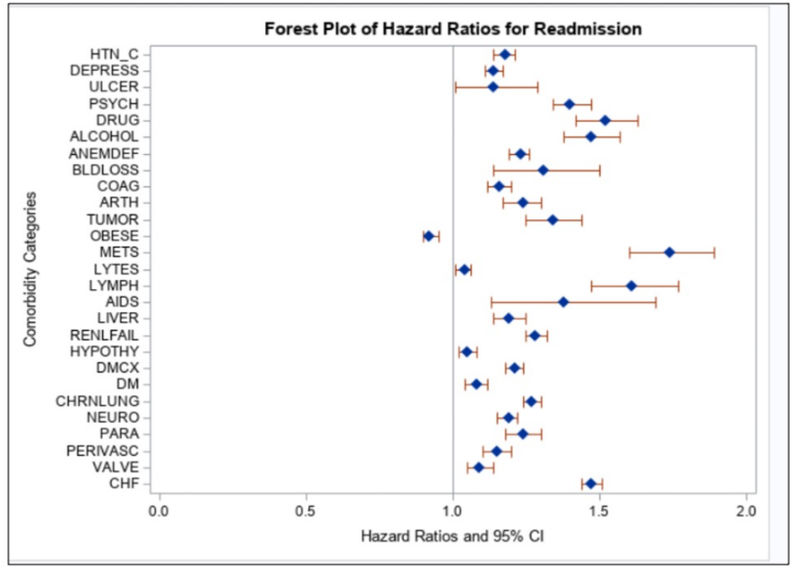
Methods

- A retrospective cohort study of patients hospitalized for COVID-19 between April 2020-December 2020 (index cohort) across 760 hospitals in the Premier Healthcare Database.
- Patients who died or left against medical advice were excluded from the index cohort.
- Surviving patients in the index cohort were followed until May 2021.
- First readmission to the same hospital as the COVID-19 index admission was considered all-cause readmission.
- The all-cause 14-month risk (95% confidence interval) of readmission was calculated using the Kaplan-Meier approach.
- A multivariable Cox proportional hazards model adjusted for demographic variables, hospital characteristics, co-existing comorbidities, and COVID-19 severity was built to study the association between Elixhauser comorbidities and readmission.

Patient's primary discharge diagnosis for first readmissions grouped by Clinical Classification Software Refined (CCSR) Categories

CSSR categories	N=36680 No (%)
Certain Infectious and Parasitic Diseases*	14240 (38.8)
Diseases of the Circulatory System	4904 (13.4)
Diseases of the Respiratory System	3040 (8.3)
Diseases of the Digestive System	2342 (6.4)
Factors Influencing Health Status and Contact with Health Services	2194 (6.0)
Diseases of the Genitourinary System	1992 (5.4)
Injury, Poisoning and Certain Other Consequences of External Causes	1812 (4.9)
Endocrine, Nutritional and Metabolic Diseases	1555 (4.2)
Diseases of the Nervous System	1102 (3.0)
Symptoms, Signs and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified	943 (2.6)
Mental, Behavioral and Neurodevelopmental Disorders	521 (1.4)
Diseases of the Musculoskeletal System and Connective Tissue	507 (1.4)
Neoplasms	503 (1.4)
Diseases of the Blood Forming Organs and Certain Disorders Involving the Immune Mechanism	419 (1.1)
Diseases of the Skin and Subcutaneous Tissue	396 (1.1)
Pregnancy, Childbirth and the Puerperium	125 (0.3)
Unacceptable principal diagnosis (inpatient data) or first-listed diagnosis (outpatient data)	41 (0.1)
Diseases of the Ear and Mastoid Process	24 (0.1)

Figure1:Forest Plot of Hazard Ratios for Readmissions



Abbreviations-95% CI : 95% confidence interval
HTN_C : Hypertension with complications; DEPRESS: Depression; ULCER: Peptic ulcer disease with bleeding; PSYCH: Psychoses ;DRUG: Drug abuse; ALCOHOL: Alcohol abuse; ANEMDEF: Deficiency anaemias; BLDLOSS: Chronic blood loss anaemia; COAG: Coagulopathy; ARTH: Rheumatoid arthritis or collagen vascular disease; TUMOR: Solid tumor without metastasis; OBESE: Obesity ;METS: Metastatic cancer; LYTES: Fluid and electrolyte imbalance, LYMPH: Lymphoma; AIDS: Acquired Immune Deficiency Syndrome; LIVER: Liver disease; RENLFAIL: Renal failure; HYPOTHY: Hypothyroidism; DMCX: Diabetes with chronic complications; DM : Diabetes without chronic complications; CHRNLUNG: Chronic pulmonary disease; NEURO: Other Neurological disorders; PARA: Paralysis; PERIVASC: Peripheral vascular disease; VALVE: Valvular heart disease; CHF: Congestive Heart Failure

Results

- Among 232,155 unique patients in the index cohort, 36,680 were readmitted to the same hospital at least once, followed through May 2021.
- The 14-month risk of readmission was 16.2% (95% CI:16.1% - 16.4%).
- With each additional comorbidity, the readmission hazard increased by 19% (HR, 1.19; 95% CI:1.18 - 1.19)
- In the multivariable Cox proportional hazards model, many comorbidity categories were associated with an increased risk of readmission.
- Metastatic cancer (HR, 1.74; 95% CI:1.60 –1.89), lymphoma (HR, 1.61; 95% CI:1.47 – 1.77), drug abuse (HR, 1.51; 95% CI:1.41 – 1.62), congestive heart failure (HR, 1.47; 95% CI:1.44– 1.51), and alcohol abuse (HR, 1.46; 95% CI:1.36– 1.56) were associated with the highest hazard for readmission. Obesity was associated with decreased risk of readmission (HR, 0.92; 95% CI: 0.90-0.95)

Conclusions

- COVID-19 patients have a high risk of all-cause readmission and are frequently readmitted for COVID-19
- With the continued emergence of COVID-19 variants, this study provides valuable insights into developing more informed discharge plans and improving post-discharge care for COVID-19 patients with existing comorbidities to prevent readmission.

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