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The Impact of COVID-19 on Medicare Beneficiaries in Nursing Homes

Methodology

Objective: The analysis evaluated Medicare beneficiaries with a COVID-19 diagnosis or hospitalization by institutional setting (i.e., nursing home versus community), as well as other demographic and clinical characteristics.

Data Sources: Medicare fee-for-service (FFS) claims data, Medicare Advantage (MA) encounter data, Minimum Dataset 3.0 (MDS), and Medicare enrollment data.

Study Period: Dates of service between March 1, 2020 and December 31, 2020. Note: Data were received as of March 19, 2021.

Methodology: We applied a 30-day look-back period for Medicare beneficiaries diagnosed or hospitalized with COVID-19 to assign a Medicare beneficiary to a setting. Beneficiaries were designated as "nursing home" if they were in a nursing home within 30 days prior to their first COVID-19 diagnosis or COVID-19 hospitalization; otherwise, they were designated as "community". When the discharge date from the nursing home was unclear, we assessed if there was a gap of more than 150 days between the target date of the most recent assessment and December 31, 2020 (the last date of the study period) in our analysis. In these cases, we assigned the discharge date as 150 days after the most recent assessment for the beneficiary. Please note that "nursing home residents" includes all Medicare beneficiaries regardless of whether their nursing facility stay was covered by Medicare, Medicaid or private pay. We excluded non-Medicare beneficiaries and Medicare Part B only beneficiaries from this analysis.

Methodology

Medicare COVID-19 Cases: A count of beneficiaries with a diagnosis of COVID-19 on a claim or encounter record in *any* healthcare setting (e.g., physician's office, inpatient hospital, laboratory).

We use the following International Classification of Diseases (ICD), Tenth Revision (ICD-10), diagnosis codes to identify COVID-19 cases on claims and encounters:

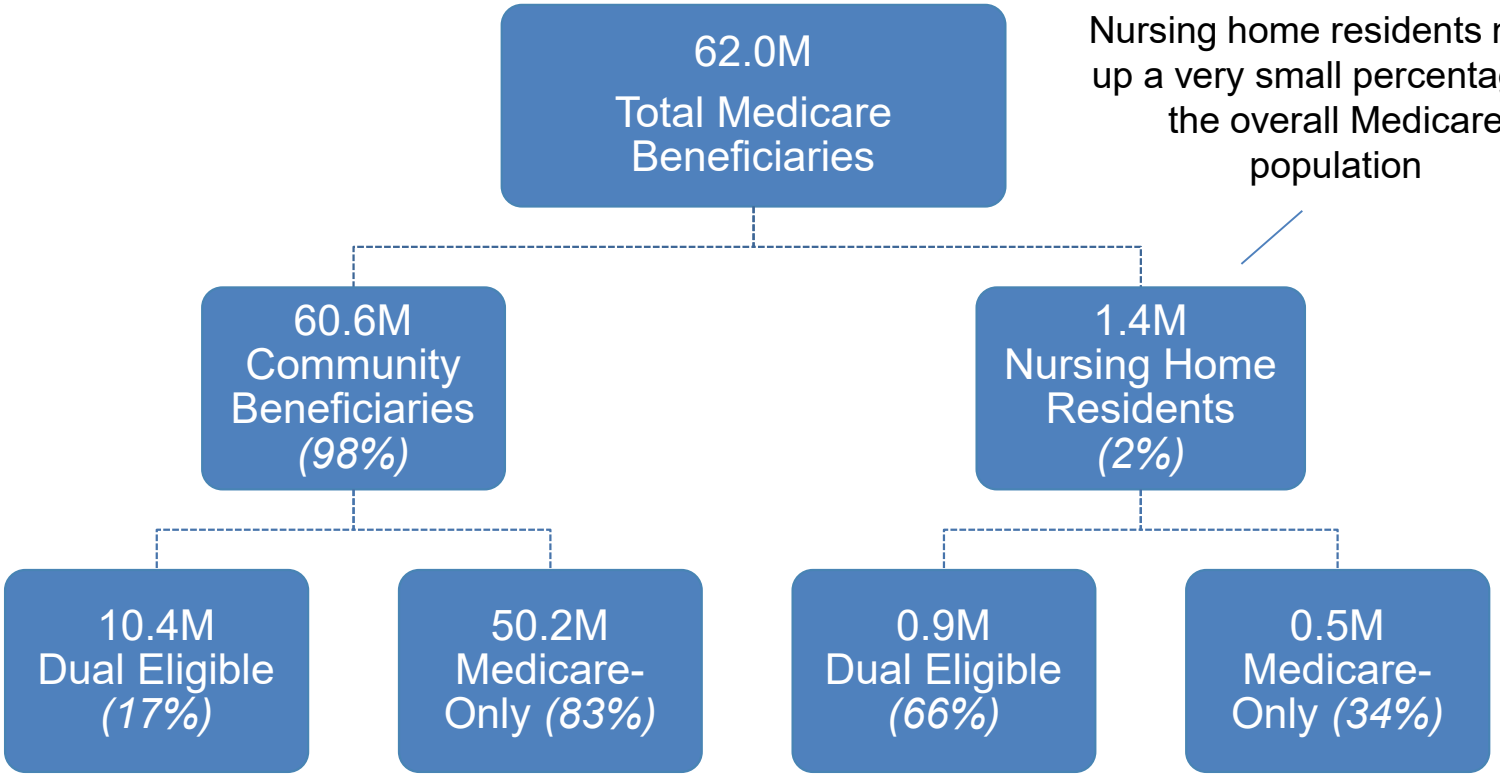
- B97.29 (other coronavirus as the cause of diseases classified elsewhere) – before 4/1/2020.
- U07.1 (2019 Novel Coronavirus, COVID-19) – from 4/1/2020 onward.

We identified COVID-19 cases using ICD-10 diagnosis codes on claims and encounters. The Centers for Disease Control and Prevention (CDC) has issued COVID-19 ICD-10 coding guidance. Diagnosis code accuracy depends on: (1) how clinicians document (e.g., omitting information or using synonyms or abbreviations to describe a patient's condition) and (2) medical coder experience and training. As a result, we consider diagnosis information from claims and encounters less reliable than clinical information collected other ways (e.g., chart reviews). Since we don't need this type of clinical information to run our programs, we only collect it in limited circumstances (e.g., for program integrity purposes).

Medicare COVID-19 Hospitalizations: A count of beneficiaries with a diagnosis of COVID-19 on a claim or encounter record in an *inpatient hospital* setting. Beneficiaries included in this analysis are Medicare Part A Enrollees.

Characteristics of Study Population

Medicare Enrollment by Institutional Status and Dual Status, January 2020



Nursing home residents make up a very small percentage of the overall Medicare population

Dual eligible beneficiaries make up a much larger percentage of nursing home residents compared to beneficiaries in the community – 66% to 17%

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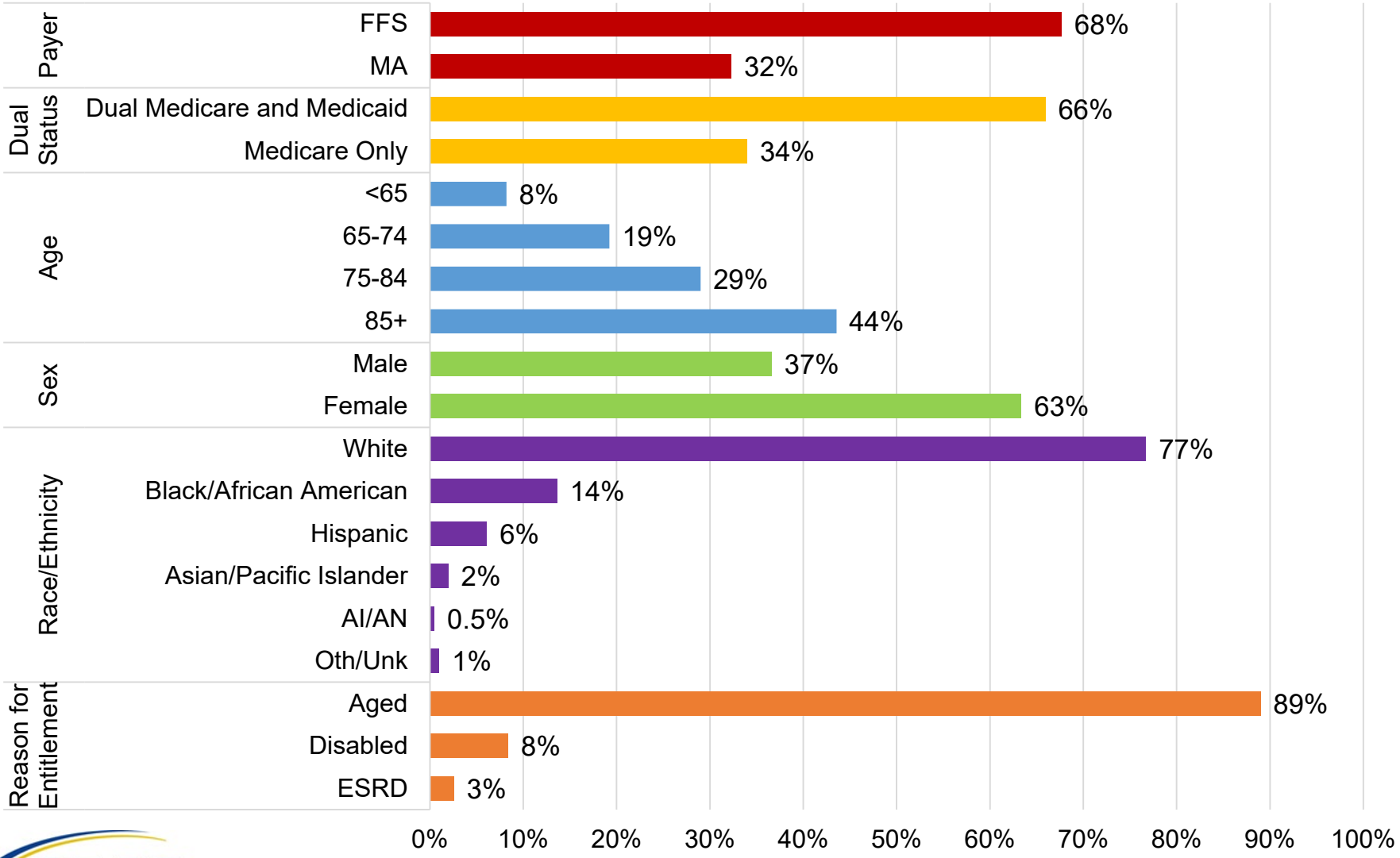
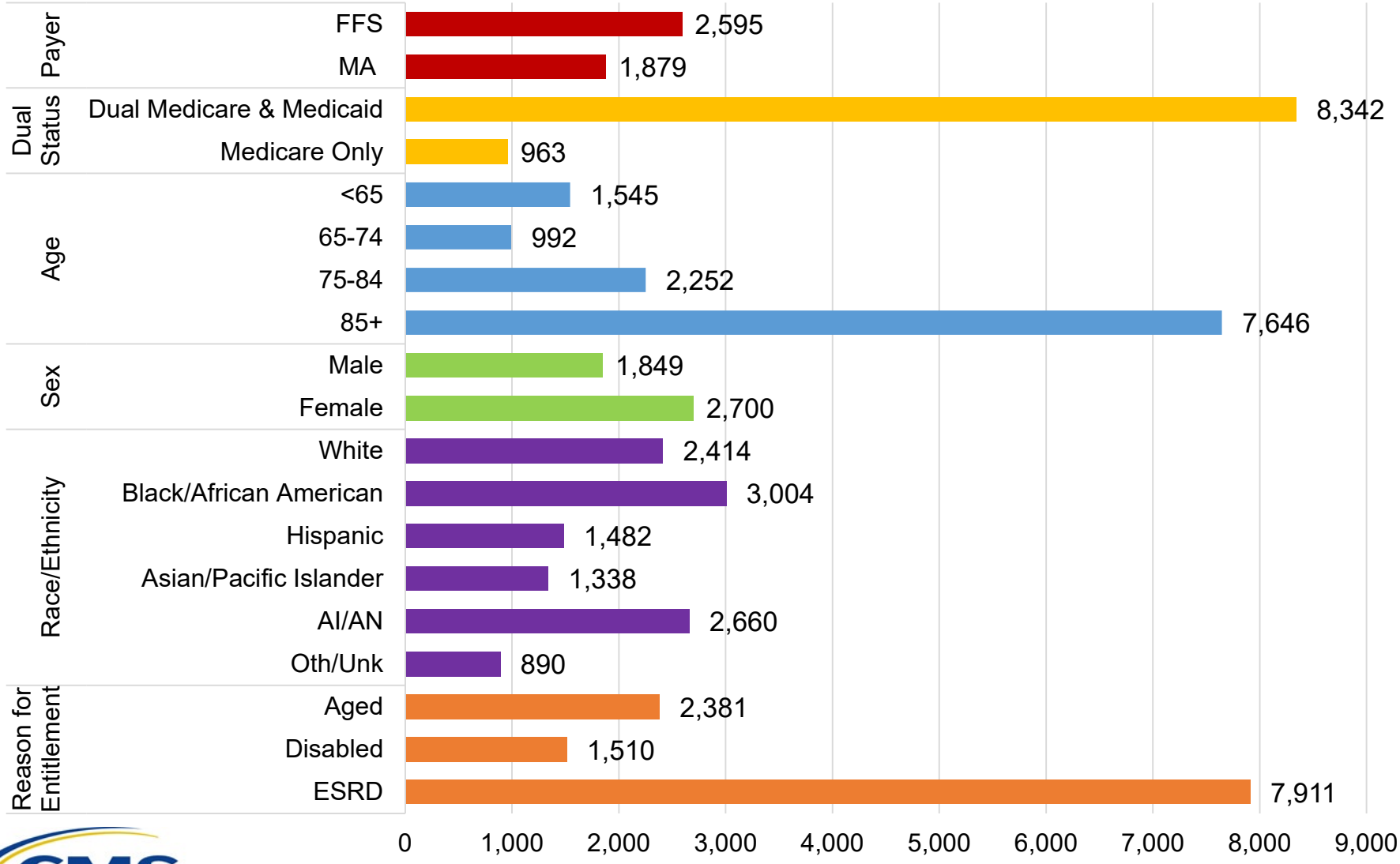
Demographic Characteristics among Medicare Nursing Home Residents (N=1.4M), January 2020



Note: AI/AN = American Indian/Alaska Native

Nursing Home Utilization (Rates per 100K) among Medicare Beneficiaries, January 2020



Note: AI/AN = American Indian/Alaska Native

COVID-19 Cases among Medicare Beneficiaries

Overview of COVID-19 Cases in the Medicare Population

Nursing home residents account for about 2% of the Medicare population, but about 22% of all COVID-19 cases. Nursing home residents were 14 times more likely to be diagnosed with COVID-19 compared to beneficiaries in the community. It is unclear what impact the lack of widespread testing early in the pandemic may have had on these case rates.

	Count of COVID-19 Cases	Adjusted Cumulative Incidence (Rates per 100K)	Average Monthly Incidence (Rates per 100K)
Total	**3,031,930**	**4,847**	**485**
Nursing Home	654,583	54,214	5,421
Community	2,377,347	3,875	388

Adjusted Cumulative Incidence is defined as the count of Medicare COVID-19 cases divided by the average monthly Medicare Part A enrollment. Average Monthly Incidence is defined as the Adjusted Cumulative Incidence divided by the number of months in the study period.

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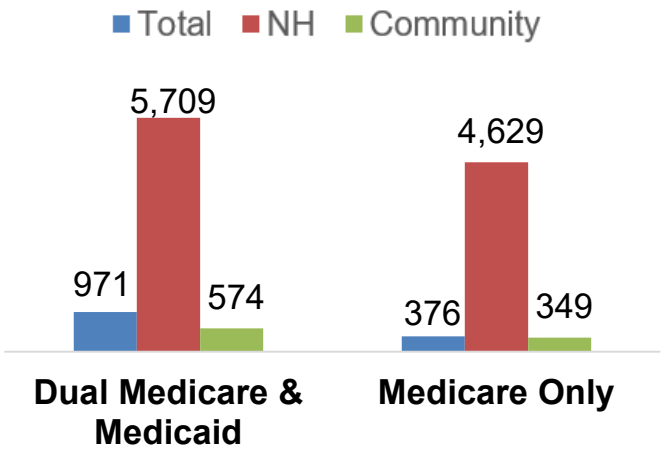
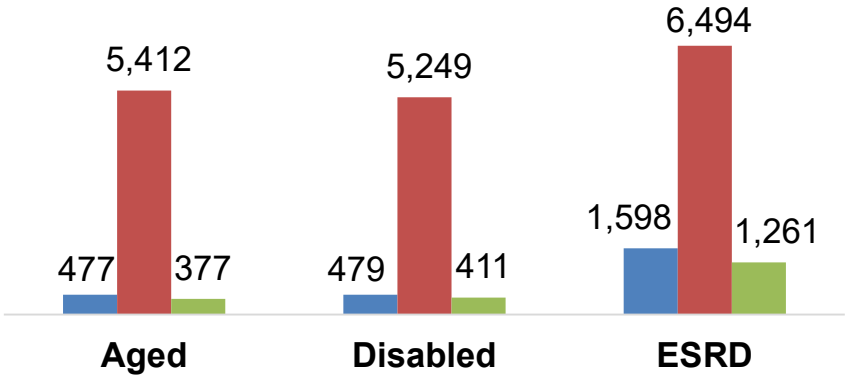
COVID-19 Cases (Average Monthly Incidence per 100K) by Institutional Status and Beneficiary Characteristics

Across all demographic breakdowns, nursing home beneficiaries had much higher COVID-19 case rates than community beneficiaries. In general, institutional status had a larger impact on case rates than demographic characteristics.

Among duals, those in a nursing home were 10 times more likely than those in the community to be diagnosed with COVID-19.



Among nursing home beneficiaries, those with ESRD had higher case rates than the aged or disabled. ESRD beneficiaries in the community had much higher case rates than aged or disabled beneficiaries in the community.

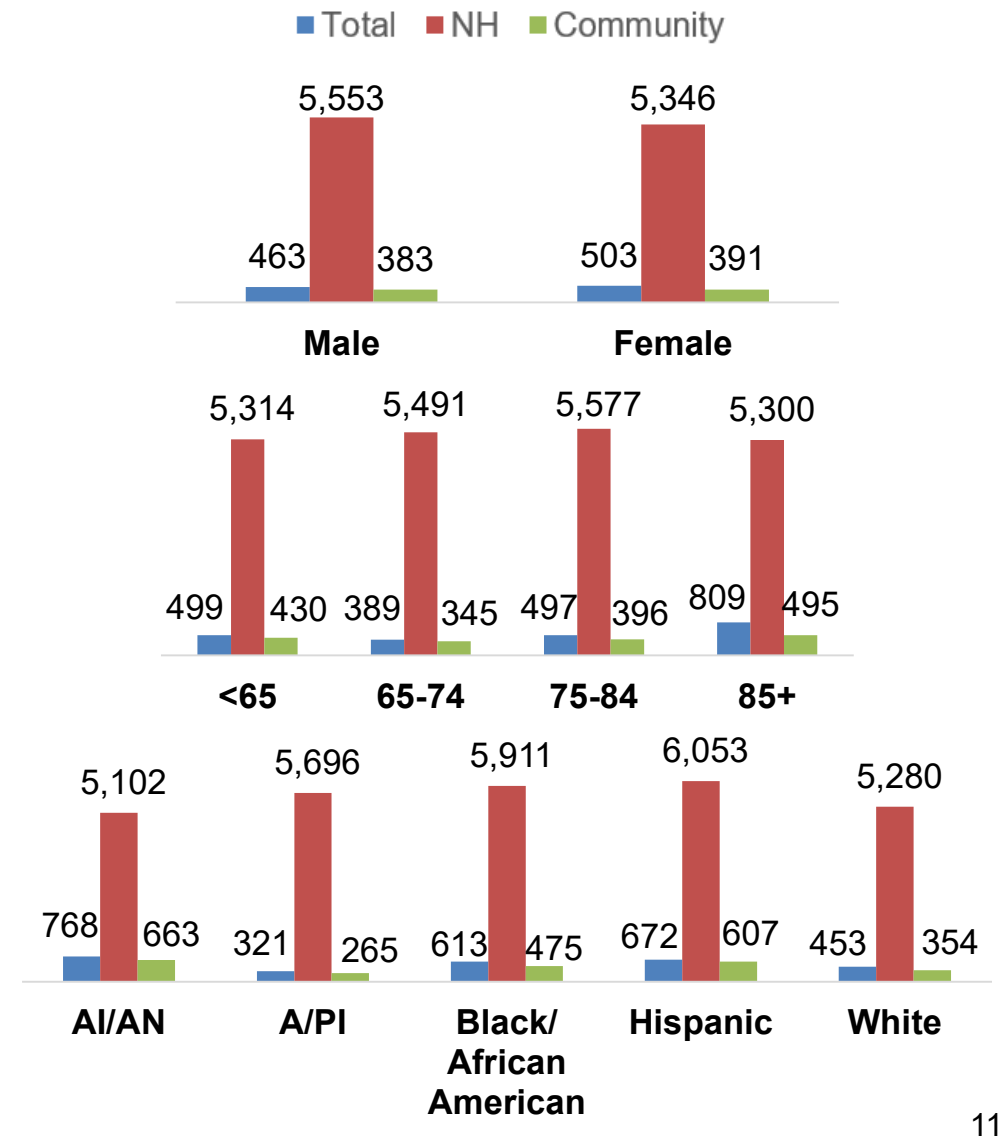


COVID-19 Cases (Average Monthly Incidence per 100K) by Institutional Status and Beneficiary Characteristics

Male and female nursing home beneficiaries had nearly identical risk of being diagnosed with COVID-19.

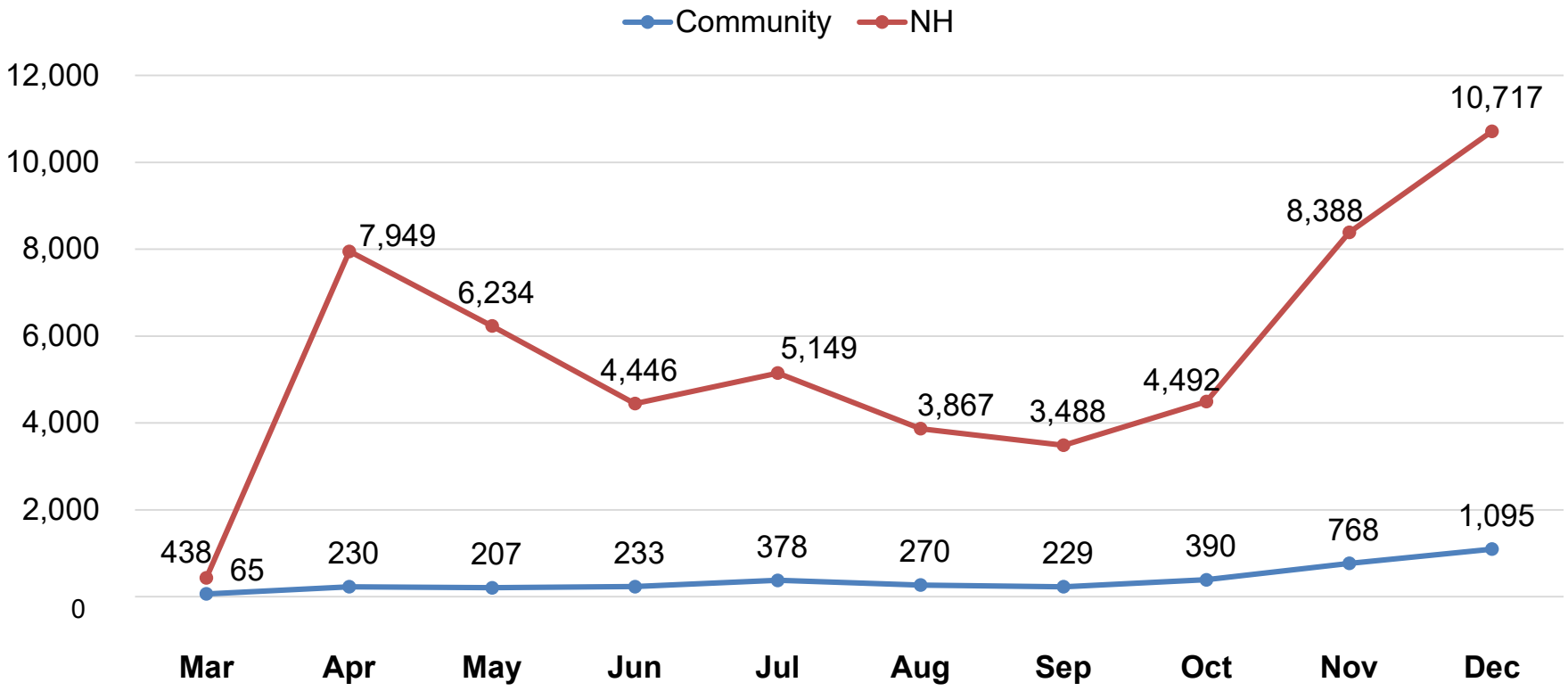
There was little difference in risk of being diagnosed with COVID-19 across all age groups.

Hispanic, Black/African American, and Asian beneficiaries in nursing homes had the highest COVID-19 case rates.



Monthly COVID-19 Case Rates per 100K by Institutional Status

Beneficiaries in the nursing home consistently had higher risk of being diagnosed with COVID-19 compared to community beneficiaries. Even when community spread was relatively low, nursing home beneficiaries were at least 11 times more likely to be diagnosed with COVID-19.



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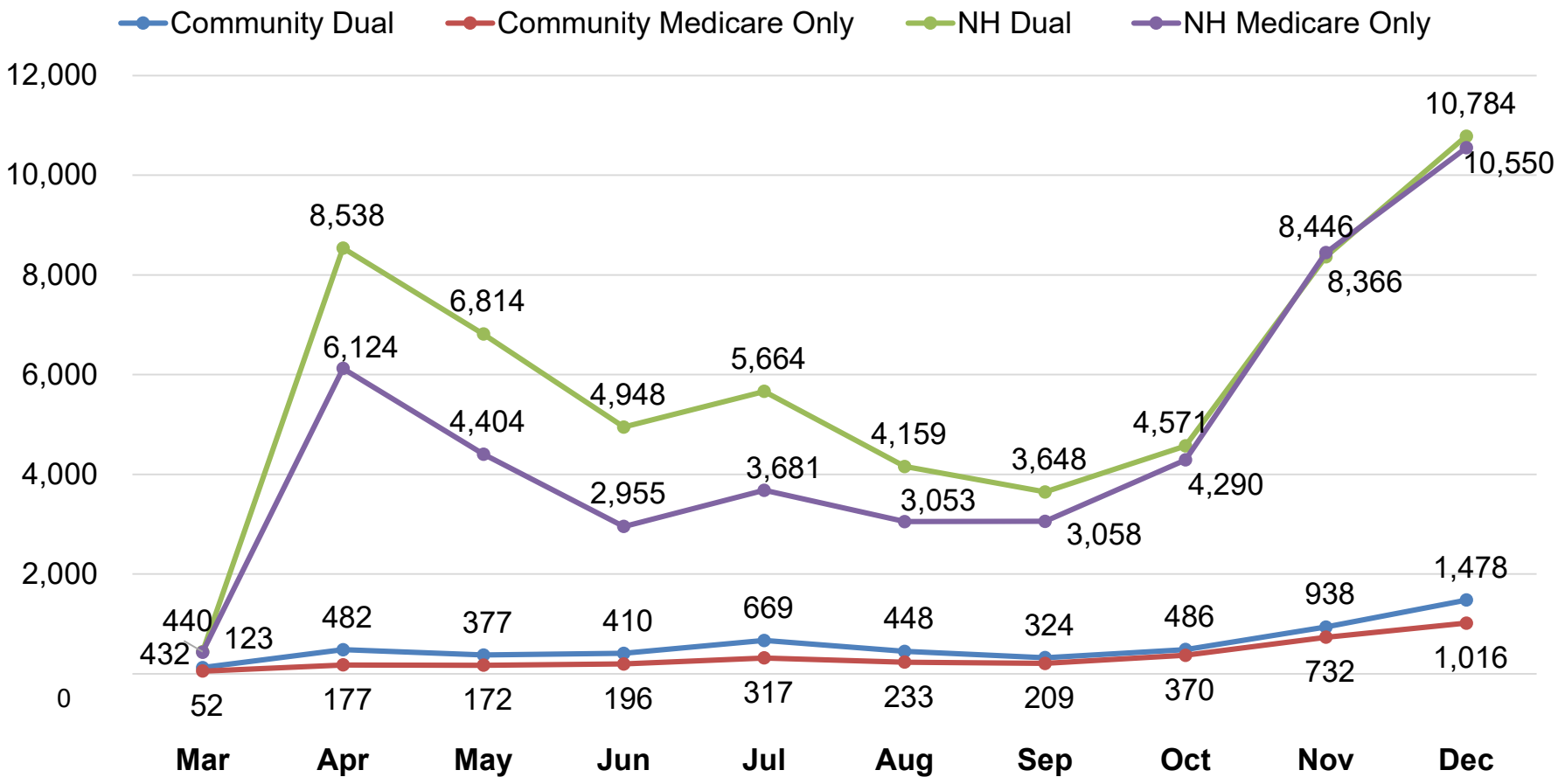
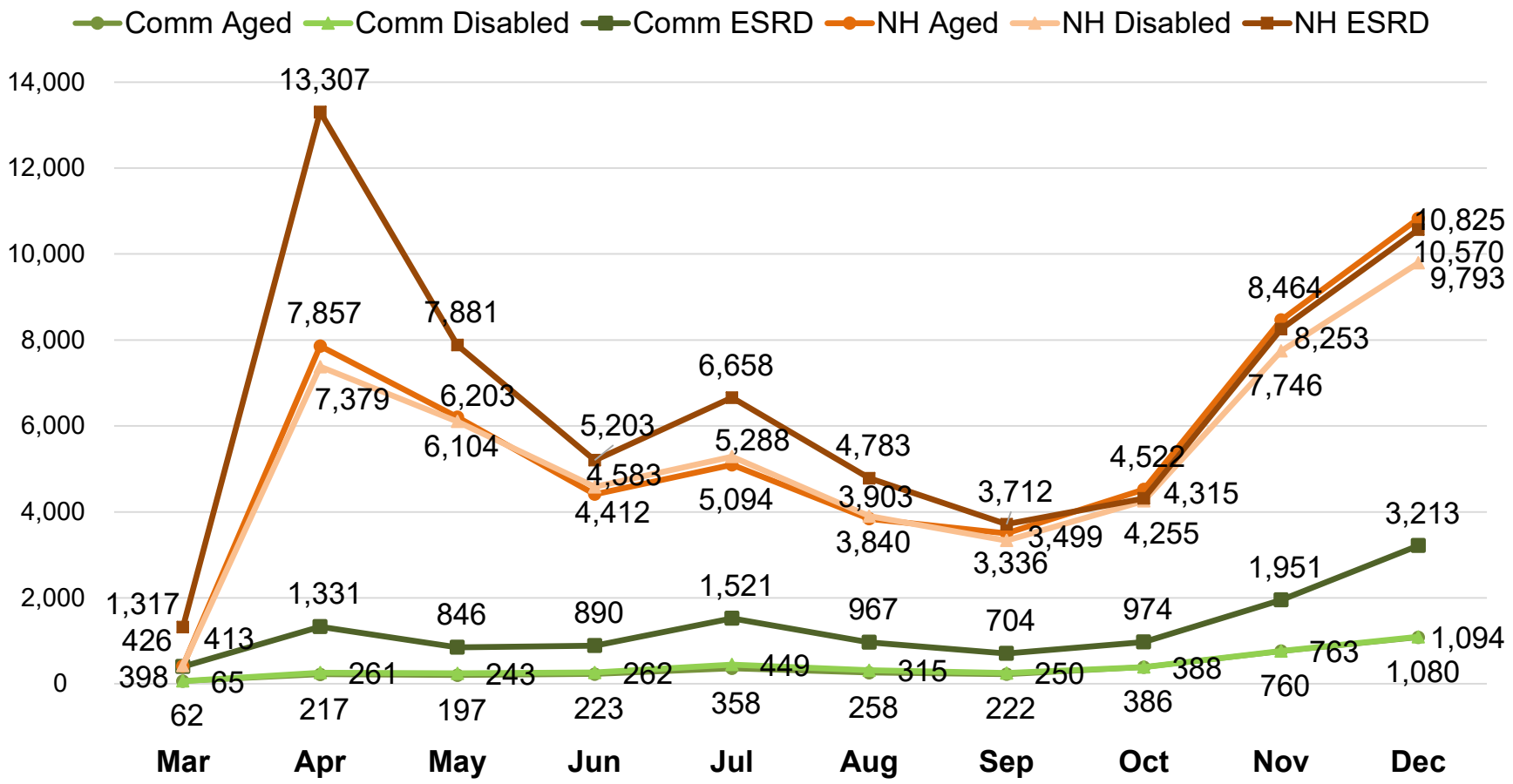
Monthly COVID-19 Case Rates per 100K by Institutional Status and Dual Status

As expected, institutional status is associated with an increased risk of being diagnosed with COVID-19 much more so than dual status.



Monthly COVID-19 Case Rates per 100K by Institutional Status and Current Reason for Entitlement

Beneficiaries with ESRD have a heightened risk of being diagnosed with COVID-19 compared to the aged and disabled.



COVID-19 Hospitalizations among Medicare Beneficiaries

COVID-19 Hospitalization Data

Nursing home residents account for about 2% of the Medicare population but about 19% of all COVID-19 hospitalizations. Nursing home residents were 12 times more likely to be hospitalized with COVID-19 compared to beneficiaries in the community.

	Count of COVID-19 Hospitalizations	Adjusted Cumulative Incidence (Rates per 100K)	Average Monthly Incidence (Rates per 100K)
Total	**853,101**	**1,364**	**136**
Nursing Home	159,082	13,145	1,315
Community	694,019	1,131	113

Adjusted Cumulative Incidence is defined as the count of Medicare COVID-19 cases divided by the average monthly Medicare Part A enrollment. Average Monthly Incidence is defined as the Adjusted Cumulative Incidence divided by the number of months in the study period.

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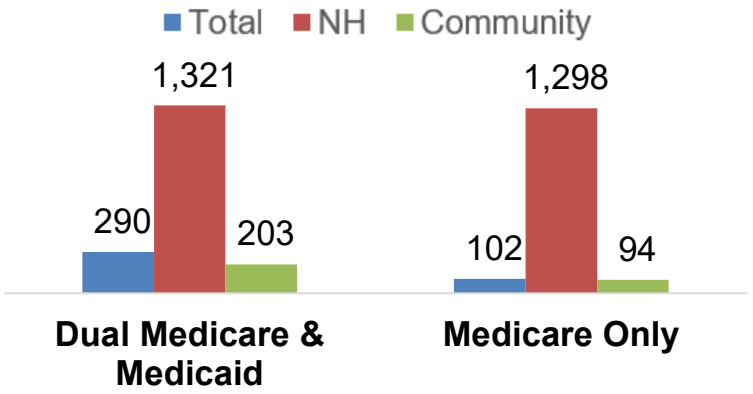
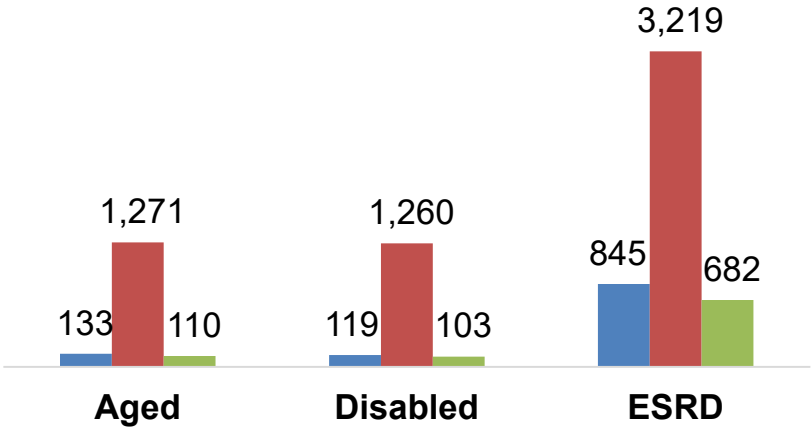
COVID-19 Hospitalizations (Average Monthly Incidence per 100K) by Institutional Status and Beneficiary Characteristics

Across all demographic breakdowns, nursing home beneficiaries had much higher COVID-19 hospitalization rates than community beneficiaries. However, certain demographic characteristics were also associated with an increased risk of a COVID-19 hospitalization.

Dual status had less of an impact on the rate of COVID-19 hospitalizations among nursing home residents than institutional status.



While institutional status had a larger impact on the risk of hospitalization, ESRD status also increased the risk of hospitalization in both the community and nursing home settings.

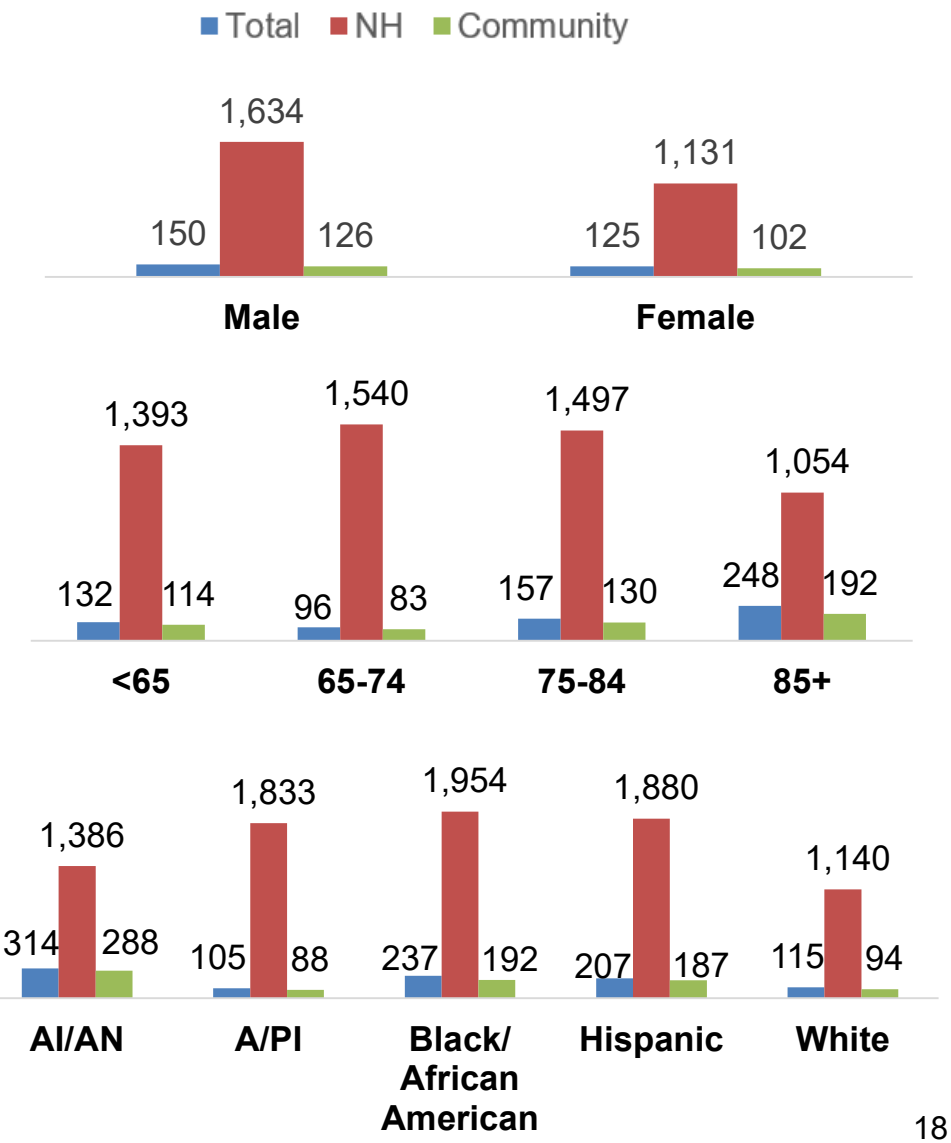


COVID-19 Hospitalizations (Average Monthly Incidence per 100K) by Institutional Status and Beneficiary Characteristics

Male nursing home beneficiaries had a higher risk of COVID-19 hospitalization than female nursing home beneficiaries.

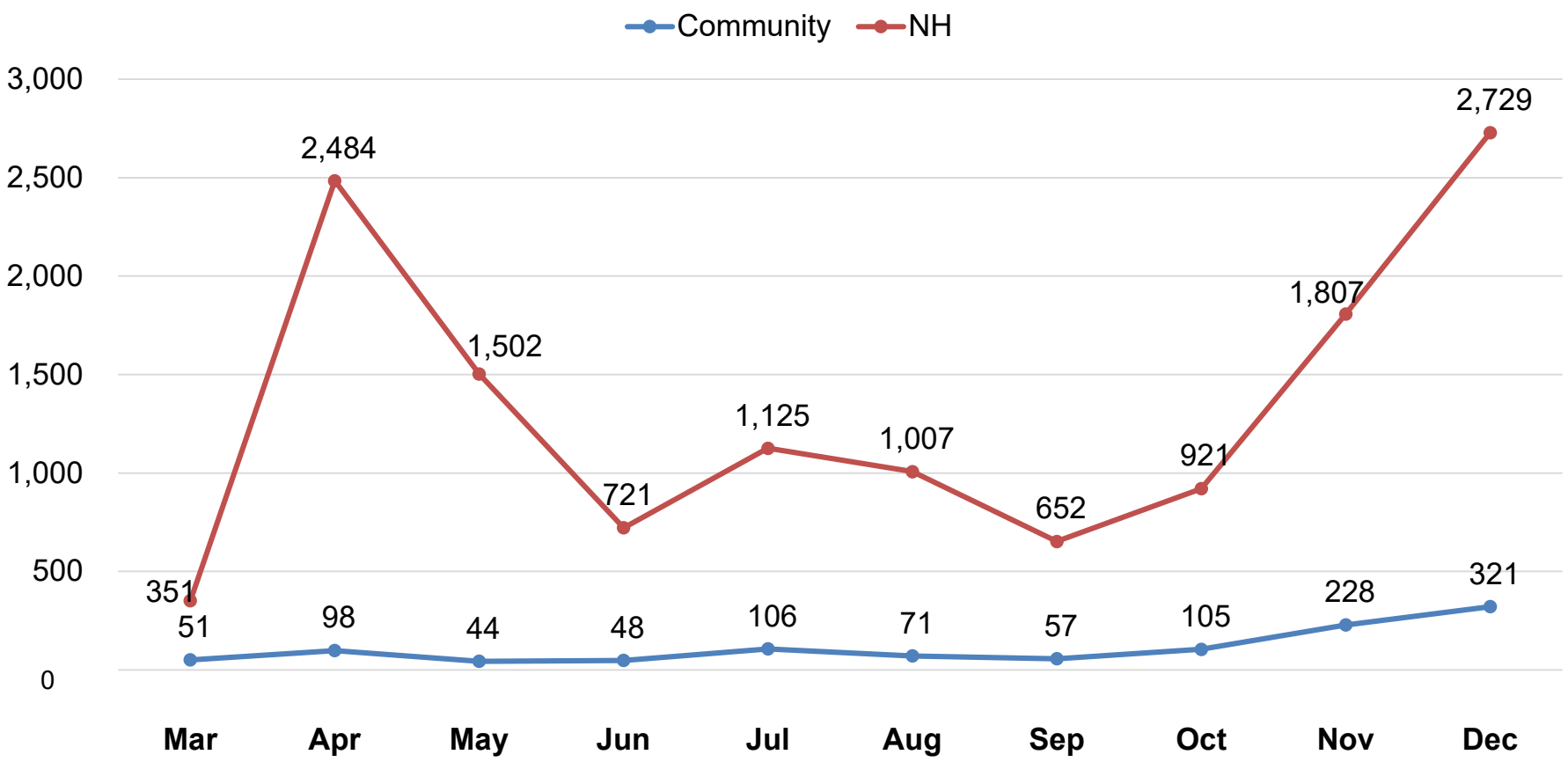
Among residents in the nursing home, those aged 65-74 had the highest risk of a COVID-19 hospitalization compared to other age groups; whereas among beneficiaries in the community, the highest risk of a COVID-19 hospitalization was among those aged 85+, followed by those aged 75-84.

Similar to cases, Hispanic, Black/African American, and Asian nursing home beneficiaries had the highest risk of COVID-19 hospitalization.



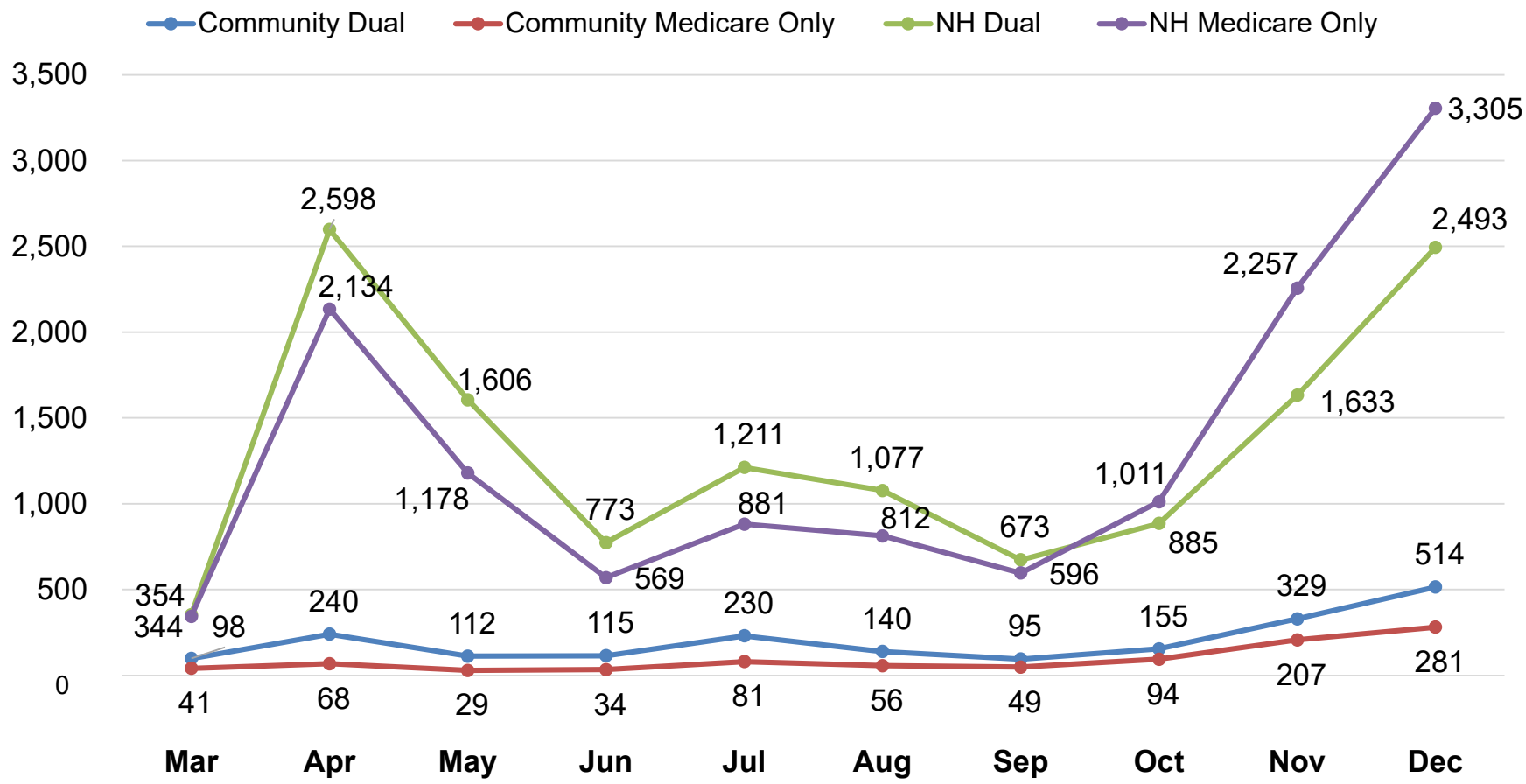
Monthly COVID-19 Hospitalization Rates per 100K by Institutional Status

Similar to cases, COVID-19 hospitalizations are consistently higher among nursing home beneficiaries compared to community beneficiaries.



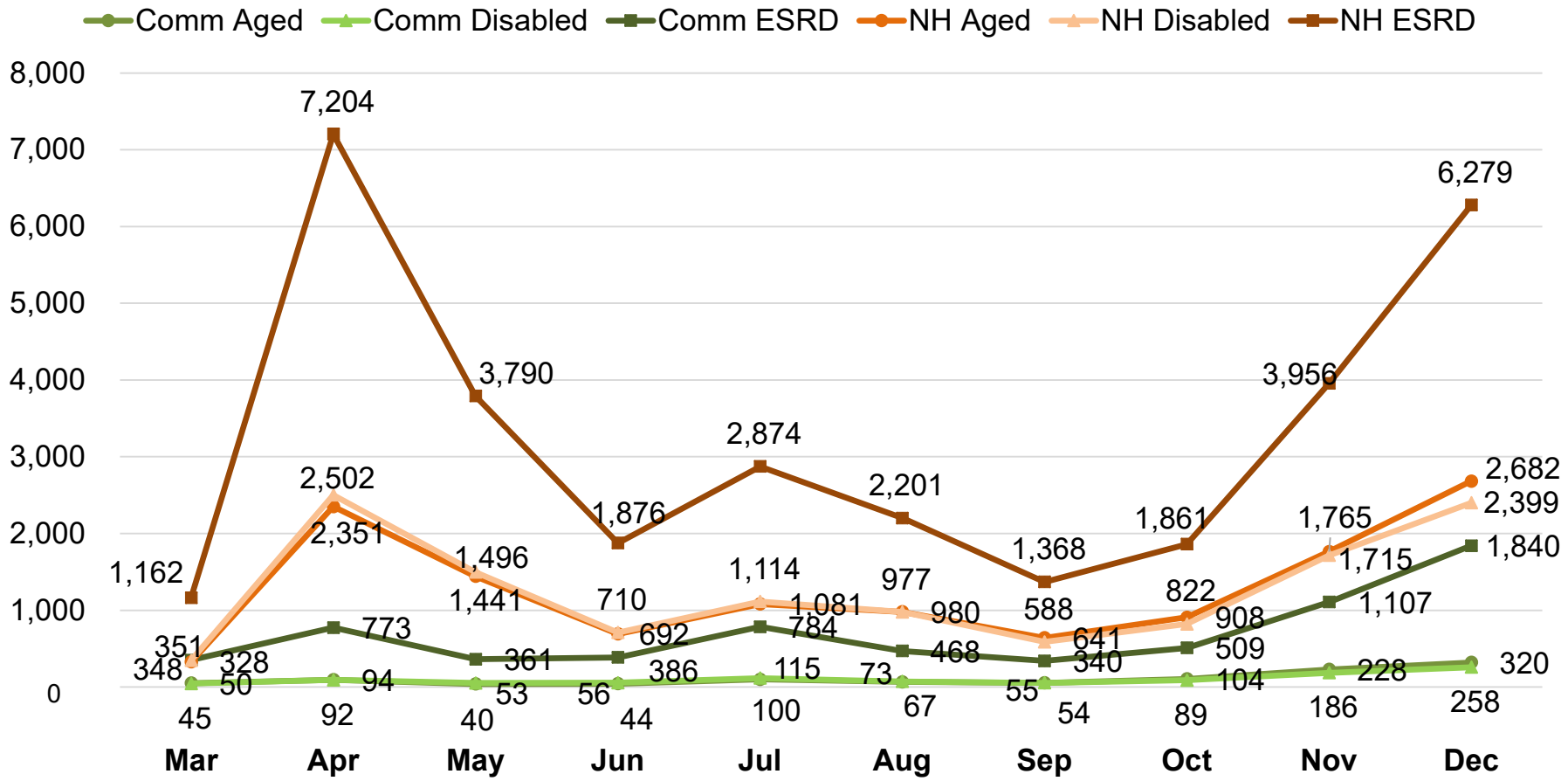
Monthly COVID-19 Hospitalization Rates per 100K by Institutional Status and Dual Status

Similar to cases, institutional status is associated with an increased risk of being hospitalized with COVID-19 much more so than dual status.



Monthly COVID-19 Hospitalization Rates per 100K by Institutional Status and Current Reason for Entitlement

Similar to cases, beneficiaries with ESRD have a heightened risk of being hospitalized with COVID-19 compared to the aged and disabled.



COVID-19 Hospitalizations by Chronic Condition among Fee-For-Service Medicare Beneficiaries

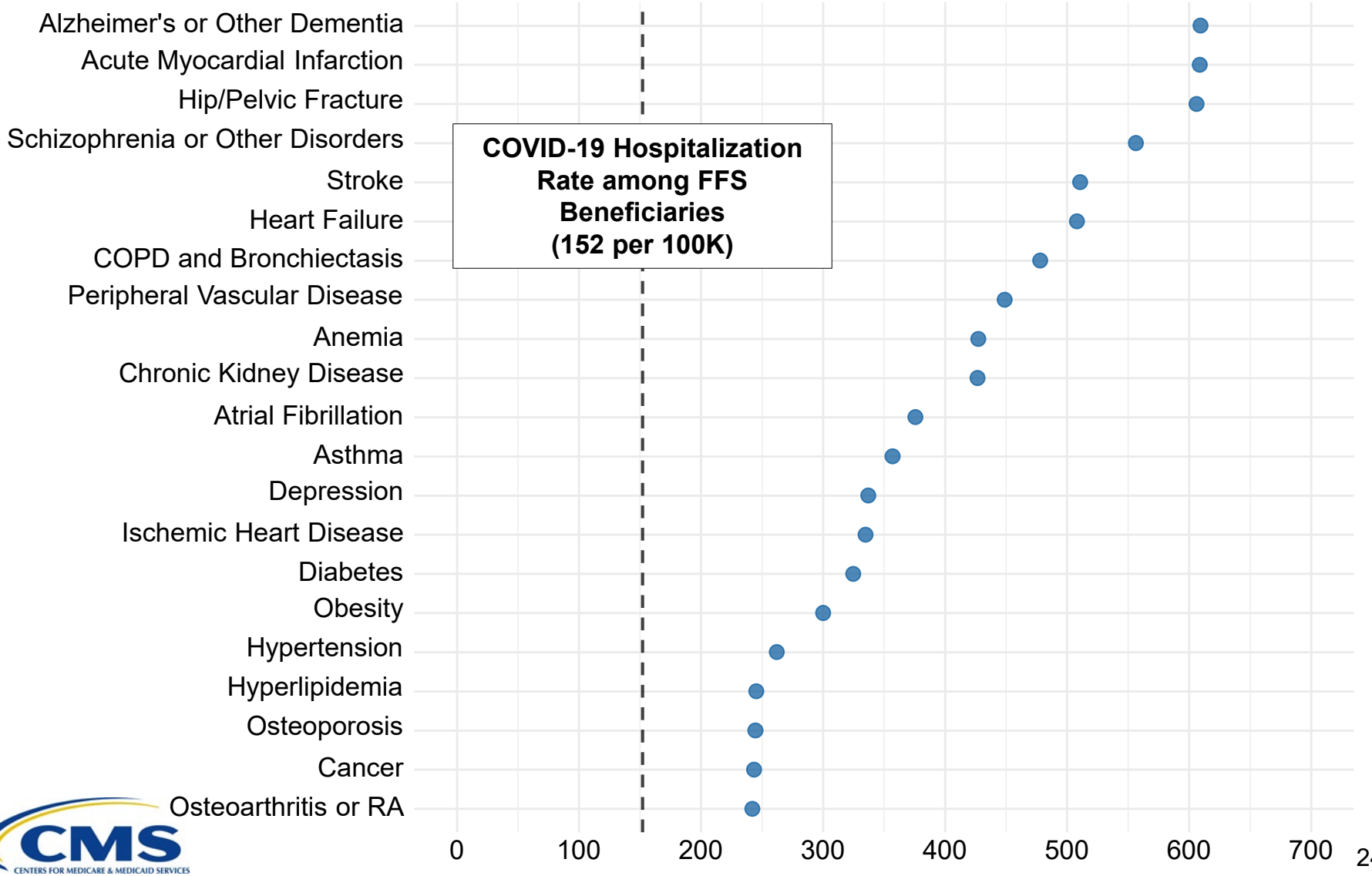
Overview of Medicare Fee-For-Service Population Evaluated for Chronic Conditions

- We report chronic condition prevalence for beneficiaries in fee-for-service Medicare (roughly 60% of beneficiaries in 2020).
- We include 21 chronic conditions that are either common among the Medicare population or associated with increased risk of COVID-19*.

Institutional Status	Dual Status	Fee-For-Service Beneficiaries (Millions)	Medicare Advantage Beneficiaries (Millions)	Total (Millions)
Community	Dual Medicare and Medicaid	5.5	5.0	10.5
	Medicare Only	30.9	19.2	50.1
Nursing Home	Dual Medicare and Medicaid	0.6	0.3	0.9
	Medicare Only	0.3	0.2	0.5
Total		37.4	24.6	62.0

*Additional information related to Chronic Conditions can be found at: https://www2.ccwdata.org/web/guest/condition-categories

Overall COVID-19 Hospitalization Rates (per 100K) by Chronic Condition



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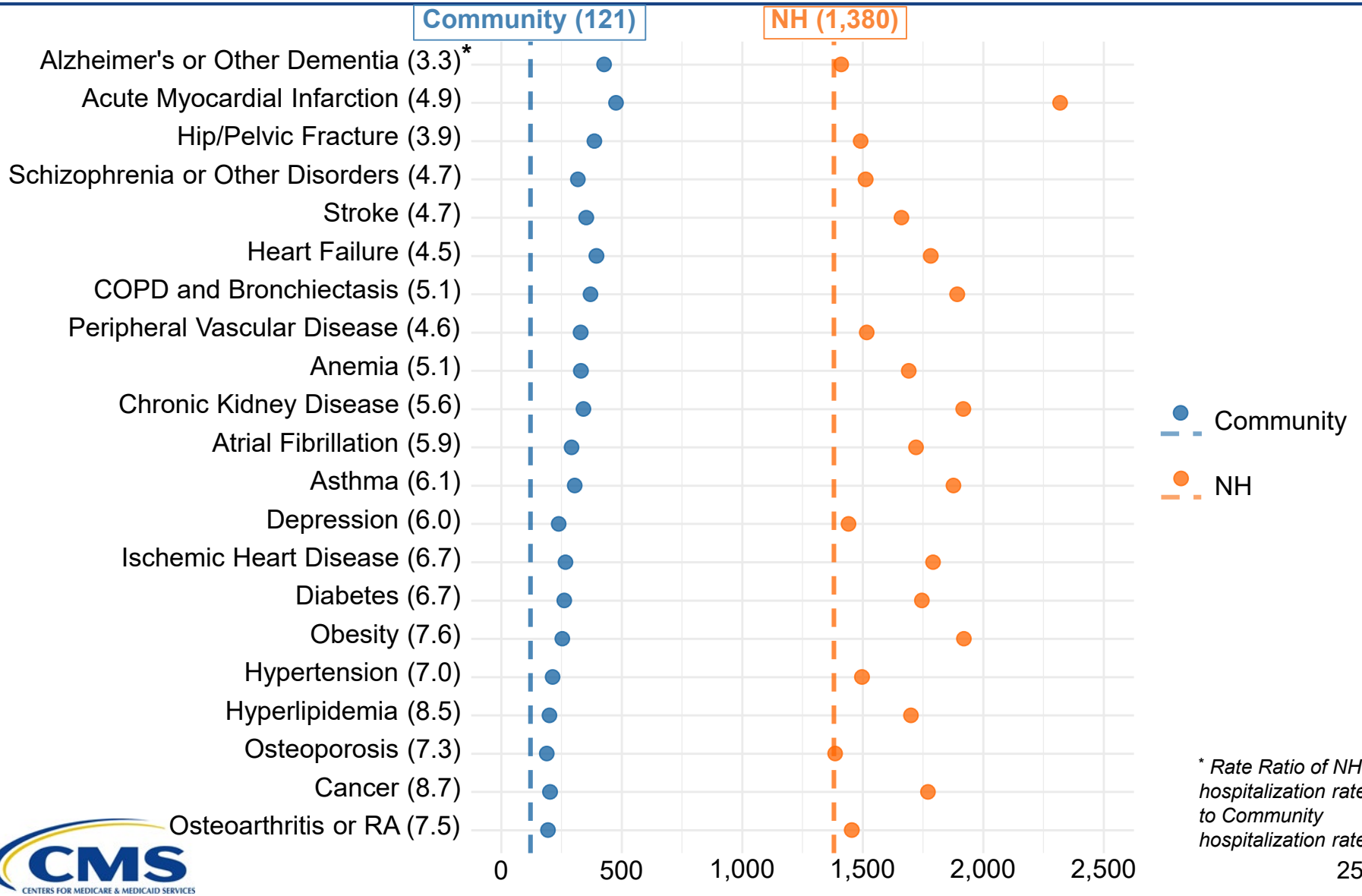
COVID-19 Hospitalization Rates (per 100K) by Chronic Condition and Institutional Status



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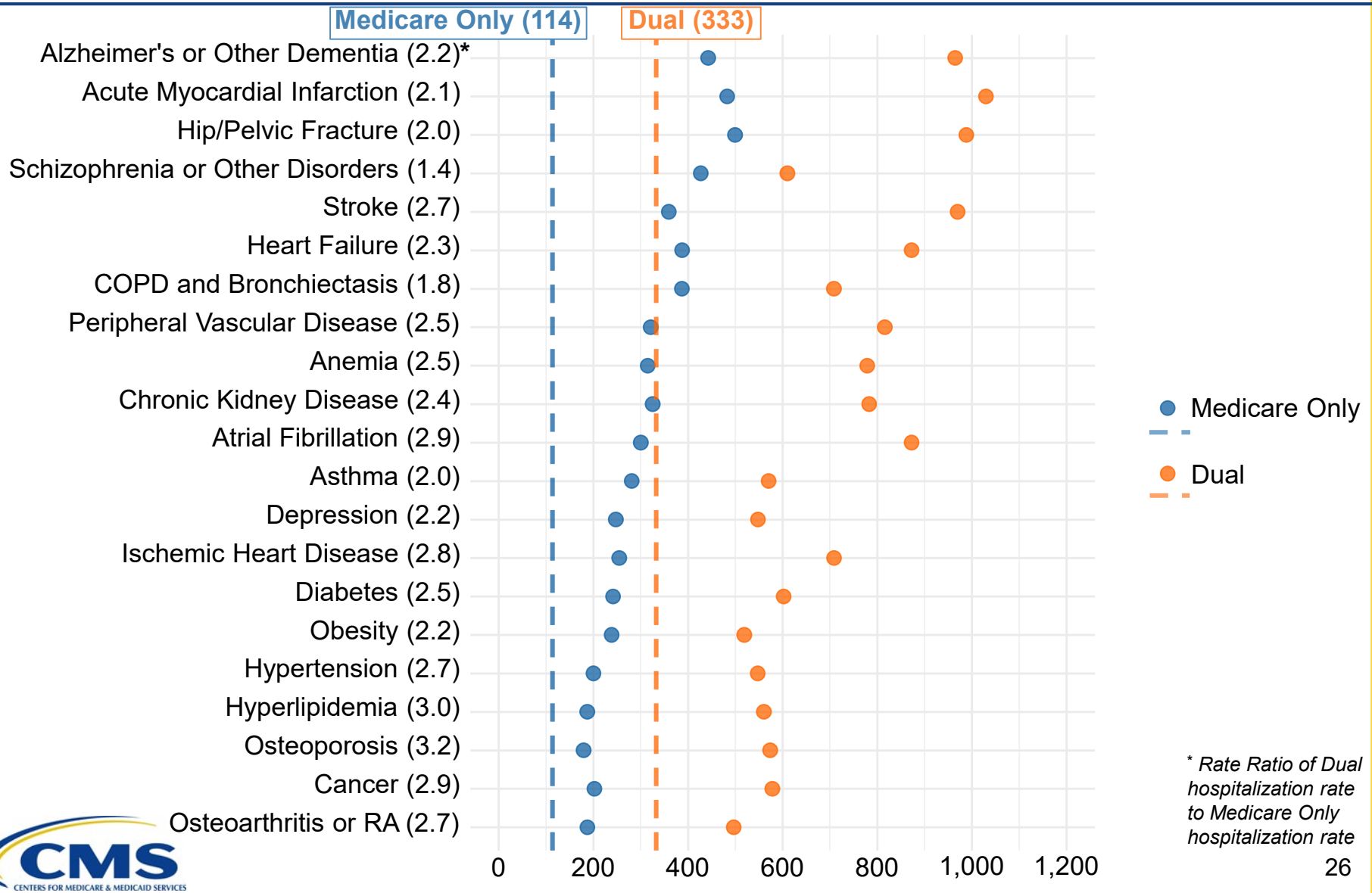
COVID-19 Hospitalization Rates (per 100K) by Chronic Condition and Dual Status



* *Rate Ratio of Dual hospitalization rate to Medicare Only hospitalization rate*

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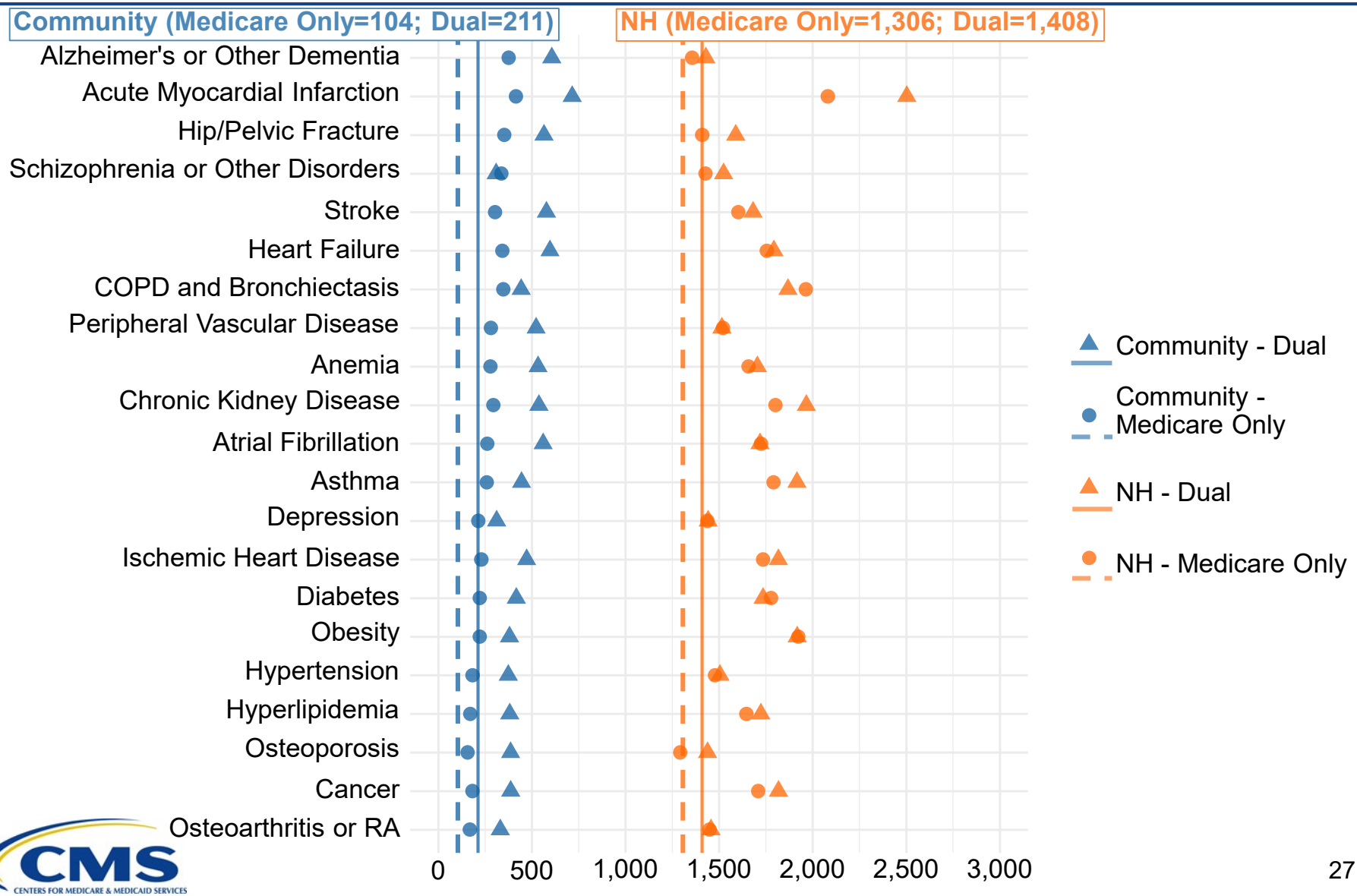
COVID-19 Hospitalization Rates (per 100K) by Chronic Condition, Institutional Status, and Dual Status



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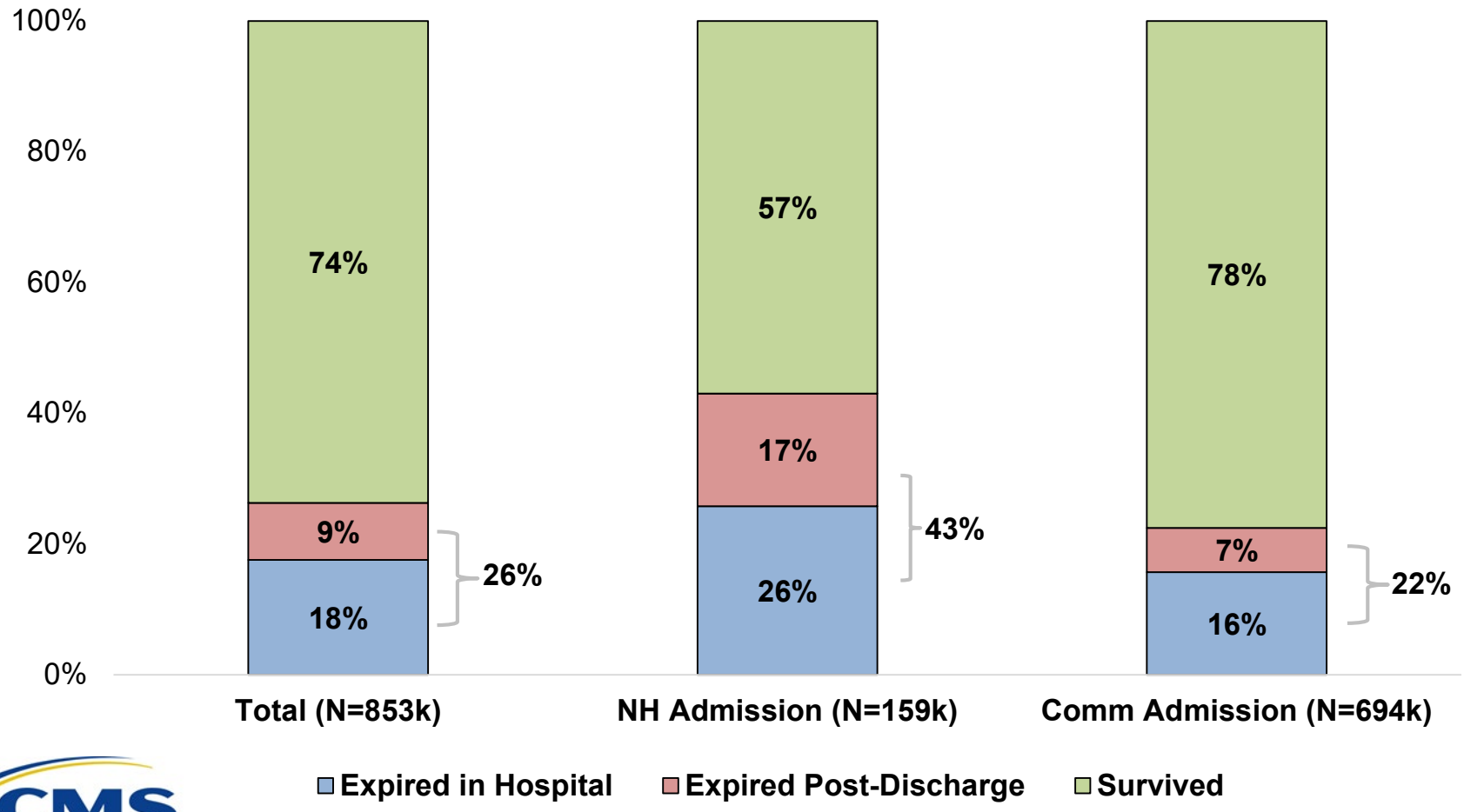
30-Day Mortality Rates among Medicare Beneficiaries Hospitalized for COVID-19

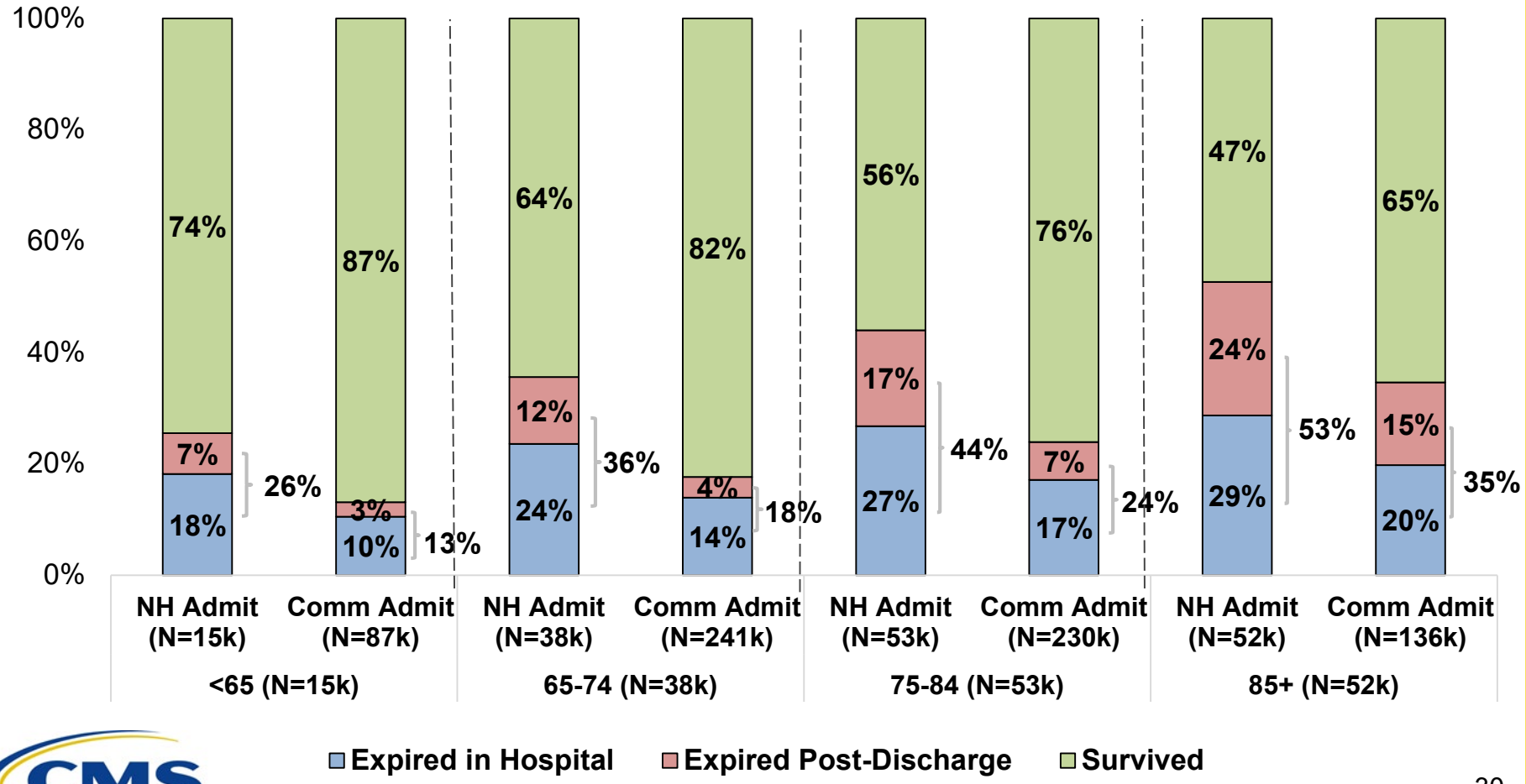
30-Day Mortality Rates among Beneficiaries with a COVID-19 Hospitalization by Institutional Status

A larger percentage of beneficiaries who were admitted to the hospital from a nursing home died within 30 days (43%) as compared to community admissions (22%).



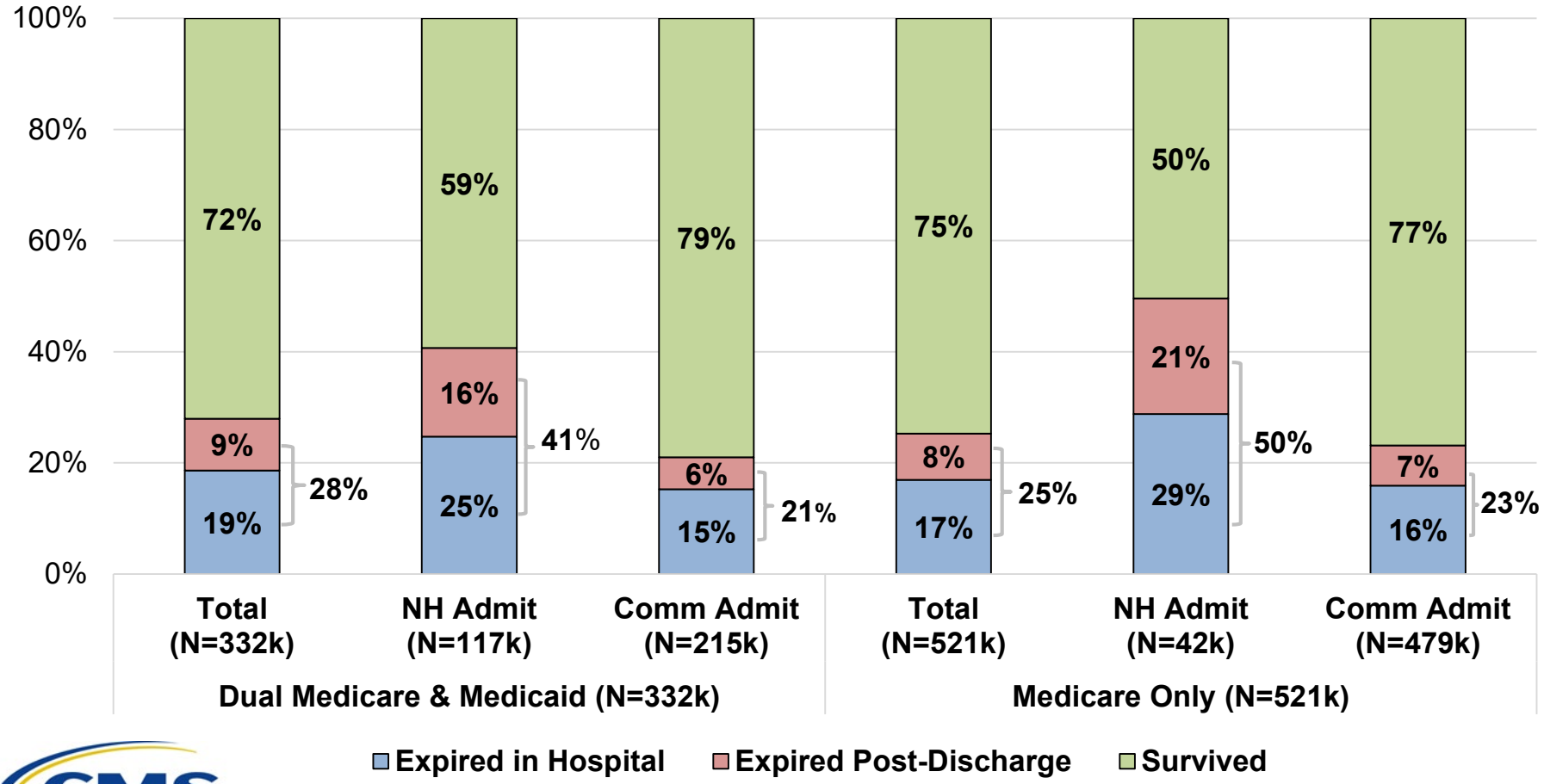
30-Day Mortality Rates among Beneficiaries with a COVID-19 Hospitalization by Institutional Status and Age

The 30-day mortality rate increases with age and institutional status in a linear fashion; community beneficiaries under 65 had the lowest mortality rate while nursing home beneficiaries 85+ had the highest mortality rate.



30-Day Mortality Rates among Beneficiaries with a COVID-19 Hospitalization by Institutional Status and Dual Status

The 30-day mortality rate is slightly higher among duals compared to non-duals. However, when stratified by institutional status, NH duals were less likely to die compared to NH non-duals and community duals were nearly as likely to die compared to community non-duals.



Implications

- The location where beneficiaries reside (e.g. nursing homes) have significantly impacted COVID-19 related diagnoses, hospitalizations, and 30-day mortality.
- Although co-morbidities are associated with COVID-19 diagnosis, hospitalization, and 30-day mortality, these co-morbidities do not seem to explain the associations observed with institutional status.

Future Directions

- CMS plans to assess the extent to which COVID-19 related outcomes are associated with facility-level characteristics, quality, and safety.
- Further examination of the relationship between disparities (e.g., socioeconomic, racial) and COVID-19 outcomes within and across nursing home care is required.
- Better understanding the reasons for such disparities in COVID-19 related outcomes among nursing home residents before, during, and after hospital discharge may also yield insights for improving equity among all beneficiaries who require long-term care services.

Appendix

Comparison of COVID-19 Case Rates per 100K by Demographic Characteristics

Demographic Category	Demographic Characteristic	Case Rate per 100K, Community	Case Rate per 100K, NH	Risk Ratio, NH:Community
Age	<65	430	5,314	12.4
	65-74	345	5,491	15.9
	75-84	396	5,577	14.1
	85+	495	5,300	10.7
Dual Status	Dual Medicare and Medicaid	574	5,709	10.0
	Medicare Only	349	4,629	13.3
Race/Ethnicity	White	354	5,280	14.9
	Black/African American	475	5,911	12.4
	Hispanic	607	6,053	10.0
	Asian/Pacific Islander	265	5,696	21.5
	AI/AN	663	5,102	7.7
Sex	Male	383	5,553	14.5
	Female	391	5,346	13.7
Reason for Entitlement	Aged	377	5,412	14.3
	Disabled	411	5,249	12.8
	ESRD	1,261	6,494	5.1
Total	Total	388	5,421	14.0

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Comparison of COVID-19 Hospitalization Rates per 100K by Demographic Characteristics

Demographic Category	Demographic Characteristic	Hospitalization Rate per 100K, Community	Hospitalization Rate per 100K, NH	Risk Ratio, NH:Community
Age	<65	114	1,393	12.2
	65-74	83	1,540	18.5
	75-84	130	1,497	11.5
	85+	192	1,054	5.5
Dual Status	Dual Medicare and Medicaid	203	1,321	6.5
	Medicare Only	94	1,298	13.7
Race/Ethnicity	White	94	1,140	12.1
	Black/African American	192	1,954	10.2
	Hispanic	187	1,880	10.1
	Asian/Pacific Islander	88	1,833	20.9
	AI/AN	288	1,386	4.8
Sex	Male	126	1,634	12.9
	Female	102	1,131	11.1
Reason for Entitlement	Aged	110	1,271	11.5
	Disabled	103	1,260	12.3
	ESRD	682	3,219	4.7
Total	Total	113	1,315	11.6

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Methodology

Medicare Enrollee and Nursing Home Facts: As of January 2020, over 62 million Americans were enrolled in Medicare: 60% in Medicare fee-for-service (FFS), also known as Original Medicare, and 40% in Medicare Advantage (MA) plans. There were 1.4 million Medicare beneficiaries residing in nursing facilities as of January 2020. Nursing home residents accounted for about 2% of the Medicare population.

Race/Ethnicity Data: A person's race/ethnicity is identified using data collected by the Social Security Administration (SSA) with adjustments to improve the race/ethnicity classification for Hispanic and Asian/Pacific Islander populations. Specifically, CMS worked with the Research Triangle Institute (RTI) to develop an algorithm that uses Census surname lists for likely Hispanic and Asian/Pacific Islander origin and simple geography (residence in Puerto Rico or Hawaii) to improve the SSA race/ethnicity data. The variable developed using this algorithm is often referred to as the RTI Race Code. The race/ethnicity classifications are: American Indian/Alaska Native, White, Black/African American, Asian/Pacific Islander, Hispanic, and Other/Unknown.

Note: Even with the application of the RTI algorithm, comparisons to self-reported data show that race/ethnicity is still misclassified for some people (self-reported data is only available through survey and assessment data for a small subset of the Medicare population). The RTI algorithm improves the accuracy of Medicare race/ethnicity data, but continues to undercount people with a race/ethnicity of Asian/Pacific Islander and American Indian/Alaska Native, and to a lesser extent Hispanic, in the Medicare population.

Medicare Entitlement: Medicare entitlement is available to three basic groups of "insured individuals" – people age 65 and older (aged), younger people with disabilities (disabled), and people with end stage renal disease (ESRD). Medicare entitlement for a beneficiary may change over time (e.g., when a person turns 65 his/her entitlement reason changes to aged). For purposes of this snapshot, people who have ESRD, regardless of whether they are also aged or disabled, are classified as ESRD. In all other cases, we use a person's current reason for entitlement (aged or disabled).

Methodology

What You Should Know When Using Our Data: You should use caution when interpreting our data. We collect Medicare claims data and encounter records for payment and other program purposes, but not for public health surveillance. There will always be a delay or "claims lag" between when a service occurs and when the claim or encounter for that service is in our database. The length of the lag depends on the service type and program. There may also be longer claims lag due to the pandemic, but we are unsure of the impact.

Medicare FFS Claims and MA Encounter Records: Historically, 90% of FFS claims across all claim types are submitted within 3 months, while 90% of MA encounter records across all claim types are submitted within 12 months. We expect timely FFS claims submissions because providers submit claims directly to us for payment. A longer claims lag is expected for Medicare Advantage encounter records because Medicare Advantage Organizations: (1) collect encounter records before submitting them to us and (2) have more time to submit encounter records because there are different programmatic uses for the data, like risk adjustment.

Minimum Dataset 3.0 (MDS): There is also a data lag present in the Minimum Dataset 3.0 (MDS). MDS data are uploaded monthly in CMS's Chronic Conditions Warehouse with about a 45-day lag from assessment submission date. MDS data are currently available through February 28, 2021. These data should be used with caution since the MDS data are not fully mature, and we are uncertain of the impact that the COVID-19 pandemic and policy waivers have had on assessment submission. Based on 2019 assessment data that were submitted, we estimate that we have received roughly 95% of expected assessments for March through July 2020, 75-80% of expected assessments for August through September 2020, 85% through October through December 2020, and 50% for January 2021. We believe the increase in expected assessments for October through December 2020 may be attributed to the ending of the exemption that allowed NHs to temporarily suspend submission of MDS assessments.

Methodology

What You Should Know When Using Our Data (continued)

Percent of Medicare FFS Claims Received by Time after Date of Service

Claim Type	1 Month*	2 Months	3 Months	6 Months	9 Months	12 Months
Inpatient	11%	52%	61%	80%	88%	92%
SNF	5%	46%	66%	81%	87%	92%
Home Health	11%	52%	65%	83%	89%	93%
Outpatient	17%	63%	73%	87%	92%	95%
Professional	21%	62%	73%	87%	93%	95%

Percent of Medicare Advantage Encounters Received by Time after Date of Service

Claim Type	1 Month*	2 Months	3 Months	6 Months	9 Months	12 Months
Inpatient	43%	91%	96%	99%	99%	100%
SNF	2%	81%	94%	98%	99%	100%
Hospice	3%	81%	92%	98%	99%	100%
Home Health	22%	74%	90%	97%	99%	100%
Outpatient	37%	90%	95%	98%	99%	100%
Carrier	43%	87%	93%	98%	99%	100%

*Month 1 is the service month (i.e., month for the claim through date); FFS claims analysis based on data for July 2016; MA encounter data shows the % of encounters reported to us by 30 day increments from the through date of the service for January 2018. The data in this table is meant to be descriptive, but should not be used to adjust data presented in this update due to pandemic-related claims submission uncertainties.

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