EE333

Assessment of Medically-Attended COVID-19 Patient Risk Profiles and Health Care Resource Utilization and Costs in the U.S.

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Background

- COVID-19 remains an unprecedented, persistent global health emergency accounting for over 6.8 million deaths in total, and over 150,000 new cases every day worldwide.[1]
- It has been estimated that US life expectancy at birth dropped by 3.08 years due to COVID-19-related deaths between February 2020 and May 2022, resulting in economic welfare losses in excess of $3.5 trillion.[2]
- A number of risk factors have been identified as predictive of severe COVID-19, including advanced age, being from a racial/ethnic minority group, and the presence of select chronic comorbidities.[3,4]
- Median costs associated with COVID-19-related hospital admissions have been estimated at $11,267 per admission.[5]
- Although new vaccines and therapeutics for COVID-19 have improved patient outcomes, the continued emergence of new and highly transmissible variants requires continued investment in new treatments and investigation into persistent COVID-19-related healthcare resource utilization and costs.

Objective

- To assess healthcare costs for medically attended COVID-19 (MAC) patients and matched patients without MAC (non-MAC controls), to serve as a baseline for the value of potential new therapeutics in development.

Methods

Data Sources

- The 100% Medicare Fee-for-Service (FFS) and the Inovalon MORE^2 closed claims databases of patients with Medicare Advantage, Managed Medicaid, or commercial insurance between April 1, 2020, and June 30, 2022 (Wuhan strain through omicron clinical variants) were utilized for this study.
  - The Medicare FFS data includes 100% of Medicare Part A/B medical encounters for all places of service, while the Part D Prescription Drug Event data contains all retail, mail-order, and specialty pharmacy encounters.
  - The Inovalon MORE^2 Registry® is a real-world medical and pharmacy closed claims database primary sourced by over 140 health plans and covers approximately 42% of the commercially insured population, 25% of the Medicare Advantage population, and 69% of the managed Medicaid population.

Sample

- The overall MAC sample was comprised of patients with a diagnosis of COVID-19 (ICD-10 U07.1) on/after April 1, 2020 (index date), ≥ 365 days of continuous enrollment prior to index, and aged ≥ 18 years on the index date (see **Figure 1**).
- Two additional patient cohorts were created for the healthcare resource utilization (HCRU) and cost analyses:
  - **MAC Cohort:** A 20% random subset of the overall MAC cohort who also present ≥ 6 months of enrollment post-index.
  - **Non-MAC Controls:** No evidence of a COVID-19 diagnosis and matched directly to MAC patients on age, sex, and baseline Deyo-Charlson Comorbidity Index (DCI; *controls' index date set to calendar date of matched COVID-19 patient).*

Methods Cont.

Figure 1. Patient Selection

≥ 1 inpatient or ≥ 1 outpatient claim with an ICD-10 diagnosis code for COVID-19 on or after April 1, 2020. *The earliest date of service associated with a COVID-19 claim served as the index date.*
N= 12,528,331

↓

Continuous medical and pharmacy enrollment for ≥ 12 months preceding index.
N= 7,273,126

↓

At least 18 years of age on the index date.
Overall MAC Cohort = 5,746,432

↓

20% random MAC sample with ≥ 6 months of post-index enrollment
N= 656,158

Matched →

Non-MAC patients matched to MAC patients: age, gender and DCI
N= 611,137

Outcomes

- Demographics were assessed on the index date, while comorbid conditions and an assessment of patients presenting as high-risk for developing severe COVID-19 per CDC guidelines[6] were measured during the baseline period.
- HCRU and costs were assessed during the 180-day period following index and were compared between a subset of MAC and non-MAC controls.
- Descriptive statistics were presented for all outcomes, and included means, standard deviations, frequencies, and proportions.

Results

- A total of 5,746,432 MAC patients met all study inclusion criteria; the mean DCI score was 1.79±2.69, with 26.0% of patients presenting a DCI score ≥ 3, and with 49.7% of MAC patients qualifying as being at high-risk for complications per the CDC guidelines (**Table 1**).
- A total of 1,267,295 MAC and non-MAC patients qualified for the analyses of post-index healthcare resource utilization and costs during the 180-day post-index period.

Table 2. HCRU Between Matched MAC and Non-MAC Controls

	MAC Cohort N =656,158		Non-MAC Cohort N =611,137	
	Mean/N	SD/%	Mean/N	SD/%
Physician Office/Clinic Visits				
Total (Mean, SD)	5.24	6.51	4.80	6.51
Patients with ≥ 1 Visit (N,%)	549,470	83.7%	463,695	75.9%
ER Visits				
Total (Mean, SD)	0.62	1.42	0.24	0.85
Patients with ≥ 1 Visit (N,%)	223,166	34.0%	85,665	14.0%
Other Outpatient				
Total (Mean, SD)	4.22	7.55	2.30	4.37
Patients with ≥ 1 Visit	430,804	65.7%	331,957	54.3%
Inpatient Hospital				
Total (Mean, SD)	0.28	0.66	0.09	0.38
Patients with ≥ 1 Visit	135,297	20.6%	40,936	6.7%

Results

Table 1. MAC Demographics and Baseline Clinical Characteristics

Total MAC Cohort N = 5,746,432			
Demographics	**%**	**Clinical Characteristics**	**%**
High Risk Patient (N,%)	49.7%	**Age (M, SD)**	21.2
Deyo-Charlson Comorbidity Score (N,%)		**Age (N, %)**	
0	48.9%	18-29	17.1%
1	16.5%	30-39	14.3%
2	8.7%	40-49	13.0%
3+	26.0%	50-64	21.0%
Comorbidities (N,%)		65-74	15.9%
Bronchiectasis	0.6%	75-79	6.4%
Cancer	15.5%	80+	12.3%
Cerebrovascular disease	9.2%	**Sex (N, %)**	
Chronic kidney disease	16.1%	Male	39.4%
Chronic liver disease	6.4%	Female	60.6%
COPD	9.6%	**Race/Ethnicity (N, %)***	
Cystic fibrosis	0.1%	White	67.4%
Dementia	3.6%	Black or African American	18.0%
Diabetes mellitus, Type I	1.9%	North American Native	0.3%
Diabetes mellitus, Type II	22.8%	Hispanic or Latino	11.6%
Disabilities	42.7%	Asian	2.7%
HIV	4.6%	**Payer Type (N, %)**	
Heart conditions	27.6%	Medicare FFS	30.7%
Interstitial lung disease	3.4%	Medicare Advantage	7.1%
Mental health conditions	14.2%	Managed Medicaid	26.0%
Obesity	27.4%	Commercial	36.2%
Physical inactivity	7.8%	**Census Region (N, %)**	
Pregnancy	3.7%	Northeast	18.2%
Primary immunodeficiencies	3.4%	Midwest	23.2%
Pulmonary hypertension	2.4%	South	41.0%
Pulmonary embolism	1.9%	West	16.1%
Solid organ transplant	0.8%	Unknown	1.4%
Stem cell transplant	0.1%		
Tobacco dependence	14.5%		
Tuberculosis	1.8%		

*Race data available among a subset of patients.

Figure 2. Outpatient Costs Between Matched MAC and Non-MAC Controls

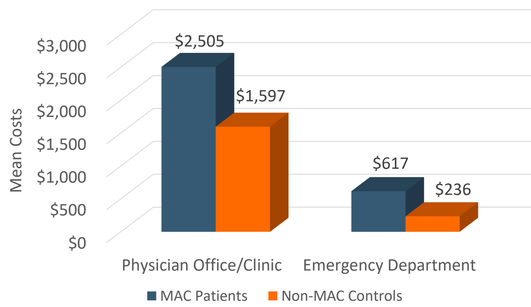
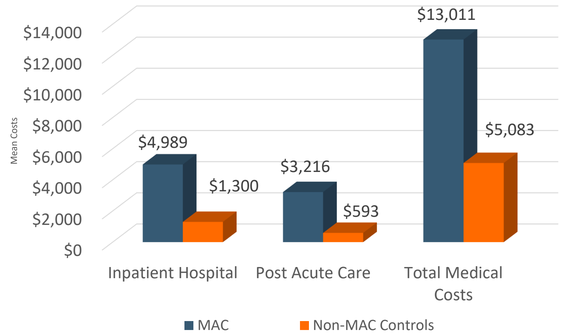


Figure 3. Hospital, Post-Acute Care, and Total Medical Costs Between Matched MAC and Non-MAC Controls



- Analyses of HCRU between the matched MAC and non-MAC controls revealed that MAC patients presented greater utilization in all service categories assessed, including 2.4-fold and 3.1-fold greater emergency department and inpatient hospital use, respectively (**Table 2**).
- MAC patients incurred ~$1,000 greater mean physician office/clinic costs and ~$400 greater mean emergency department costs during the follow-up period (**Figure 2**); MAC patients also incurred 3.8-fold greater mean inpatient hospital costs and 5.4-fold greater mean post-acute care costs (**Figure 3**).
- Compared to non-MAC controls, total medical costs for MAC patients were 2.6-fold higher during the 6-month follow-up period ($13,011±$28,382 vs. $5,083±$15,061; **Figure 3**), while MAC patients classified as high risk presented 4.2-fold higher total medical costs compared to non-MAC controls ($21,573±$35,433).

Conclusions

- **A key feature of COVID-19 is higher costs and HCRU for all patients, but especially for patients at high-risk for severe COVID.**
- **This study demonstrated that approximately half of MAC patients qualified as high-risk, and half as standard-risk, with higher post-COVID HCRU and costs incurred across all sites of service.**
- **All COVID-19 patients, both high risk and standard risk, incurred substantial mean incremental medical costs to the healthcare system; costs were 2.6 times greater among MAC patients than matched, non-MAC controls.**
- **These data serve as a baseline for assessing the value of new therapeutics in development that can treat a broad population of COVID-19 patients.**

References

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