

# What Role Did Post-Acute Care Providers Play in Addressing the COVID-19 Public Health Emergency?

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## New Research Illustrates the Distinct Roles of Post-Acute Care Settings During the Pandemic to Inform Policymaking Now and Going Forward

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**WASHINGTON, DC:** A new analysis of the discharge destinations of Medicare patients leaving hospitals during the first wave of the COVID-19 pandemic sheds light on the role of post-acute care (PAC) providers supporting the health system response to COVID-19. Health economists from KNG Health quantified key clinical characteristics of COVID-19 patients compared to other patients in hospital last year. The differences persisted beyond the initial period of hospitalization. Upon discharge, COVID-19 patients were half as likely to be discharged home, twice as likely to go to long-term acute-care hospitals (LTCHs), and 66% more likely to go to Skilled Nursing Facilities (SNF) than non-COVID-19 patients.

Health economist and lead author, Lane Koenig, President of KNG Health Consulting, described the impetus for the study. “The pandemic has highlighted some key gaps in the U.S. healthcare system. Early on, many raised concerns as to whether we had the hospital capacity to provide adequate care to COVID-19 and other patients. We wanted to examine the role of post-acute care in helping communities and hospitals respond to the COVID-19 emergency.” This latest study builds on KNG Health’s prior data-driven analyses on the impact of COVID-19 on hospitalizations, patient characteristics, and resource use during the first wave of the pandemic.

The KNG Health team compared the frequency of PAC use and patient characteristics for Medicare beneficiaries by condition (COVID-19 versus non-COVID-19) and year (2019 versus 2020) to better understand how communities used post-acute providers to help respond to the nation’s public health emergency and whether these uses of PACs are consistent with historical patterns of care. The study analyzed Medicare transfers from general hospitals to post-acute hospitals (LTCHs or IRFs), skilled nursing facilities, hospice facilities, and home health. “Our study demonstrated that each of the post-acute care settings played an important but different role in responding to the COVID-19 emergency. There are important questions about how patients fared given the shift in post-acute treatment settings. We believe that understanding these outcomes could help inform efforts to improve post-acute care in the future.”

The study was just published August 3 through the [Health Care Financing Initiative](#) at the McCourt School of Public Policy, Georgetown University. It is the latest report featured in HCFI’s growing digital collection, [The Impact of COVID-19 on Post-Acute Patients, Providers, and Public Policy](#). Carol Davis, Assistant Research Professor at McCourt School of Public Policy serves as editor for the HCFI digital collection. “This research by KNG Health quantifies what many providers were seeing on the frontlines in the early months of the pandemic— that the particular capabilities of various post-acute settings would be called on to contribute in markedly different ways during the pandemic, often departing from some traditional patterns of hospital and post-acute care use. We encourage providers and policymakers to use this and subsequent analyses demonstrating practical distinctions between PAC settings that have become more pronounced over the past several years.” HCFI continues its project to develop and curate a body of policy-focused research aggregating insights about PAC settings into a coordinated vision of system readiness for the remainder of the pandemic and beyond.

Find the full report at <http://hdl.handle.net/10822/1062183>

[KNG Health Consulting](#) is a health economics and policy company with research expertise across all sectors of the health care industry.

The [Health Care Financing Initiative](#) is one of several public policy research centers at the McCourt School of Public Policy, Georgetown University.

#postacutecare, #COVID-19, #criticalcare, #healthcarepolicy, #PHE, #McCourtSchool



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## ABOUT THE RESEARCHERS: KNG Health Consulting, LLC



**Lane Koenig, PhD**

*President*

Lane Koenig, PhD is President of KNG Health Consulting and leads its Healthcare Reform and Payment Innovation Practice. With expertise on hospital and post-acute care payment policy, care delivery models, and quality, his work regularly assesses the potential impact of proposed legislation or regulations on providers and patients. Prior to founding KNG Health in 2007, Dr. Koenig was an economist in the Office of Policy at the Centers for Medicare & Medicaid Services.



**Aig Unuigbe, PhD**

*Senior Research Associate*

Aig Unuigbe, PhD is a Senior Research Associate in the Healthcare Reform and Payment Innovation Practice at KNG Health. Dr. Unuigbe is an applied microeconomist with expertise in health economics, health policy, and labor economics. He has analyzed the impact of public health and labor policies on healthcare utilization, health measures and financial outcomes.



**Julia Sheriff, BM**

*Research Associate*

Julia Sheriff, BM is a Research Associate in the Healthcare Reform and Payment Innovation Practice at KNG Health where she conducts quantitative analyses using Medicare claims and other healthcare data sources. Her work includes the modeling of the effects of healthcare payment systems changes on providers and patient outcomes and the development of interactive models to model these effects.



**Berna Demiralp, PhD**

*Principal Research Associate*

Berna Demiralp, PhD is a Principal Research Associate at KNG Health Consulting and Director of the Evaluation and Health Economics practice. She is an applied micro-economist with expertise in health, labor and demographic economics. Dr. Demiralp evaluates Medicare programs and alternative payment models; analyzes cost, utilization, and patient outcomes associated with acute and post-acute care; and assesses cost-effectiveness of treatment alternatives.

# ABOUT THE HEALTH CARE FINANCING INITIATIVE: McCourt School of Public Policy, Georgetown University

## Our Mission

The Health Care Financing Initiative fosters research and engagement between our students and faculty, legislative and policymaking leaders, and industry leaders in the areas of health care financing and public policy. The McCourt School established the Health Care Financing Initiative (HCFI) in June 2018 with the generous support of the Institute for Critical Care Foundation (ICCF)\*.

## HCFI Team



### **Thomas DeLeire, PhD**

*Professor, McCourt School of Public Policy & Director, Health Care Financing Initiative*

Thomas DeLeire is Professor at Georgetown University. His research focuses on policies to improve healthcare access and on the dynamics between these policies and labor markets. He has advised federal and state agencies, having been a Senior Advisor for the U.S. Department of Health and Human Services, a Senior Analyst with the Congressional Budget Office, and a Senior Economist for the President's Council of Economic Advisers. He also was the principal investigator for an evaluation of the State of Wisconsin's BadgerCare Plus program.



### **Carol B. Davis, PhD, MBA**

*Associate Director of Research and Publications, HCFI*

Carol B. Davis is an Assistant Research Professor in the McCourt School of Public Policy at Georgetown University. Her research focuses on public policies that govern access to healthcare and medical-financial security. She is currently working to establish a forum for research on financing post-acute care for critically-ill patients within the Health Care Financing Initiative Research Center. Before joining the faculty at Georgetown, Dr. Davis was the Interim President of the Institute for Critical Care (ICCF), an education and public policy foundation. Dr. Davis' principal occupation before ICCF was a management consultant at BoozAllen and KPMG, with expertise in strategic planning and operations improvement for health and hospital systems.



### **Rochelle Archuleta, MSHA MBA**

*Research Fellow, HCFI and Director of Public Policy, American Hospital Association*

Rochelle Archuleta is the Policy Director for the American Hospital Association, focusing on post-acute care issues. She works with hospitals nationwide, the Congress, the Administration, and other stakeholders to develop and advocate for AHA members' policy priorities. Additionally, she is a Board Member of Unity Health Care, a network of 29 community health centers located throughout Washington DC, which provides comprehensive primary healthcare services to uninsured and under-insured individuals. Prior to joining the AHA in 2002, Ms. Archuleta served as the David Winston Health Policy Fellow with the U.S. House of Representatives Ways & Means Health Subcommittee. She also provided policy and operations leadership for the Baptist Health Services in Colorado. In addition, Ms. Archuleta worked as policy analyst for the Colorado State Legislature.



### **Lisa Grabert, MPH**

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Lisa Grabert is a research faculty member at Georgetown University in Washington, DC and Marquette University in Milwaukee, WI. She teaches graduate-level health policy courses. Lisa previously served as a senior aide for the US House Ways & Means Committee where she had responsibility over Medicare Part A issues. Prior to her Congressional service, Lisa was a director of public policy at the American Hospital Association (AHA). Lisa started her career at the Centers for Medicare & Medicaid Services (CMS). She is a graduate of the University of Wisconsin. She earned a Masters in Public Health from Emory University.

## Abstract

**Research Objective.** Although short-term acute care hospitals (STACHs) are the nation's frontline in fighting severe COVID-19 infections, the post-acute care (PAC) sector—home health agencies (HHAs), skilled nursing facilities (SNFs), inpatient rehabilitation facilities (IRFs), and long term care hospitals (LTCHs)—offered a source for clinical staff, capacity, and other resources to support STACHs. We investigate the role played by PAC during the first wave of the COVID-19 public health emergency (PHE).

**Study Design.** The analysis was conducted using data from the 100% Medicare fee-for-service (FFS) claims. The population consisted of Medicare beneficiaries discharged from a STACH between March 2020 and July 2020. We compared patient characteristics and PAC use patterns between COVID-19 and non-COVID-19 patients during the study period and to patterns observed in a pre-COVID-19 period.

**Population Studied:** The population consisted of Medicare FFS beneficiaries discharged from a STACH in March-July 2020 and March-July 2019.

**Principal Findings.** Medicare beneficiaries with a diagnosis of COVID-19 were more likely to either die during the STACH stay or be discharged to institutional PAC, or hospice than non-COVID-19 patients. Among PAC users, we find that COVID-19 patients were more than twice as likely to be admitted to an LTCH (5.1% v. 2.1%) and 66 percent more likely to go to a SNF (61.6% v. 37.0%) than non-COVID-19 patients. In contrast, COVID-19 patients were 43 percent less likely to be discharged with home health than non-COVID-19 patients and 59 percent less likely to go to an IRF than a non-COVID-19 patient during the initial phase of the pandemic. Overall, COVID-19 patients exhibit higher measures of illness severity than non-COVID-19 patients, but there are differences in severity across PAC settings with severity of illness among COVID-19 patients highest for those discharged to LTCHs and IRFs. A comparison of the distribution of non-COVID-19 discharges to PAC between 2019 and 2020 shows a notable difference in the share of patients discharged to a SNF, with a 6.6-percentage-point decline (43.6% to 37.0%). The decline in the proportion of SNF discharges was accompanied by a 4.5- and 2.0-percentage-point increase in the share of discharges to HHA and IRF, respectively.

**Conclusions.** We find difference in patterns of STACH discharge for COVID-19 patients and others during the PHE, supporting the hypotheses that PAC providers played important and varied roles in responding to the initial phase of the COVID-19 pandemic. Our results support the notion that HHAs and IRFs served as substitutes for SNFs. We also found some support that LTCHs and SNFs may have served as COVID-19 treatment facilities as COVID-19 patients were significantly more likely to be seen in one of these settings than non-COVID-19. Finally, to the extent that STACHs faced capacity constraints, our findings are consistent with LTCHs and, to some degree, IRFs serving as release valves for STACHs by caring for the most severely ill COVID-19 and, in the case of LTCHs, non-COVID-19 patients.



## Introduction

As the COVID-19 pandemic has ravaged the U.S. with almost 600 thousand deaths and over 2 million hospital admissions<sup>1</sup>, hospitals and the broader healthcare infrastructure have had to adapt to shortages of beds, staff, and personal protective equipment. Although short-term acute care hospitals (STACHs) are the nation's frontline in fighting severe COVID-19 infections, the post-acute care (PAC) sector—home health agencies (HHAs), skilled nursing facilities (SNFs), inpatient rehabilitation facilities (IRFs), and long term care hospitals (LTCHs)—offered a source for clinical staff, capacity, and other resources to support STACHs.

Early in the pandemic, some advocated for an expanded role for PAC in addressing the public health emergency (PHE) because of projected shortages during COVID-19 surge periods. Arora and Fried argued for ramping up home health to care for COVID-19 patients following hospital discharge, in areas where SNF bed availability is unable to meet demand.<sup>2</sup> Makam and Grabowski argued that LTCHs, as hospital level providers that care for medically complex patients, could free up STACH capacity by caring for both COVID-19 and non-COVID-19 patients.<sup>3</sup> Dafny and Lee proposed the establishment of dedicated SNFs for COVID-19 patients to limit infection spread and expand capacity.<sup>4</sup> These papers pointed to two possible distinct roles for PAC providers during the PHE: (1) capacity extenders for both SNFs (i.e., home health agencies) and STACHs (i.e., LTCHs); and (2) COVID-19 treatment facilities, specializing in the treatment and recovery of COVID-19 patients.

In this paper, we examine PAC utilization patterns to understand the role of each of the post-acute care providers in responding to the initial phase of the PHE. We focus on Medicare beneficiaries discharged from a STACH to examine:

- Changes in PAC use between 2019 and 2020;
- Differences in PAC use between COVID-19 and non-COVID-19 patients; and
- Variations in patient characteristics by COVID-19 status and time period.

By comparing PAC use and patient characteristics for Medicare beneficiaries by condition (COVID-19 vs non-COVID-19) and year (2019 vs 2020), we can better understand how communities used PAC providers to help respond to the PHE and whether these uses of PAC are consistent with historical patterns of care.





## Methods

To assess PAC use patterns, we examined claims for Medicare fee-for-service beneficiaries discharged from a STACH during March through July of 2019 and 2020, using the Medicare inpatient and SNF Standard Analytic Files for calendar year quarters 1 through 3.<sup>5</sup> To obtain beneficiary characteristics and enrollment information, we merged data from the annual Medicare Beneficiary Summary Files.

**Study Population:** To be included in the analytic sample, a patient must have been enrolled in Medicare Part A and not enrolled in Medicare Advantage during the month of discharge from the STACH. We excluded cases with zero Medicare covered days or charges and claims missing a discharge date. COVID-19 patients were identified with a primary or secondary diagnosis of COVID-19 during a STACH stay, using ICD-10-CM B97.29 (for claims before April 1, 2020: “other coronavirus as the cause of diseases classified elsewhere”) and U07.1 (for claims after April 1, 2020: “2019 Novel Coronavirus, COVID-19”).

**Identification of STACH Discharge Destinations:** We identified a patient as admitted to a SNF, IRF, LTCH, or other inpatient facility if the patient was admitted to these settings either same day or next day after a STACH discharge. For STACH discharges that we did not identify as being immediately admitted to a SNF, IRF, LTCH, or other inpatient facility, we identified patients as discharged to hospice, home with home health or home without home health using the STACH claim’s discharge status code.

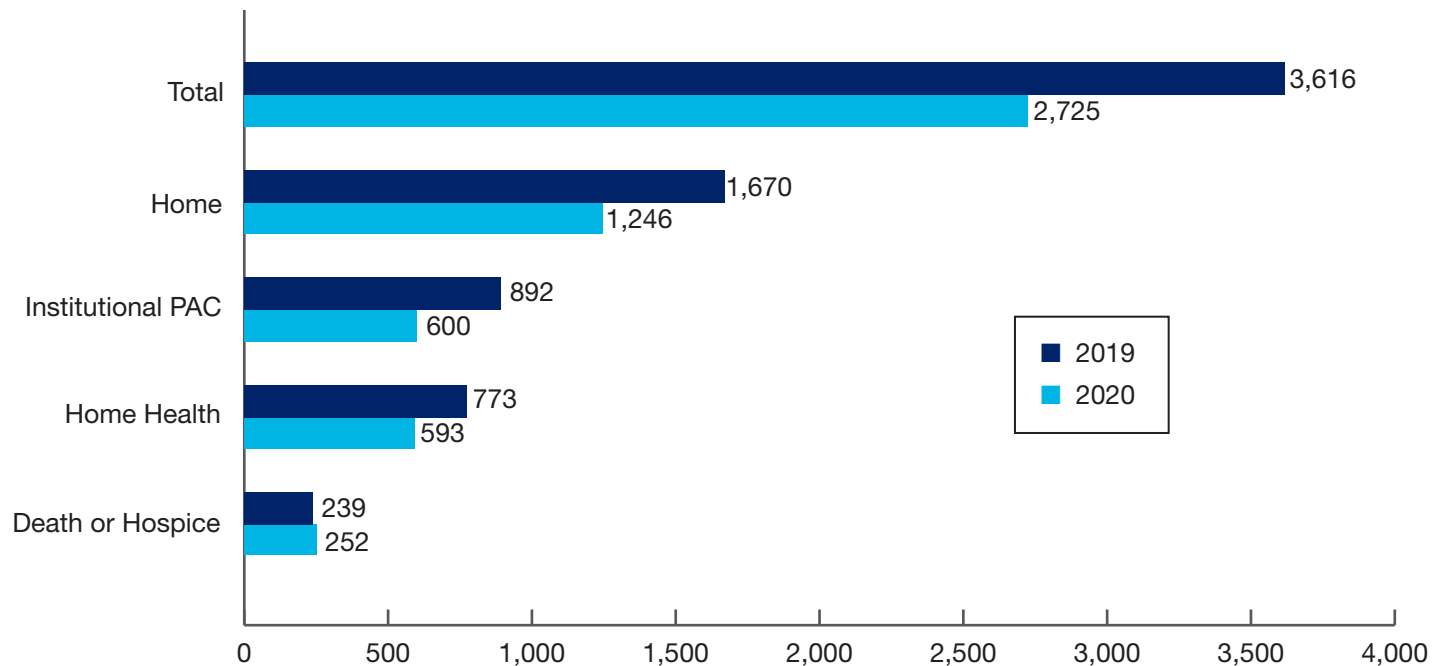
**Analysis:** We compared 2020 COVID-19 patients to 2020 non-COVID-19 patients, and 2020 non-COVID-19 patients to 2019 patients to understand both changes in healthcare utilization during the pandemic and differences between COVID-19 and other patients. For the three populations (2020 COVID-19, 2020 non-COVID-19, 2019) we described patient demographic and clinical characteristics by discharge destination. Measures of service utilization included STACH length of stay, intensive care unit (ICU) use, and ventilator use. We also examined measures of patient severity, including indicators for case-mix index<sup>6</sup>, organ failure, number of comorbidities and complications (CCs) and major CCs (MCCs)<sup>7</sup>, and the Elixhauser comorbidity index<sup>8</sup>.

# Findings

## Volumes at Hospitals and Post-Acute Care Providers Fell Significantly During the Initial Months of the PHE

From March to July 2020, there were over 2.7 million discharges of Medicare FFS enrollees from STACHs. Relative to the same period in 2019, we estimate that total Medicare FFS discharges from STACHs fell by 900 thousand (-25%) during the initial months of the PHE (Figure 1). As a result of lower overall volume at STACHs, the number of Medicare FFS beneficiaries discharged to each of the PAC discharge destinations also decreased relative to 2019 levels. Discharges to institutional PAC settings, which include SNFs, IRFs, and LTCHs, fell by 292 thousand (-33%), while discharges to home health fell 180 thousand (-23%). However, the number of patients that were either discharged to hospice or that died in the STACH increased by about 14 thousand (6%).

**FIGURE 1. Short-term Acute Care Hospital Discharges Overall and by Discharge Status (in Thousands)**



Source: KNG Health analysis of 2019 and 2020 Standard Analytic Files and Master Beneficiary Summary Files.

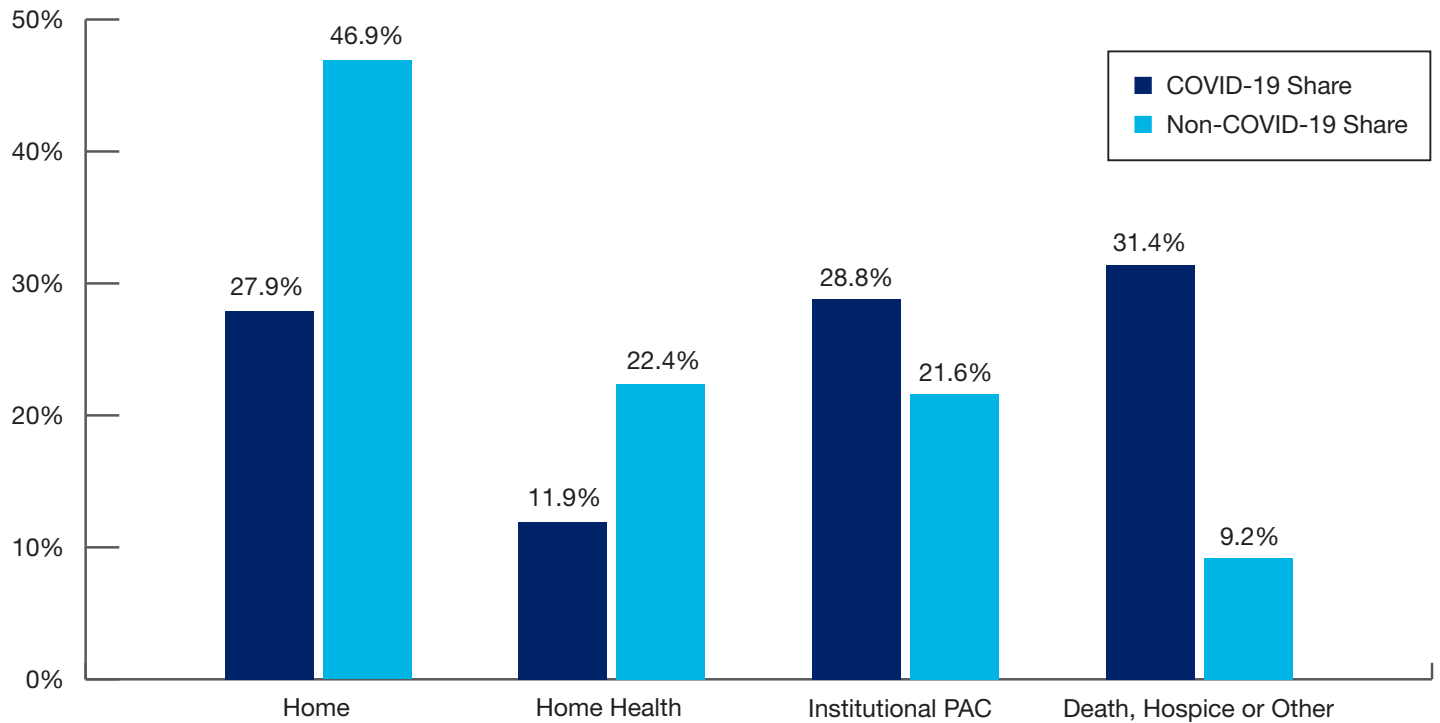
Notes: The period for both 2019 and 2020 covers from March 1 to July 31. Institutional PAC includes skilled nursing facilities, inpatient rehabilitation facilities, and long-term care hospitals. The Total includes “Other Inpatient Facilities”, but this category is not included in the figure.

## Discharge Patterns and Clinical Characteristics Varied Widely between COVID-19 and Other Patients

Between March 1, 2020, and July 31, 2020, approximately 6 percent (160,597 of 2,724,823) of Medicare patients discharged from a STACH had a diagnosis of COVID-19. We observed marked differences between the discharge destination distribution for COVID-19 and other patients discharged from a STACH (Figure 2). Medicare beneficiaries with a diagnosis of COVID-19 were more likely to either die during the STACH stay or be discharged to institutional PAC, or hospice than non-COVID-19 patients. While almost 70 percent of non-COVID-19 patients went home (with or without home health) after hospital discharge, roughly 40 percent of COVID-19 patients were discharged home with or without home health. COVID-19 patients were over 6 times more likely to die in a STACH than other patients (24.6% v. 4.0%; not shown in figure) and 41 percent more likely to go to hospice (5.5% v. 3.9%; not shown in figure).



**FIGURE 2. Share of Discharge Destination by COVID-19 Status**



Source: KNG Health analysis of 2020 Standard Analytic Files and Master Beneficiary Summary Files.

Notes: The period covers from March 1, 2020, to July 31, 2020. The percentages represent the share of either patients with COVID-19 or patients without COVID-19 who were discharged to a particular discharge destination. Institutional PAC includes skilled nursing facilities, inpatient rehabilitation facilities, and long term care hospitals.

In Table 1, we show PAC discharge destination for COVID-19 and other patients, after excluding patients that either died in the STACH or were discharged to hospice or “Other” inpatient setting. Among PAC users, we find that COVID-19 patients were more than twice as likely to be admitted to an LTCH (5.1% v. 2.1%) and 66 percent more likely to go to a SNF (61.6% v. 37.0%) than non-COVID-19 patients. In contrast, COVID-19 patients were 43 percent less likely to be discharged with home health than non-COVID-19 patients and 59 percent less likely to go to an IRF than a non-COVID-19 patients during the initial phase of the pandemic.

**TABLE 1: Number and Percentage of STACH Cases Discharged to Each Setting**

Discharge Destination	All Patients		COVID-19		Non-COVID-19		COVID-19 Share to Non-COVID-19 Share
	Volume	%	Volume	%	Volume	%	Ratio
HHA	593,188	49.7%	19,044	29.2%	574,144	50.9%	0.57
IRF	114,929	9.6%	2,682	4.1%	112,247	10.0%	0.41
SNF	457,728	38.4%	40,222	61.6%	417,506	37.0%	1.66
LTCH	27,266	2.3%	3,317	5.1%	23,949	2.1%	2.39
<b>Total</b>	<b>1,193,111</b>	<b>100%</b>	<b>65,265</b>	<b>100%</b>	<b>1,127,846</b>	<b>100%</b>	<b>1.00</b>

Source: KNG Health analysis of 2020 Standard Analytic Files and Master Beneficiary Summary Files.

Notes: The period covers from March 1, 2020, to July 31, 2020. HHA = Home Health Agency; SNF=Skilled Nursing Facility; IRF = Inpatient Rehabilitation Facility; LTCH = Long Term Care Hospitals.

The relatively high discharge rates to LTCHs and SNFs among COVID-19 patients suggest that these settings served, in some capacity, as specialized care settings for COVID-19 patients. Between March and July 2020, 12 and 9 percent of all LTCH and SNF patients had a diagnosis of COVID-19, respectively (Table 1; number of COVID-19 patients divided by all patient volume). In contrast, 3 and 2 percent of all home health and IRF patients had a diagnosis of COVID-19, respectively.

The differences in discharge patterns between COVID-19 and other patients reflect differences in the severity between these patient groups (Table 2). On average, COVID-19 patients had longer hospital stays (9.3 v. 5.1 days), were more likely to have spent time in an intensive care unit (ICU), were more likely to have organ and multiple organ failure, were more likely to be on a ventilator (10% v. 2%), had higher case mix index, and had more major comorbidities and complications. When the STACH patient population is limited to those with a discharge to PAC (HHA, SNF, IRF, or LTCH), we find similar results, although with slight variations in the differences between COVID-19 and other patients (Table A1).

Given the clinical profile of COVID-19 patients, some of the PAC use patterns observed above are not unexpected. For example, the relatively high transfer of COVID-19 patients (as compared to other patients) to LTCHs is consistent with their status as acute care hospitals and traditional role in caring for the most medically complex patients, including those on mechanical ventilation. Although IRFs, like LTCHs, must also meet hospital requirements to participate in the Medicare program and are, therefore, able to care for patients with the highest clinical needs, these facilities were less likely to admit COVID-19 patients (as compared to other patients) than LTCHs or SNFs. One possible explanation for this observation may be that many COVID-19 patients may not be capable of receiving the intensive rehabilitative care provided in IRFs.

**TABLE 2: Resource Use and Clinical Characteristics of COVID-19 and Other Patients at STACH (2020)**

Resource use and Clinical Characteristic	COVID-19 Patients (N=160,597)	Non-COVID-19 (N=2,564,226)
Average Length of Stay	9.3	5.1
<b>Intensive Care Unit (ICU)</b>		
Proportion with Any ICU Use	0.5	0.4
Proportion with 3 or More ICU Days	0.4	0.2
Average Days in ICU (for those with an ICU Stay)	4.2	1.9
<b>Organ Failure</b>		
Proportion with at Least 1 Organ System Failure	0.8	0.6
Proportion with 2 or More Organ System Failures	0.5	0.3
<b>Clinical Characteristics</b>		
Proportion on Mechanical Ventilator	0.10	0.02
Number of Comorbidities and Complications (CCs)	3.0	2.6
Number of Major CCs	2.5	0.9
Case Mix Index (Average MS-DRG Weight in STACH)	2.4	1.9
Elixhauser index	5.2	5.4

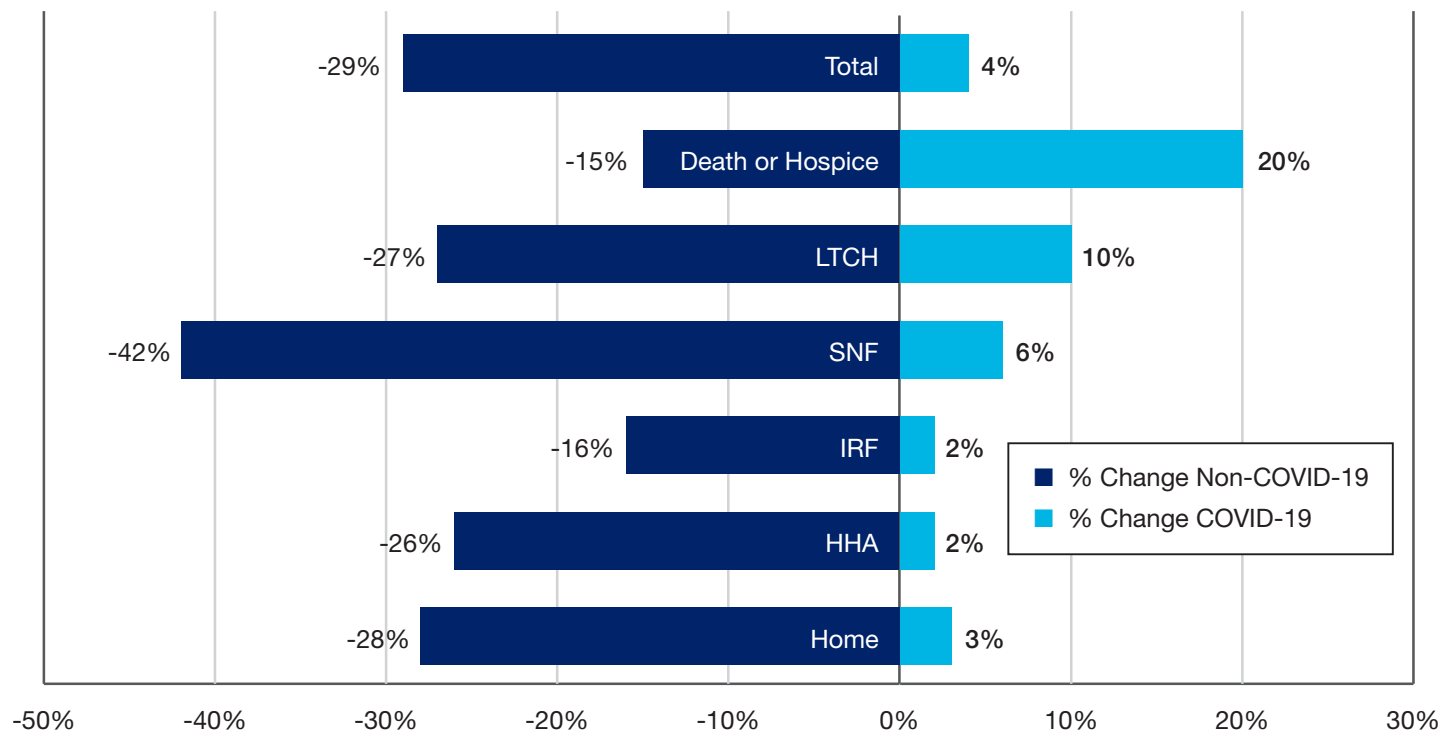
Source: KNG Health analysis of 2020 Standard Analytic Files and Master Beneficiary Summary Files.

Notes: The period covers from March 1, 2020, to July 31, 2020.

## Share of Discharges to SNFs Fell but Increased for Home Health and Inpatient Rehabilitation Facilities

Between March 1, 2020, and July 31, 2020, non-COVID-19 Medicare discharges fell by 29 percent, but this was offset by an increase of volume by 4 percent due to COVID-19 cases (net reduction of 25% in discharges). This pattern of significant volume decreases in non-COVID-19 cases, partially offset by a rise in discharges with COVID-19, is observed across all discharge destinations. However, the relative reduction in non-COVID-19 discharges and increases in COVID-19 discharges vary by discharge destinations. STACHs discharged 42 percent fewer non-COVID-19 patients to SNFs and 36 percent fewer overall (COVID-19 and non-COVID-19), the largest reduction relative to all other PAC settings. The percent offsets in volume due to COVID-19 cases were largest for LTCHs (Net change of -17%; -27% reduction due to lower non-COVID-19 volume offset by 10% increase due to COVID-19).

**FIGURE 3. Volume Changes between 2019 and 2020 Attributed to Non-COVID-19 and COVID-19 Discharges**



Source: KNG Health analysis of 2019 and 2020 Standard Analytic Files and Master Beneficiary Summary Files.

Notes: HHA = Home Health Agency; SNF=Skilled Nursing Facility; IRF = Inpatient Rehabilitation Facility; LTCH = Long Term Care Hospitals. This figure shows the 2020 change in percent of discharges based on COVID-19 status. For example, total STACH discharges fell by 25% between 2019 and 2020, because of a 29% reduction due to lower volumes of non-COVID-19 discharges and an offsetting increase of 4% in volume due to COVID-19 discharges. The Total includes “Other Inpatient Facilities”, but this category is not included in the figure.

A comparison of the distribution of non-COVID-19 discharges to PAC between 2019 and 2020 shows a notable difference in the share of patients discharged to a SNF, with a 6.6-percentage-point decline (43.6% to 37.0%) (Table 3). The reduction in the share of patients admitted to SNFs is likely due to patient and physician efforts to limit facility-based exposure to COVID-19, as infection outbreaks at a number of SNFs and nursing homes (which are often co-located) gained national attention. The decline in the proportion of SNF discharges was accompanied by a 4.5- and 2.0-percentage-point increase in discharges to HHA and IRF, respectively.





These results suggest that HHA and IRFs may have absorbed some of the cases that would have otherwise gone to a SNF. From an absolute volume perspective, HHAs appear to have served as the primary alternative setting to SNFs, with this setting increasing volume by approximately 50,376 cases over expected (Limited to PAC and where “expected” volume is determined by using the 2019 share of patients in HHAs multiplied by 2020 total non-COVID-19 volume)<sup>9</sup>. On the other hand, IRFs volume in 2020 exceeded expected volume by 22,081. From a percent change perspective, however, IRFs experienced a larger increase in admissions over expected admissions.

**TABLE 3: Discharge Destination of all Non-COVID-19 Patients in 2019 and 2020**

Discharge Destination	2019		2020		Difference	
	All Patients		non-COVID-19 Patients		Volume	Percentage Points
	Volume	%	Volume	%		
HHA	773,345	46.4%	574,144	50.9%	-199,201	4.5
IRF	133,130	8.0%	112,247	10.0%	-20,883	2.0
SNF	725,921	43.6%	417,506	37.0%	-308,415	-6.6
LTCH	32,871	2.0%	23,949	2.1%	-8,922	0.1
<b>Total</b>	<b>1,665,267</b>	<b>100%</b>	<b>1,127,846</b>	<b>100%</b>	<b>-537,421</b>	<b>0.0</b>

Source: KNG Health analysis of 2019 and 2020 Standard Analytic Files and Master Beneficiary Summary Files.

Notes: The period covers from March 1 to July 31. HHA = Home Health Agency; SNF=Skilled Nursing Facility; IRF = Inpatient Rehabilitation Facility; LTCH = Long Term Care Hospitals.

## Substantial Variation in Clinical Characteristics by PAC Destination for COVID-19 and Other Patients

A further examination of clinical characteristics by PAC destination shows differences in the kinds of patients going to each PAC. In each of the PAC settings, COVID-19 patients overall exhibit higher measures of illness severity than non-COVID-19 patients (Table 4), but there are differences in illness severity between COVID-19 patients and other populations with respect to IRF. Among non-COVID-19 patients, patients discharged to IRFs have similar illness severity to those discharged to SNF and HHA, while patients discharged to LTCH have the highest illness severity measures. However, COVID-19 patients discharged to IRFs have higher severity than those COVID-19 patients discharged to HHA or SNF (Table 4). This indicates that IRFs and LTCHs served as destinations for the most severely ill COVID-19 patients, although a relatively lower proportion of COVID-19 patients were admitted to IRFs overall.

**TABLE 4: Clinical Characteristics of STACH Patients by PAC Destination and COVID-19 Status (2020)**

	COVID Patients				Non-COVID Patients			
	SNF	IRF	LTCH	HHA	SNF	IRF	LTCH	HHA
Average Length of Stay	11.2	18.7	22.7	9.1	7.2	7.0	14.9	5.2
<b>Intensive Care Unit (ICU)</b>								
Proportion with Any ICU Use	0.5	0.7	0.8	0.4	0.4	0.5	0.9	0.4
Proportion with 3 or More ICU Days	0.4	0.6	0.8	0.4	0.3	0.4	0.8	0.3
Average Days in ICU (for those with an ICU Stay)	4.0	10.3	17.3	3.4	2.4	3.2	10.9	1.8
<b>Organ Failure</b>								
Proportion with at Least 1 Organ System Failure	0.8	0.9	0.9	0.8	0.7	0.6	0.9	0.6
Proportion with 2 or More Organ System Failures	0.4	0.5	0.7	0.4	0.3	0.3	0.6	0.3
<b>Clinical Characteristics</b>								
Proportion on Mechanical Ventilator	0.05	0.26	0.45	0.04	0.01	0.02	0.32	0.01
Number of Comorbidities and Complications (CCs)	3.2	3.9	4.9	2.6	3.2	3.1	5.9	2.7
Number of Major CCs	2.1	2.9	4.0	2.0	1.1	1.0	3.4	0.8
Case Mix Index (Avg. MS-DRG Weight in STACH)	2.1	3.4	5.7	2.1	1.9	2.6	5.4	1.9
Elixhauser index	5.8	5.8	6.0	5.1	6.1	5.6	7.1	5.8

Source: KNG Health analysis of 2019 and 2020 Standard Analytic Files and Master Beneficiary Summary Files.

Notes: The period covers from March 1, 2020, to July 31, 2020.

## Variation in Demographic and Enrollment Variables by PAC Destination for COVID-19 and Other Patients

The demographic and enrollment measures across STACH patients are also similar between 2019 and 2020. The major differences arise when we compare COVID-19 patients with others. A larger proportion of COVID-19 patients are older (22% aged 85+). They are also less likely to be white and about twice as likely to be a dual eligible enrollee (Table A2). These findings of disparities in COVID-19 hospitalizations are consistent with results reported elsewhere.<sup>10</sup> The breakdown by PAC destination shows older COVID-19 patients are more likely to be discharged to a SNF while younger patients are more likely to be discharged to the other PAC types.

## Discussion

This study examines the role played by different PAC providers during the initial phase of the COVID-19 pandemic. Overall, our results suggest that, while PAC providers did contribute to the response to the PHE, each PAC type contributed differently. For example, we found that COVID-19 patients were more likely to be discharged to SNFs and LTCHs in comparison to non-COVID-19 patients, while non-COVID-19 patients were more likely to be discharged to HHAs and IRFs. Differences in PAC use patterns between COVID-19 and non-COVID-19 patients can be partially explained by the higher severity of COVID-19 patients relative to other patients.

Early in the pandemic, health policy commenters had pointed to two possible distinct roles for PAC providers during the PHE. First, concerns were raised regarding the capacity of the nation's hospitals and SNFs to care for COVID-19 and other patients. Home health agencies and LTCHs were suggested as capacity extenders for SNFs and STACHs, respectively. Second, it was suggested that some PAC providers serve as COVID-19 treatment facilities, specializing in the treatment and recovery of COVID-19 patients. Our results support the notion that HHAs served as substitutes for SNFs, although this role appears to have been driven by patient avoidance of SNFs more so than limited SNF capacity: the discharge rate to SNFs fell by 15 percent (6.6 percentage points) between 2019 and 2020 among non-COVID-19 patients (Table 3). We also found evidence that IRFs may have substituted for SNFs, as the share of non-COVID-19 patients discharged to IRFs increased relative to 2019. In fact, among all PAC providers, IRFs saw the largest percentage increase in the share of hospitalized non-COVID-19 patients discharged to their setting. We also found some support that LTCHs and SNFs may have served as COVID-19 treatment facilities as COVID-19 patients were significantly more likely to be seen in one of these settings than non-COVID-19 patients (Table 1).

We posit that our findings are also consistent with LTCHs and, potentially, IRFs substituting for STACH care, although overall volumes at STACHs and PACs were down from 2019 levels. We note that while overall STACH discharges were down by 25 percent relative to 2019, discharges to LTCHs and IRFs fell by 17 and 14 percent, respectively (Figure 3). By contrast, discharges to SNFs and HHAs fell by 36 and 24 percent, respectively. Moreover, the overall reduction in STACH discharges does not paint the full picture on capacity. Overall occupancy and in ICUs was higher than the volume reductions would suggest for two reasons. First, average length of stay was 15 percent higher in 2020 relative to 2019 (5.3 days vs. 4.6 days; not shown) for Medicare beneficiaries. Length of stay was also higher in the ICU, and, as a result, total Medicare ICU days fell by only 14 percent between 2019 and 2020 (not shown). Further, a recent study found that COVID-19 patients require significantly more nurse time in the ICU than other ICU patients.<sup>11</sup> Collectively, these observations suggest that STACHs may have faced capacity constraints, despite overall volume reductions. Because they must meet the certification requirements of a STACH, LTCHs and IRFs can care for the most severely ill patients, which is supported by our finding that the most severely ill COVID-19 patients that survived the STACH were treated in these settings (Table 4).







Comparison of patient severity across PAC settings in 2020 revealed different patterns for COVID-19 and non-COVID-19 patients. Among non-COVID-19 patients, HHA patients were the least severe, LTCH patients were the most severe, and SNF and IRF patients had similar severity that fell between that of LTCH and HHA patients. This pattern is consistent with patterns in 2019. Among COVID-19 patients, IRF patients were, on average, sicker than SNF COVID-19 patients and similar in severity to LTCH patients. The results suggest that the sickest COVID-19 patients were treated in LTCHs and IRFs after being discharged from a short-term hospital. This finding adds to a deeper understanding of the role of IRFs, which admitted relatively fewer COVID-19 cases as compared to LTCHs and SNFs.

While we observe shifts in the use of PAC among Medicare beneficiaries during the PHE, the role of regulatory changes on these shifting patterns separate from the direct effects of COVID-19 is unclear. Congress and the Centers for Medicare & Medicaid Services implemented several regulatory waivers to increase the flexibility of providers to respond to the needs of their communities. For example, to receive a Medicare covered SNF stay, patients do not need have at least 3 days in a STACH prior to admission during the PHE. Other regulatory waivers were implemented for HHAs, IRFs, and LTCHs. These waivers appear to have aided the response of PAC providers and may have been particularly impactful in shifting care toward home health.

The extent to which the changes in PAC patterns of care will remain after the PHE and the waivers expire is also uncertain. The COVID-19 pandemic may accelerate a shift away from SNFs to home health that had, in fact, started earlier. Between 2012 and 2017, among Medicare beneficiaries discharged from hospital to a PAC setting, the share

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discharged to home health care increased from 39 to 41 percent, and the share discharged to SNFs decreased from 50 percent to 48 percent.<sup>12</sup> Prior research has identified alternative care models, such as bundled payments and accountable care organizations, as one of the drivers of lower use of institutional PAC.<sup>13</sup> As a result of alternative payment models, patient preference for home, and desire to lower costs, the shift away from SNF to HHA may persist. While such a shift may benefit patients and the Medicare trust fund, careful review of patient outcomes is needed to ensure that patients moved to an appropriate care setting.

Medicare's PAC payment systems have been undergoing significant change in recent years. In FY 2016, LTCH payment system started phasing in new patient criteria; in FY 2020, SNF payment system adopted a new risk adjustment method, and IRF case-mix system was recalibrated; in CY 2020, Medicare implemented a new payment system for HHA. In addition, the Centers for Medicare & Medicaid Services is taking steps, as required by the IMPACT Act, to move towards a unified PAC payment system that covers all four PAC setting. The shifts and challenges experienced in the PAC sector during COVID-19 PHE have policy implications. For example, if the PAC populations have become more differentiated across the four PAC settings, movement towards a unified PAC payment system may have more limited impact. Second, COVID-19 highlighted the challenge faced by SNFs in controlling infections. Addressing these challenges may require a review of conditions of participation across the PAC settings and have a direct impact of the costs of PAC. Future policy proposals should consider lessons learned from the COVID-19 PHE.

This study has focused on the first stage of the PHE. As there are multiple stages of the pandemic and infection intensity has varied across states over time, it is possible the role played by PACs evolved during later stages of the PHE. Thus, our findings here might not hold in these latter periods. Another consideration is the absence of analysis of patient outcomes. There are likely to be differences in outcomes (such as mortality, patient expenditures etc.) by PAC destination and these differences could vary from patterns observed in the prior periods or by patient characteristics. Given these limitations, there is an opportunity in future studies to explore these topics and extend our analysis as additional data becomes available.





## Endnotes

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- 6 Case-mix index is defined as the average MS-DRG weight across patients in the STACH. The MS-DRG weights are used for hospital payments in Medicare's Inpatient Prospective Payment System, with higher weights reflecting greater STACH resource use for treatment.
- 7 Patients with CCs or MCCs group to higher paying MS-DRGs within the Medicare Inpatient Prospective Payment System. Each year the Medicare program releases a list of secondary conditions that qualify as a CC or MCC.
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- 9 Our "expected" volume does not account for case mix changes between years that could also affect the discharge destination distribution.
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# Appendix

**TABLE A1: Number and Percentage of STACH Cases Discharged to Each Setting (Limited to PAC Facility Users)**

Resource use and Clinical Characteristic	COVID-19 Patients	Non-COVID-19 Patients
Average Length of Stay	11.4	6.3
<b>Intensive Care Unit (ICU)</b>		
Proportion with Any ICU Use	0.5	0.4
Proportion with 3 or More ICU Days	0.4	0.3
Average Days in ICU (for those with an ICU Stay)	4.7	2.3
<b>Organ Failure</b>		
Proportion with at Least 1 Organ System Failure	0.8	0.6
Proportion with 2 or More Organ System Failures	0.4	0.3
<b>Clinical Characteristics</b>		
Proportion on Mechanical Ventilator	0.08	0.02
Number of Comorbidities and Complications (CCs)	3.1	2.9
Number of Major CCs	2.2	1.0
Case Mix Index (Avg. MS-DRG Weight in STACH)	2.4	2.1
Elixhauser index	5.6	5.9

Source: KNG Health analysis of 2020 Standard Analytic Files and Master Beneficiary Summary Files.

Note: PAC facility refers to SNF, LTCH, IRF and HHA.

**TABLE A2: Clinical Characteristics of STACH Non-COVID-19 Patients by PAC Destination and Year**

	All Patients 2019				Non-COVID Patients 2020			
	SNF	IRF	LTCH	HHA	SNF	IRF	LTCH	HHA
Average Length of Stay	6.8	6.8	14.4	4.9	7.2	7.0	14.9	5.2
<b>Intensive Care Unit (ICU)</b>								
Proportion with Any ICU Use	0.4	0.5	0.9	0.4	0.4	0.5	0.9	0.4
Proportion with 3 or More ICU Days	0.3	0.4	0.8	0.2	0.3	0.4	0.8	0.3
Average Days in ICU (for those with an ICU Stay)	2.3	3.1	10.6	1.7	2.4	3.2	10.9	1.8
<b>Organ Failure</b>								
Proportion with at Least 1 Organ System Failure	0.6	0.5	0.9	0.6	0.7	0.6	0.9	0.6
Proportion with 2 or More Organ System Failures	0.3	0.2	0.6	0.3	0.3	0.3	0.6	0.3
<b>Clinical Characteristics</b>								
Proportion on Mechanical Ventilator	0.01	0.02	0.29	0.00	0.01	0.02	0.32	0.01
Number of Comorbidities and Complications (CCs)	2.8	2.7	5.4	2.3	3.2	3.1	5.9	2.7
Number of Major CCs	1.0	0.9	3.2	0.7	1.1	1.0	3.4	0.8
Case Mix Index (Avg. MS-DRG Weight in STACH)	1.9	2.5	5.1	1.9	1.9	2.6	5.4	1.9
Elixhauser index	6.0	5.4	7.1	5.5	6.1	5.6	7.1	5.8

Source: KNG Health analysis of 2019 and 2020 Standard Analytic Files and Master Beneficiary Summary Files.

**TABLE A3: Patient Demographic Characteristics**

	All Patients 2019	All Patients 2020	COVID Patients 2020	Non-COVID Patients 2020
<b>Age (%)</b>				
<65	19.2	19.1	17.1	19.2
65-74	33.3	33.7	31.5	33.9
75-84	29.2	29.2	29.3	29.2
85+	18.4	18	22.1	17.7
Male (%)	46.5	47.9	50	47.7
<b>Race (%)</b>				
White	80.6	79.5	61.81	80.6
Black	12.3	13	24.39	12.3
Other	7.1	7.6	13.8	7.2
Dual Eligible (%)	22.4	23.7	44.3	22.5
<b>Original reason for enrollment (%)</b>				
Old age	68	67.7	66.7	67.8
Disability only	28.8	28.8	29.2	28.8
ESRD only	1.9	2.3	2.6	2.2
Disability & ESRD	1.3	1.2	1.5	1.2

Source: KNG Health analysis of 2019 and 2020 Standard Analytic Files and Master Beneficiary Summary Files.

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The McCourt School established the Health Care Financing Initiative (HCFI) in June 2018 with the generous support of the Institute for Critical Care Foundation (ICCF). ICCF is a 501(c)(3) private operating foundation that promotes academic research related to the delivery of healthcare to critically ill or injured patients ([www.instituteforcriticalcare.org](http://www.instituteforcriticalcare.org)).

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