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Ownership of Hospitals: An Analysis of Newly-Released Federal Data & A Method for Assessing Common Owners

by W. Pete Welch, Lanlan Xu, Nancy De Lew, and Benjamin D. Sommers

KEY POINTS

- In December 2022, for the first time, the Centers for Medicare & Medicaid Services (CMS) released a public dataset on the ownership of hospitals that are enrolled in Medicare. This report analyzes this new dataset.
- The new CMS data show that nearly half of the 4,644 Medicare-enrolled hospitals are non-profit (49.2 percent), 36.1 percent are for-profit, and 14.7 percent are government-owned. Relative to skilled nursing facilities (SNFs), hospitals are more likely to be non-profit and government-owned and less likely to be for-profit. Across all ownership types, 54.6 percent are structured as corporations, 26.6 percent as limited liability companies, 2.6 percent as partnerships, and 16.2 percent as "other."
- Using a new approach to impute ownership relationships and identify ultimate corporate parents, we find that chains with at least three hospitals constitute a majority of hospitals (56.1 percent). Mean bed size is similar between chains (170 beds) and non-chain hospitals (166 beds). Nine chains have at least 50 hospitals each.
- Individuals (as distinct from organizations) have 8.0 percent of the ownership shares of hospitals, in contrast to the much larger ownership share of nearly 50 percent by individuals of SNFs. Individuals disproportionately own more specialty hospitals (e.g., psychiatric) and fewer short-term acute care hospitals.
- The owners of SNFs and of hospitals rarely overlap, whether they be organizational or individual owners.
- Future research using these data on hospital ownership, which can be merged with other datasets on hospital characteristics, can inform discussions of competition and consolidation in health care markets, which may have impacts on health care costs, access to care, and quality.

BACKGROUND

Hospital markets have become increasingly concentrated (typically fewer and larger hospitals in a geographic area) in the past few decades.[1] In a recent analysis accompanying an environmental scan conducted by RAND, ASPE reported that the percentage of hospital referral regions (HRRs) that are *unconcentrated* decreased from 23 percent (71 of 306) in 2008 to 12 percent (38 of 306) in 2019.[2]

Consolidation and limited competition in health care markets can increase prices without any clear benefits to patients in terms of improved health care quality. RAND's environmental scan finds strong evidence that hospital horizontal consolidation is associated with higher prices paid to providers, while the literature is less conclusive on how consolidation impacts health care quality and patient access.[3] One key challenge to assessing the impacts of consolidation is the lack of data that identifies and maps ownership relationships.

In April 2022 the Centers for Medicare & Medicaid Services (CMS) publicly released datasets on Medicare-enrolled hospitals and SNFs Change of Ownership, including mergers and acquisitions since 2016.[4] This was in line with the Administration's plan to improve transparency, safety, and quality of care in the nation's hospitals and nursing homes[5] and the President's Executive Order on promoting competition.[6] The release made these data more readily available to the public in support of the transparency initiatives noted above. Researchers, press, monitoring agencies, and other interested stakeholders can identify what types of ownership structures are shaping these markets, how those structures are affecting consolidation and competition, and impacts on prices, affordability, and quality.

To further improve transparency, in December 2022, CMS released data on *all* Medicare-enrolled hospitals, complementing the prior data release which only included the hospitals that had experienced a recent change of ownership.[7] This December 2022 release enables users to answer basic questions about the hospital industry, including size of chains, prevalence of individual vs. multiple owners, and co-ownership of hospitals and SNFs. As with the previous release, these files can be merged with other CMS public use files (PUFs) for additional policy analyses. The dataset will be updated monthly.

This report provides an overview of the available data, a brief description of the ownership variables, a methodology for calculating the ownership shares by individuals vs. organizations, and several preliminary analyses to showcase the data and lay the foundation for future analyses.

DATA AND METHODS

Data

On December 20, 2022, CMS released four files with information on all hospital owners currently enrolled in Medicare, excluding critical access hospitals.* The four files represent ownership at one point in time (December 2022), without any historical data. Their source is the Provider Enrollment, Chain, and Ownership System (PECOS). Before being paid by Medicare, providers must enroll in Medicare through PECOS, either via a paper enrollment form or on-line.† This "enrollment" is only for Medicare providers and is separate from the enrollment of Medicare beneficiaries.

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* The four files are as follows: A hospital-level file ("Hospital_Enrollments"), a hospital-owner-level file ("Hospital_All_Owners"), a hospital-addresses-level file ("Hospital Additional Addresses"), and a (very small) file of hospitals with multiple NPIs ("Hospital_Additional_NPIs"). https://data.cms.gov/provider-characteristics/hospitals-and-other-facilities/hospital-all-owners, https://data.cms.gov/provider-characteristics/hospitals-and-other-facilities/hospital-all-owners, accessed on 12-21-22. Scroll down to find related data files and data guidance.

† Hospitals and other institutional providers enroll using form 855A, which can be found at: https://www.cms.gov/medicare/cms-forms/cms-forms/downloads/cms855a.pdf, accessed 3-10-23.

The hospital file has enrollment data, including hospital name, physical address, and (for merging) CMS Certification Number (CCN). The owner file distinguishes between individuals and organizations and between direct and indirect owners. Unlike a direct owner, there is at least one subsidiary between the provider and an indirect owner. Owners with less than 5% ownership shares need not be reported.

In this report, to enhance our analyses of the hospital enrollment file, we merged it with two public use files (PUFs): Care Compare, which provides information on the number of beds; and hospital cost report, which provides information on urban-rural location. Providers are asked about organizational structure, but currently the enrollment form does not offer "government" as one of the options.[‡] This information is available in a different data source - Care Compare - as part of the state-agency submitted data, and we used this alternative data source for categorization of government entities in this report.

Methodology

As the dataset does not have variables for ultimate owners or for chains,[§] we developed an approach for identifying those variables. An ultimate owner is an entity that has a subsidiary (e.g., a hospital) but which is not a subsidiary of another entity. All individual owners are ultimate owners, because individuals cannot be owned by other individuals or by organizations.

To identify ultimate owners of organizations, we first assume that the owner of the largest set of hospitals is generally the ultimate owner, in part, because all hospitals owned by a subsidiary are also owned by the ultimate owner.[**] In the second step, any hospitals owned by the first ultimate owner are removed from the working file, and the owner of the most remaining hospitals is arguably a second ultimate owner, and so forth. This methodology identifies hospital chains using only the existing PECOS data. (For details on our methodology, see the appendix.)

Limitations

The primary limitation of the PECOS data is that it is self-reported. Nonetheless, PECOS is designated as a System of Record (SOR) for Medicare provider enrollment data. That is, if there is a conflict between PECOS and another dataset in CMS, PECOS is considered authoritative for Medicare provider enrollment data.

There are other limitations due to several data issues. First, owners with less than a 5 percent share of a provider are not required to be reported and generally do not appear in the dataset. Second, as noted, the dataset does not identify ultimate owners, which is why we developed a method to infer ultimate owners and hence to assign hospitals to chains. A third set of limitations relates to data errors. While most hospitals (72.0 percent) report having at least one direct and/or indirect owner, [††]of these, 216 report indirect owners but not direct ones (a logical inconsistency). For direct owners, the ownership shares are either missing or sum to more than 100 percent (479 and 143 hospitals, respectively) (see Table A-2). All told, 838 hospitals report owners with problematic data, comprising more than one-sixth of all hospitals (838/4,644=18.0 percent).

Finally, there are limitations related to our assignment methodology, which presumes a hierarchical set of subsidiaries. Although such hospitals are the numerically dominant structure (constituting at least three-fifth of hospitals), little is known about the structure of the other two-fifths. In contrast, we do not search for a set of interlocking owners, which are arguably more plausible for individual owners, who are atypical owners of hospitals (See the appendix's discussion organizational structures.)

[‡] Medicare Enrollment Application – Institutional Providers, CMS 855A , p. 11, accessed 3-29-23.
[§] The enrollment form has a section on chains, but the data are not included in the data release
[**] Only owners with a majority share of a hospital are included here.
[††] Hospitals that do not have owners (or partners) are presumed to have a governing board.

We have vetted our assignment methodology in two ways (see appendix). First, using filings with the Security and Exchange Commission (SEC), we vetted the five largest chains, finding that the chains were correctly identified, even if the ultimate owner was not always distinguished from its first-tier subsidiary. Second, we used branding (sometimes incorporated into a hospital's doing-business-as name) to vet our assignment of hospitals to chains. Some hospitals, however, are branded as part of a specific chain but are not assigned to that chain. Such findings point the way towards an improved dataset of chains.

RESULTS

Overview of U.S. Hospitals

Our dataset is comprised of 4,644 hospitals and as noted, does not include critical access hospitals. (See the methodology and data appendix for further details.) As presented in Table 1, short-term acute care hospitals constitute about 70 percent of hospitals and have above-average mean beds. In contrast, specialty hospitals (except for children's hospitals) have below-average mean beds.

Table 1. Hospital Type, Control Type, and Other Features of U.S. Hospitals, 2022

	Hospitals		Mean
Hospital type	**Number**	**%**	**beds**
Total	4,644	100.0%	168
Hospital type			
Short-term acute care	3,240	69.8%	198
Psychiatric	631	13.6%	110
Rehabilitation	341	7.3%	66
Long-term care	342	7.4%	65
Children's	90	1.9%	241
Control type			
Non-profit	2,286	49.2%	209
For-profit	1,677	36.1%	107
Government	681	14.7%	175
Organizational structure			
Corporation	2,534	54.6%	198
Limited liability company (LLC)	1,237	26.6%	91
Partnership	121	2.6%	177
Other	752	16.2%	187
Urban-rural location			
Urban	3,173	68.3%	171
Rural	1,217	26.2%	161
Missing	254	5.5%	-

Because bed size is missing for 6.6 percent of hospitals, mean beds is calculated without those hospitals.
Sources: PECOS, Care Compare, and cost reports.

Almost half of hospitals are non-profit and they are larger hospitals on average, with a mean bed size of 209 (vs. 107 for for-profit and 175 for government hospitals).

Hospitals structured as corporations constitute 54.6 percent of hospitals and are larger than average by bed size. Limited liability companies (LLCs) constitute 26.6 percent of hospitals and have the smallest size (91 beds on average). Partnerships constitute fewer than 2.6 percent of hospitals. A challenge in interpreting these

numbers is that an organization can be both an LLC and a partnership.[‡‡] A second challenge is that 16.2 percent of hospitals and beds are classified as "others."

Over two-thirds of hospitals are in urban areas, and they are slightly larger on average than rural hospitals (171 vs. 161 beds). About 5.5 percent of hospitals are missing urban-rural location data.[§§]

PECOS makes a distinction between owners who are individuals and those that are organizations. We estimate that individuals have a total ownership share that equals 8.0 percent of all hospitals.[***] Organizations have 90.9 percent of hospital ownership shares, with the remaining 1.1 percent representing owners whose shares were below 5 percent and hence who did not need to be reported.

Given that organizational owners numerically dominate, we focus on them in our analyses below.

Organizational Owners

We have assigned many hospitals to organizations that appear to be their ultimate owners. Hospitals with the same organizational ultimate owner constitute an organizational chain. Some hospitals are not assigned to any owner (either organizational or individuals); presumably most of these have a governing board.

As presented in Table 2, the nine chains with at least 50 hospitals owned 18.1 percent of hospitals and a slightly lower share (15.9 percent) of beds. (There are 730,285 beds reported across all hospitals in this dataset.) If the minimum was defined as five hospitals, chains had slightly less than half of hospitals (48.5 percent) and beds (47.1 percent). If we define the minimum for being a chain as owning three hospitals, chains have a majority of both hospitals (56.1 percent) and beds (56.3 percent). The remaining hospitals are not affiliated with a chain. These non-chain hospitals constitute 43.9 percent of all hospitals. The mean bed size is similar - 170 for chains and 166 for non-chain hospitals.

Table 2. Distribution of Chains, Hospitals, and Beds, by Chain Size, 2022

Chain size	number			% of hospitals	% of	% of
(# of hospitals)	chains	hospitals	beds	in chains	hospitals	beds
Total in this table	243	2,603	411,385	100.0%	56.1%	56.3%
50 or more	9	841	115,815	3.7%	18.1%	15.9%
25-49	10	331	51,742	4.1%	7.1%	7.1%
10-24	36	509	84,088	14.8%	11.0%	11.5%
7-9	42	329	55,163	17.3%	7.1%	7.6%
5-6	44	241	44,606	18.1%	5.2%	6.1%
3-4	102	352	59,971	42.0%	7.6%	8.2%

The hospital chains with at least 10 hospitals are listed in Table 3. For each chain, the state with a plurality of its hospitals is listed, as is the percentage of its hospitals in that state. Each of the ten largest chains are spread across multiple states and have less than one-third of their hospitals in any single state. Smaller chains are more likely to be limited to one state (or two or three contiguous ones). The ten largest chains are for-profit entities, except for Common spirit, which is a non-profit entity. Smaller chains are more likely to be non-profit.

[‡‡] IRS, "Publication 3402 (03/2020), Taxation of Limited Liability Companies," https://www.irs.gov/publications/p3402, accessed 3-9-2023.

[§§] PECOS contains each hospital's physical address, which could be used to impute urban-rural location.

[***] That is, of individual owners of hospitals, few own entire hospitals; rather they own shares of certain hospitals. Those ownership shares sum to 8% of all hospitals. See the end of appendix for the methodology of dividing ownership into three components: individuals, organizations, and unreported.

The largest government chain is NYS Office of Mental Health, which is ranked 20th, and there are nine governmental chains with between three and nine hospitals each.

Table 3. Hospital Chains With At Least Ten Hospitals, 2022

(In descending order by number of hospitals)

Hospital Chains with At Least Ten Hospitals (Listed in declining order by number of hospitals)

Rank	Chain/Ultimate owner	Count		State home to greatest % of chain's hospitals		Control type
		Hospitals	Beds	State	% of chain's hospitals in that state	
Total in dataset		4,644	730,285			
Total in this table		1,681	251,645			
These chains as % of total		36.2%	34.5%			
1	HCA, INC.	152	37,353	FL	29%	for-profit
2	UNIVERSAL HEALTH SERVICES INC	147	19,108	TX	14%	for-profit
3	ENCOMPASS HEALTH CORP	122	8,353	TX	18%	for-profit
4	SELECT MEDICAL CORP	107	6,009	OH	13%	for-profit
5	COMMUNITY HEALTH SYSTEMS INC	74	9,929	IN	14%	for-profit
6	LIFEPOINT HEALTH INC	66	6,620	NC	12%	for-profit
7	KNIGHT HEALTH HOLDINGS, LLC	63	5,870	TX	19%	for-profit
8	COMMONSPIRIT HEALTH	58	9,891	CA	22%	non-profit
9	TENET HEALTHCARE CORP	52	12,682	CA	25%	for-profit
10	ACADIA HEALTHCARE COMPANY INC	47	4,344	LA	9%	for-profit
11	TRINITY HEALTH CORP	44	10,091	MI	16%	non-profit
12	KAISER FOUNDATION HOSPITALS	36	9,148	CA	97%	non-profit
13	PRIME HEALTHCARE SERVICES, INC	31	4,686	CA	35%	mixed
14	STEWARD HEALTH CARE SYSTEM LLC	30	5,345	MA	23%	for-profit
15	EPOCH ACQUISITION INC	30	1,006	TX	30%	for-profit
16	BON SECOURS MERCY HEALTH INC	29	5,338	OH	48%	non-profit
17	PAM CUBED LLC	29	1,395	TX	28%	for-profit
18	ADVENTIST HEALTH SYSTEM SUNBELT HEALTHCARE CORP	28	7,174	FL	61%	non-profit
19	ARDENT LEGACY HOLDINGS INC	27	3,215	TX	37%	for-profit
20	NYS OFFICE OF MENTAL HEALTH	22	3,821	NY	95%	govt
21	TEXAS HEALTH RESOURCES	22	2,601	TX	100%	mixed
22	UPMC	21	4,818	PA	90%	non-profit
23	SUTTER HEALTH	21	3,494	CA	100%	non-profit
24	BANNER HEALTH	21	5,244	AZ	76%	non-profit
25	ADVOCATE AURORA HEALTH, INC	21	4,716	WI	62%	non-profit
26	CHRISTUS HEALTH	19	3,621	TX	68%	non-profit
27	IHC HEALTH SERVICES INC	18	2,359	UT	78%	non-profit
28	OCEANS TOPCO, INC	17	553	LA	53%	for-profit
29	QUORUM HEALTH CORP	16	1,363	IL	25%	mixed
30	SPRINGSTONE HEALTH OPCO, LLC	16	1,331	TX	31%	for-profit
31	SIGNATURE HEALTHCARE SERVICES, LLC	15	1,901	CA	40%	for-profit
32	ASCENSION HEALTH	15	2,537	TN	40%	non-profit
33	THE CLEVELAND CLINIC FOUNDATION	15	3,595	OH	73%	non-profit

34	CORNERSTONE HEALTHCARE GROUP HOLDING	14	695	TX	36%	for-profit
35	BAPTIST MEMORIAL HEALTH CARE CORP	14	2,405	MS	43%	non-profit
36	MERCY HEALTH	13	4,120	MO	54%	non-profit
37	BALLAD HEALTH	13	1,756	TN	69%	non-profit
38	CHARLOTTE-MECKLENBURG HOSPITAL AUTHORITY	13	3,626	NC	54%	mixed
39	COVENANT HEALTH	12	1,652	TN	75%	non-profit
40	OCHSNER CLINIC FOUNDATION	12	1,335	LA	75%	non-profit
41	DIGNITY COMMUNITY CARE	12	2,222	CA	67%	non-profit
42	SSM HEALTH CARE CORP	12	2,721	MO	58%	non-profit
43	PRIME HEALTHCARE FOUNDATION INC	11	1,492	CA	36%	mixed
44	SHRINERS HOSPITALS FOR CHILDREN	11	-	OH	9%	non-profit
45	LHC GROUP, INC	11	340	LA	73%	for-profit
46	NEW YORK CITY HEALTH AND HOSPITALS CORP	11	3,277	NY	82%	govt
47	FRANCISCAN ALLIANCE, INC.	11	1,641	IN	91%	non-profit
48	ASCENSION SETON	10	1,130	TX	100%	non-profit
49	MCLAREN HEALTH CARE CORP	10	1,857	MI	90%	non-profit
50	NORTHWELL HEALTHCARE INC	10	3,723	NY	100%	non-profit
51	BETH ISRAEL LAHEY HEALTH, INC	10	2,245	MA	100%	non-profit
52	MEDSTAR HEALTH, INC	10	2,497	MD	70%	non-profit
53	CHAMBER INC	10	2,228	CA	30%	for-profit
54	SURGERY CENTER HOLDINGS INC	10	291	TX	30%	for-profit
55	VIBRA HEALTHCARE, LLC	10	881	CA	40%	for-profit

Notes: Ultimate owners may own subsidiaries but are not subsidiaries of other owners. Because the number of beds is missing for 6 percent of hospitals, care should be taken when using that variable. If fewer than 75 percent of hospitals are of the same control type (for profit/non-profit/govt), "mixed is reported.

Most of the dozen largest hospital chains concentrate in one of the five hospital types, either short-term acute hospitals or one of four types of specialty hospitals. HCA, Community Health, Common spirit, Tenet, Trinity, and Kaiser concentrate in short-term acute hospitals. Universal and Acadia concentrate in psychiatric hospitals, Encompass in rehabilitation hospitals, and Select and Knight in long-term care (LTC) hospitals. LifePoint concentrates less than the other chains.

Individual Owners

Hospitals in which individuals have a majority of ownership shares constitute 6.9 percent (320/4,644) of hospitals. Individual-owned hospitals are disproportionately specialty hospitals. Individuals have a majority of shares of almost of a quarter (23.8 percent) of psychiatric hospitals (150/631). The same measure is 14.0 percent (48/342) for long-term care hospitals and 10.9 percent (37/341) for rehabilitation hospitals, but 2.6 percent (83/3,240) for short-term acute care hospitals.

Only eight individuals own the equivalent of at least five hospitals.[†††] As shown in Table 4, the top ranked individual owns at least part of 114 hospitals. This individual owns a total ownership share of 84.2 hospitals, for which they own 74 percent shares on average. At the bottom of the table, the 8th ranked individual owns 100 percent of each of their hospitals. Individuals ranked 1 and 5 concentrate on psychiatric hospitals, and individuals ranked 2, 3, and 4 concentrate on a combination of rehabilitation and long-term care hospitals.

[†††] The equivalent number of hospitals is calculated as the sum of the ownership shares (percentages) divided by 100. For instance, if an individual owns 80 percent of each of three hospitals, their equivalent number of hospitals would be 2.4 hospitals.

Except for individual ranked 2, each owner's share averages more than half, suggesting that each owner controls most of their hospitals.
Almost two-thirds of hospitals owned by the individual ranked 4 are in Texas and almost all of those owned by the individual ranked 6 are in Louisiana. Otherwise, the hospitals owned by each individual are not concentrated in a single state.

Table 4. Largest Individual Owners and the Distribution of their Hospitals by Specialty and by State, 2022

(In descending order by number of hospitals)

	Count of hospitals owned (perhaps partially)								State home to greatest % of owner's hospitals	
Rank	Total, A	Short stay	Psychi-atric	Rehabil-itation	LTC	Child-ren	Equivalent # of hospitals, B	Mean ownership share, C=B/A	State	% of owner's hospitals in that state
Total	226	32	112	34	40	1	147.1	65%	NA	NA
1	114	14	98		1	1	84.2	74%	FL	11%
2	39			23	16		11.7	30%	TX	28%
3	20			5	15		12.1	60%	LA	15%
4	14			9	5		7.6	55%	TX	64%
5	13		13				11.8	91%	TX	31%
6	10	8	2				6.4	64%	LA	90%
7	8	8					5.3	67%	CT	38%
8	8	2			6		8.0	100%	CA	25%

Notes: Total is the sum of the counts across the five hospital types. LTC = long-term care (hospitals).
The equivalent number of hospitals is calculated as the sum of the ownership shares (percentages) divided by 100.

Common Ownership of Hospitals and SNFs

Because hospital patients can be discharged to SNFs, financial integration of hospitals and SNFs might facilitate clinical integration. For this reason, we searched for evidence that the two provider types were under the same ultimate owners, be it organizational or individual. Out of 14,810 SNFs, only 336 were owned by one of the hospital chains with at least three hospitals each. The two hospital chains with the most SNFs have several times as many as SNFs as hospitals and hence might be best described as SNF chains that own a few hospitals.

Only four individuals owned the equivalent of at least two hospitals and the equivalent of at least two SNFs. While these two analyses are not definitive, in part, because they do not consider what non-chain hospitals might own, the analyses suggest that few organizations or individuals own both hospitals and SNFs.

CONCLUSION

This report describes several useful patterns that can be gleaned from CMS's new data released on hospital ownership. This report is intended to familiarize potential users with some of the types of analyses—such as those involving chains, individual owners, and geography—that can be performed with these data in combination with public use files, as well as identify some of the limitations and challenges of using these data.

Organizations own the vast majority of shares of hospitals (90.9%), individuals own 8.0%, with the remaining 1.1% pertaining to owners whose share of a specific hospital is too small to require reporting.

Organizational chains with at least three hospitals constitute a majority of hospitals (56.1 percent). The methodology of assigning hospitals to chains presumes a hierarchical structure, which is the prevalent structure (representing at least three-fifths of hospitals).

A knowledge of chains is important for several reasons. First, it can be supportive of program integrity efforts. If a problem is identified in one hospital within a chain, the problem may be prevalent among other members of that chain. Second, chains may have additional administrative capabilities relative to hospitals that are not members of a chain. Third, knowing chains is necessary for calculating market concentration in local markets. Future analyses merging this dataset with changes of ownership and other datasets on hospital characteristics can be used to inform trends in consolidation and competition that may have important impacts on health care costs, access to care, and quality.

APPENDIX: DATA AND METHODS

Data

Overview of the Dataset and Definitions: On December 20, 2022, CMS released four files with information on the owners of hospitals currently enrolled in Medicare, as noted.

Hospital file: This hospital-level file has enrollment data, including hospital name, physical address, NPI, and (for merging) CMS Certification Number (CCN).

As noted in the Data Guidance for hospitals, CMS uses "provider" in two senses. For the purpose of ownership, a provider represents a tax identification number (TIN); for the purpose of certification, a provider represents a CMS CCN. We use "provider" in the latter sense.

Each CCN uniquely identifies a hospital. Providers report their TIN when submitting forms to PECOS. Rather than make public these TINs, CMS has uniquely assigned to each TIN an associate ID, which is in this file.

In the typical arrangement, each associate ID represents the legal form of a single CCN. The associate ID may have direct and indirect owners.

The hospital file has 7,272 observations. However, there are several categories of these observations that are excluded from our analysis, as shown in Table A-1. There are 2,305 observations that represent special units within a hospital (i.e., psychiatric units, rehabilitation units, and swing beds). None of these units file cost reports. Because they have the same associate ID as their parent hospital, they have the same owners. Hence, they are excluded here.

Table A-1. Counts of Hospitals by Steps in Database Construction

Count of hospitals		
Total	**Change**	**Description**
7,272		downloaded from data.cms.gov
	(2,305)	Special units within hospitals (e.g., psych beds)
	(259)	ASCs & IFEDs enrolled as hospitals during PHE
	(37)	duplicate CCNs
	(27)	Critical Access Hospitals (CAHs)
	(2,628)	total dropped
4,644		working file

Another 259 observations were enrolled as hospitals during the public health emergency (PHE). Almost half of these are ambulatory surgery centers (ASCs), and a slight majority are independent free-standing emergency departments (IFEDs), the latter being almost entirely in Texas.

Because PECOS treats critical access hospitals (CAHs) as a different provider type from other hospitals,[‡‡‡] they are largely excluded in this initial release of hospital data. (CAHs were first included in the July 2023 release.) However, a few CAHs are included. For simplicity of interpretation, those hospitals are excluded here. Given these exclusions, our working file has 4,644 hospitals.

[‡‡‡] CAHs have no more than 25 beds and are paid 101% of their costs.

Owner file: In this hospital-owner-level file, each of hospital's "owners" is defined by a "role" variable. For the purposes of this report, the more prominent roles are direct owner, indirect owner, partner, officer, and director. Consistent with the standard usage, this report uses "owner" to mean only the first two roles. Unlike a direct owner, there is at least one subsidiary between the provider and an indirect owner. Owners whose ownership shares are less than 5 percent are not required to be reported.

An owner-type variable distinguishes between individuals and organizations. The first two roles (direct owner, indirect owner) can be either type; the last two roles (officer and director) pertain to individuals only. We discuss partners below.

For each direct and indirect owner, the file reports the share of the provider owned by that owner.

Ownership shares of *direct* owners should not sum to more than 100 percent. For instance, if an organization owns 50 percent of a provider and an individual owns 46 percent, this indicates that there is another owner (or set of owners) that own the remaining 4 percent but do not appear in the dataset, due to the 5 percent threshold on ownership share for reporting.

Ownership shares of *indirect* owners, however, can sum to more than 100 percent. For example, suppose a provider is 100 percent owned by organization A, which is 100 percent owned by organization B, which is 100 percent owned by organization C. Organization A would be a direct owner and the organizations B and C would be indirect owners. The shares of indirect owners would sum to 200 percent. As noted, the ultimate owner—the owner that is not a subsidiary of another owner—is not identified in PECOS. (As used here, an "ultimate owner" can have a small share of total ownership.) On an organizational chart, the ultimate owner is typically displayed at the top. Individual owners are necessarily ultimate owners, but organizational ultimate owners need to be inferred (see below).

Data on partners requires some explanation. On the one hand, PECOS allows for both organizational and individual partners to be entered. On the other hand, the Internal Revenue Service (IRS) describes a partnership as "the relationship between two or more people to do trade or business."[8] For hospitals, organizations reported as partners have almost seven times the ownership share (87.3 percent) that individual partners have (12.7 percent).[§§§] The disadvantage of providers listing organizations as 'partners" instead of as "owners" is that the second tier of control (analogous to indirect owners) is not recorded. So, our approach to inferring the ultimate owner does not work with partnership data.

Fortunately, almost all hospitals that recorded partners also recorded owners (206); only eleven hospitals recorded partners but not owners. When both ownership and partner data are available, we use only owner data.

Table A-2 classifies hospitals by the nature of their ownership data. Of the 4,644 hospitals in the working file, two-thirds (3,344) report either direct or indirect owners in the owner file. Of these, 216 report having indirect but not direct owners, a logical inconsistency. Of those reporting direct owners, 479 reported hospital names but not report the ownership shares. Of those reporting shares, 143 reported shares summing to more than 100 percent. In sum, although 72.0 percent of hospitals reported owners, only 54.0 percent reported owners without data problems.

[§§§] The mean ownership share of organizational partners is 25% but only 2% for individual partners.

Table A-2. Hospitals in Working File, by Whether They Have Owners and The Nature of Any Problematic Data

Nature of ownership data	# of hospitals	% of hospitals
Working file of hospitals	4,644	100.0%
Reported direct &/or indirect owners	3,344	72.0%
indirect owners only	216	4.7%
direct owners		
missing owner share	479	10.3%
sum of shares >100%	143	3.1%
without data problems	2,506	54.0%
Reported partners (but not owners)	11	0.2%
Reported neither owners nor partners	1,289	27.8%
in chain of at least 3 hospitals	191	4.1%
free-standing	1,098	23.6%

Notes: The counts of the three data problems are additive. Hospitals without "owners" have an associate ID that may pertain to several other hospitals. PECOS does not call this an "owner," but it functions as one.

Another 1,289 hospitals (27.8 percent) did not report either an owner or a partner. Although most hospitals have their own associate ID, 191 hospitals reported no owners or partners but shared an associate ID with at least three other hospitals. Here are three prominent examples: Kaiser Foundation Hospitals is a nonprofit with 36 hospitals. Appalachian Regional Healthcare (ARH) is a nonprofit with six hospitals, largely in eastern Kentucky. Health and Human Service Commission, part of the Texas government, has nine psychiatric hospitals. Although PECOS does not use the term "owner" in these cases, each of these three groups are chains (or at least parts of one). The other hospitals not reporting owners or partners are unaffiliated with a chain and presumably have governing boards (or are government owned).

In our database construction, all hospitals that reported no owners are treated as if their associate ID was a direct owner, thus ensuring that these hospitals are included in our subsequent analyses.

Two other released files: The December release includes two other files. The additional-NPI file deals with the fact that a few hospitals have multiple NPIs even though the vast majority of hospitals have only one. This small file is a concise method to present those additional NPIs. (We call this the "NPI file.")

The final file deals with the fact that hospitals may deliver services in multiple locations. (We call this hospital-address-level file the "address file.") Although hospitals are defined by their inpatient facilities, the majority of their revenues (across all payors) are now delivered in hospital outpatient departments (HOPD). These services can be delivered on the same campus as the inpatient services, but they can also be delivered in off-campus (HOPD), perhaps miles away.

Even though the off-campus HOPDs often function like physician offices, Medicare typically pays them at higher rates than physician offices. Medicare collects data on payment by whether on or off campus but not by each HOPD location, limiting the analyses one could perform with this file. This brief does not analyze this file.

Other Data: For this report, the hospital file was merged with two other CMS Public Use Files (PUFs): the Care Compare files and Medicare Cost Reports.[9] Care Compare provides information on number of beds and profit status (i.e., for-profit, non-profit, government).[****] Hospital cost reports report urban or rural location.[††††]

As discussed at the end of this appendix, when we assign hospitals to chains, the results can be inconsistent with how hospitals present themselves to the public via branding.

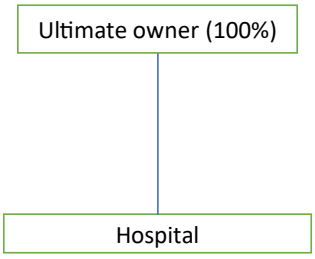
Methodology: Organizational owners and their chains

If the 855A enrollment form identified ultimate owners of each hospital, defining hospitals chains would be relatively straightforward. [‡‡‡‡] All hospitals with a given ultimate owner would be assigned to same chain, which could be labeled as the owner's name.[§§§§]

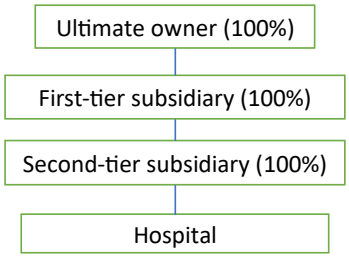
Here is our methodology for assigning hospitals to chains based on their ownership data.

Several stylized organizational structures: The usefulness of our methodology varies by the relationships among a hospital's owners. To facilitate discussion of ownership structures, we present four stylized structures, which are by no means comprehensive. Org Chart 1 presents a simple hierarchy in which the ultimate owner directly owns the hospital, which has its own tax identification number (TIN). Org Chart 2 presents a simple hierarchy with two tiers of subsidiaries between the ultimate owner and the hospital. That is, the hospital is owned by a second-tier subsidiary, which is owned by a first-tier subsidiary, which is owned by the ultimate owner.[*****] The ultimate owner and each of the two tiers of subsidiaries own 100 percent of the hospital.

Org Chart 1. Simple Hierarchy without Subsidiaries



Org Chart 2. Simple Hierarchy with Two Tiers of Subsidiaries



Org chart 3 presents a 50-50 joint venture. Unlike the two simple hierarchies, each ultimate owner has a 50 percent ownership share.

[****] Prior to merging, the CCN in the hospital file required modification, the most important modification is inserting a leading 0 and minor one is dropping suffixes. The vast majority of observations in the hospital file merged.

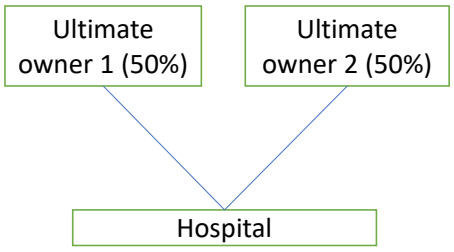
[††††] The percentage of hospitals that merge depends, in part, on the currency of the cost report. Our data included only reports for fiscal years ending in 2019.

[‡‡‡‡] The SNF ownership release has an "affiliated entity" variable; the hospital release does not.

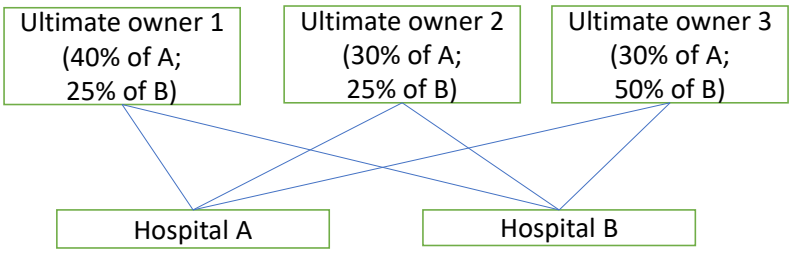
[§§§§] For simplicity, assume that each ultimate owner has a 100% ownership share.

[*****] The ownership data does not indicate which TIN is the ultimate owner, which is the first-tier owner, and so forth.

Org Chart 3. 50-50 Joint Venture



Org Chart 4. Interlocking Ownership



Org Chart 4 presents the most complex of the four structures considered here, namely interlocking owners.[†††††] Hypothetically, there are two hospitals, each of which has the same three ultimate owners. Owner 1 owns 40 percent of hospital A and 25 percent of hospital B, owner 2 owns 30 percent of hospital A and 25 percent of hospital B, and owner 3 owns 30 percent of hospital A and 50 percent of hospital B. The ownership shares sum to 100 percent for hospital A and 100 percent for hospital B.

***Prevalence of types of organizational structures*:** Estimating the prevalence of the various structures would ideally be based on a mutually exclusive set of categories that make intuitive sense. However, the heterogeneity of structures makes this difficult, and data quality issues exacerbate these problems. Still two simple calculations can be made.

Out of 2,506 hospitals reporting direct owners and without data problems, 1,523 report only owners with 100% shares, implying that each owner constitutes a different tier. These hospitals necessarily have a hierarchical organizational structure, although there may be additional hospitals that also have that structure. Thus, at least 60.8% (1,523/2,506) of hospitals with owners are structured with a hierarchy.

Another 35 hospitals are structured as 50-50 ventures. These hospitals constitute only 1.4% (35/2,506) of hospitals.

We hypothesize that interlocking owners are more common among individual owners than organizational ones, because when many individuals pool their financial resources by forming a corporation, they are better positioned to buy entire hospitals (or other providers). Given that individuals have only 8 percent of ownership shares of hospitals but about half of shares among SNFs, we would expect more interlocking ownership among SNFs. Testing our hypothesis probably requires network analysis.

***Assignment Methodology*:** Our methodology is designed for hierarchical ownership structures, as illustrated in the first two org charts. The methodology is based on this relationship: An ultimate owner ipso facto owns all the hospitals that are owned by each one of its subsidiaries. (If it has multiple first-tier subsidiaries, the ultimate owner may own more hospitals than any one of its subsidiaries.)

To assign hospitals to chains, we first retained all the TINs with an ownership share above 50 percent.[‡‡‡‡‡] For instance, in Org Chart 2, three TINs were retained. For each TIN in the file (across all hospitals), we obtained a

[†††††] A related term is "interlocking directorates," where individuals serve on the boards of competing firms. In the case of medical providers (e.g., nursing homes), members of a family (i.e., people related by marriage or blood) might jointly own a number of hospitals, even if many hospitals lack a majority owner.]

[‡‡‡‡‡] To avoid dropping too many hospitals, owners that did not report shares were also considered.

count of the hospitals with that TIN. The TIN with the most hospitals was considered to define a chain, which took the TIN name. After those hospitals were dropped from the working file, the next TIN with the most hospitals was identified and a second chain was delineated. The process continued until all the three-TIN chains were delineated, which was indicated by the delineation of the first two-hospital chain. Once the ultimate owners have been identified, we found that a few hospitals had been assigned to two chains, perhaps because of data anomalies. These issues were resolved by manual review.

If all of the hospitals in a chain have reported both the ultimate owner and its first-tier subsidiary as owners (though the PECOS data does not distinguish those roles), the TIN for those two entities would have the same number of hospitals. If the ultimate owner is not reported (but should be) for at least one hospital in the chain, the first-tier subsidiary TIN would have a higher count of hospitals. In that case, the chain would be correctly delineated even though the associated TIN is not the ultimate owner.

Spot Checks using SEC Annual Reports

One opportunity for vetting our assignments of hospitals to chains utilizes reports filed with the Security and Exchange Commission (SEC). The ultimate owner of publicly traded firms must file annual reports with the SEC. For the five largest chains in Table 3 (all of which file SEC reports), we compared our data to the SEC ultimate owner, as presented in Table A-3.

Table A-3. Ultimate Owner Based on PECOS Ownership Data vs. SEC Annual Reports, Five Largest Chains, 2022

	PECOS ownership data				
Chain		# of hospitals		ownership %	
Rank	Possible ultimate owner	#	% of max	mean	SEC
1	HCA, INC.	152	100%	99%	
1	HCA HEALTHCARE INC	151	99%	99%	SEC
1	HEALTHTRUST INC. - THE HOSPITAL COMPANY	145	95%	99%	
2	UNIVERSAL HEALTH SERVICES INC	151	100%	100%	SEC
3	ENCOMPASS HEALTH CORPORATION	122	100%	93%	SEC
3	ENCOMPASS HEALTH OWNED HOSPITALS HOLDINGS LLC	69	57%	100%	
4	SELECT MEDICAL CORPORATION	107	100%	98%	SEC
5	CHS COMMUNITY HEALTH SYSTEMS INC	74	100%	100%	
5	COMMUNITY HEALTH SYSTEMS INC	74	100%	100%	SEC
5	HMA-TRI HOLDINGS LLC	60	81%	100%	

Notes: For each chain as constructed here, the ultimate owner (per PECOS) is listed first. Of the alternative owners (of the same set of hospitals), only those with a majority of a chain's hospitals are also listed. The last column indicates the ultimate owner (per SEC annual report, 2022).

To understand the table, consider the three owners of HCA: 152 hospitals were owned by HCA, INC. All but one of them were also owned by HCA Healthcare, and 95% were also owned by Healthtrust (144/152). Each of the three owners had mean ownership shares of 99%. Therefore, consistent with Org Chart 2, two of these were subsidiaries of the ultimate owner, but the question is which owner is the ultimate owner. Our approach

selected HCA, Inc, whereas the SEC report indicates it is HCA Healthcare.[§§§§§] Our methodology does not distinguish between ultimate owner and its first-tier subsidiary, but either one defines the same chain.

Of the next three chains (Universal, Encompass, and Select), our methodology yielded the ultimate owner as reported by SEC. In the fifth chain, two entities owned the same 74 hospitals. Our methodology cannot distinguish between the ultimate owner and its first-tier subsidiary. The SEC report indicates the ultimate owner is Community Health Systems.

Across these five chains, our review of SEC reports confirms that our methodology for assigning hospitals to chains is reasonable.[******]

Conclusion: Our common owner methodology appears insensitive to minor data quality issues in identifying chains that have majority ownership of each of its hospitals, but it is not designed to identify chains involving 50-50 ventures or interlocking ownerships.

Vetting Chains Using Brand Names

In part because ownership data is self-reported, vetting of our assignment of hospitals to chains is desirable. Vetting might pertain to at least two issues: Which chains (as initially constructed) should be combined? And which hospitals are not assigned to a chain but should be?

Investigations of both issues might start with how each chain has branded its hospitals. PECOS requires providers to report their legal name and has an optional field for reporting their Doing Business As (DBA) name, which are the names they use when interacting with the general public. DBA names often start with the name of the chain. For instance, if a hypothetical chain named "XYZ" owns one hospital in the east section of town and another in the west section, their DBA names might be XYZ East Hospital and XYZ West Hospital. So, a convenient way to find a common brand is to retain the first word (or several words) of each hospital's name and determine whether multiple hospitals have the same initial name. This approach presumes that hospitals with the same brand are in the same chain. However, not all chains incorporate their brand into the DBA names of their hospitals.

About 550 hospitals (about 13 percent) had names that start with possible brand names. The relationship between these brands and chain is presented in Table A-4, which has counts of hospitals by the combination of brand and chain.[††††††] Ideally, all of hospitals under each brand would have the same chain, which is true for these three brands: HCA, KINDRED, and TEXAS HEALTH. A number of brands identify a few hospitals that have not been assigned to the chain of a majority of hospitals but possibly should be. For instance, one hospital branded as "KAISER" is not assigned to the Kaiser chain, and six of the hospitals branded "ENCOMPASS" are not assigned to the Encompass, the third largest chain.

[§§§§§] The introduction to the report mentioned both entities (and no other).

[******] As Table 3 shows, many hospital chains are nonprofit. As such, they are required to submit IRS Form 990, which includes information on "related organizations." ProPublica has recently made such filings more accessible via its "Nonprofit Explorer: Research Tax-Exempt Organizations." https://projects.propublica.org/nonprofits/, accessed 6-12-23. This issue brief has largely completed when this new data source was publicized. As yet, we have not investigated it.

[††††††] Of hospitals with same ultimate owner, some might be branded and some not. HCA, the largest chain, has 152 hospitals (see Table 3) but only 47 have the brand and hence are reported in Table A-3.

Table A-4. Using Brands to Vet Reported Ownership Data
(within a brand, chains are listed in declining order by number of hospitals)

Table A-4. Using Brands to Vet Reported Ownership Data
(within a brand, chains are listed in declining order by number of hospitals)

		Number of hospitals	
Brand	**Chain/Ultimate owner**	**by brand-chain combination**	**by brand only**
Total in this table		562	NA
ADVENTHEALTH	ADVENTIST HEALTH SYSTEM SUNBELT HEALTHCARE	28	31
ADVENTHEALTH	unassigned to any chain	3	31
ASCENSION	unassigned to any chain	19	53
ASCENSION	ASCENSION HEALTH	10	53
ASCENSION	ASCENSION SETON	8	53
ASCENSION	ASCENSION VIA CHRISTI HEALTH INC	4	53
ASCENSION	ST. VINCENT'S HEALTH SYSTEM, INC.	4	53
ASCENSION	SACRED HEART HEALTH SYSTEM INC	3	53
ASCENSION	COLUMBIA ST MARYS HOSPITAL MILWAUKEE INC	2	53
ASCENSION	ST JOHN PROVIDENCE	1	53
ASCENSION	LIFEPOINT HEALTH INC	1	53
ASCENSION	ST JOHN HEALTH SYSTEMS INC	1	53
BAYLOR SCOTT & WHITE	unassigned to any chain	15	32
BAYLOR SCOTT & WHITE	TEXAS HEALTH VENTURES GROUP LLC	6	32
BAYLOR SCOTT & WHITE	BAYLOR UNIVERSITY MEDICAL CENTER	5	32
BAYLOR SCOTT & WHITE	BAYLOR SCOTT & WHITE MEDICAL CENTERS - CAPITOL AREA	3	32
BAYLOR SCOTT & WHITE	BAYLOR REGIONAL MEDICAL CENTER AT PLANO	2	32
BAYLOR SCOTT & WHITE	SELECT MEDICAL CORPORATION	1	32
BON SECOURS	BON SECOURS MERCY HEALTH INC	9	10
BON SECOURS	BON SECOURS CHARITY HEALTH SYSTEM, INC.	1	10
CHI	COMMONSPIRIT HEALTH	23	27
CHI	unassigned to any chain	4	27
ENCOMPASS	ENCOMPASS HEALTH CORPORATION	106	112
ENCOMPASS	unassigned to any chain	6	112
HCA	HCA, INC.	47	47
KAISER	KAISER FOUNDATION HOSPITALS	35	36
KAISER	unassigned to any chain	1	36
KINDRED	KNIGHT HEALTH HOLDINGS, LLC	46	46
PAM	PAM CUBED LLC	27	41
PAM	PAM SQUARED, LLC	8	41
PAM	POST ACUTE MEDICAL LLC	5	41
PAM	unassigned to any chain	1	41
SELECT	SELECT MEDICAL CORPORATION	78	79
SELECT	unassigned to any chain	1	79
TEXAS HEALTH	TEXAS HEALTH RESOURCES	21	21
UNIVERSITY OF MARYLAND	UNIVERSITY OF MARYLAND MEDICAL SYSTEM CORP	7	9
UNIVERSITY OF MARYLAND	unassigned to any chain	2	9
VIBRA	VIBRA HEALTHCARE II, LLC	8	18
VIBRA	VIBRA HEALTHCARE, LLC	6	18
VIBRA	unassigned to any chain	2	18

Note: Excluded from this table are brands with fewer than seven hospitals.

The brands PAM and VIBRA each have a pair of chains with very similar names, suggesting ownership relationships that is not apparent from the present dataset construction. The PAM brand has PAM CUBED LLC and PAM SQUARED, LLC. The VIBRA brand has VIBRA HEALTHCARE II, LLC and VIBRA HEALTHCARE, LLC.

Finally, two brands each have more than a dozen unassigned hospitals. The ASCENSION brand has 53 hospitals, 19 of which are not assigned to any chain and the remaining are spread over nine chains. The BAYLOR SCOTT & WHITE brand has 32 hospitals, 15 of which are not assigned to any chain and the remaining are spread over four chains.

In the cases of ASCENSION and BAYLOR SCOTT & WHITE, in particular, some of the anomalies may represent legacy ownership relationships that have not been updated. That is, hospitals may have updated their names but not all of their owners.[‡‡‡‡‡‡]

Once plausibly incomplete data has been identified, additional information might resolve the issue. Non-profit entities must submit IRS form 990 to the Internal Revenue Service. The forms are downloadable, although they may not list each hospital. But there is no analogous data source for for-profit entities. Some chains list their hospitals on their website.[§§§§§§]

Because many hospital names do not start with the brand name, this approach cannot be applied to a majority of hospitals in chains. However, the problems found in these brands plausibly occur in other chains.

Methodology: Individual owners

Although PECOS does not identify ultimate owners, all individual owners are ultimate owners, because individuals cannot be owned by other individuals or by organizations. We leverage this fact to calculate the percentage of hospitals (or more precisely, the percentage of ownership shares) owned by individuals.

Consider hypothetical provider X reporting three *direct* owners: one individual A with 25 percent ownership share and two organizations with 35 percent and 40 percent shares, respectively. Each of the two organizational owners are owned by another entity. The 35 percent organization is owned by an individual B (35 percent), and the 40 percent organization is owned by an organization (40 percent). Therefore, individuals own 60 percent of provider X (25 percent+35 percent). Summing direct ownership shares and indirect ownership shares (both of individuals) does not involve double counting, because all individual owners are ultimate owners.

An additional complexity is that owners with shares below 5 percent need not be reported. In such cases, we do not know whether owners are individuals or organizations. However, the unreported share can be calculated as 100 percent minus the sum of the shares of direct owners, because those shares should not exceed 100 percent. The share of organizational owners is, therefore, 100 percent minus the sum of individual shares (direct + indirect) and minus the sum of unreported shares (direct only).[*******] If 3 percent of ownership shares were unreported, 37 percent of provider X would be owned by organizations (that is, 100 percent - 60 percent -3 percent). Included in our calculation of individual ownership shares as a percentage of all hospitals

[‡‡‡‡‡‡] Change of ownership must be reported within 30 days of the effective date.

[§§§§§§] For instance, in our dataset, PRIME HEALTHCARE SERVICES, INC and PRIME HEALTHCARE FOUNDATION INC have 31 and 11 hospitals, respectively. Prime Healthcare lists its 45 hospitals, https://www.primehealthcare.com/Print.aspx?Page=%2fOur-Locations.aspx, accessed 2-26-23. Presumably one could crosswalk the on-line list of names and addresses and our dataset.

[*******] Even this may be an overestimate because some unreported direct owners may be owned by a reported indirect owner.

are hospitals that are partnerships (completely owned by individuals) and hospitals without any direct or indirect owners. (The latter hospitals are implicitly owned by organizations.)

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200 Independence Avenue SW, Mailstop 447D
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ABOUT THE AUTHORS

W. Pete Welch is a Senior Analyst in the Office of Health Policy in the Office of the Assistant Secretary for Planning and Evaluation (ASPE).
Lanlan Xu is a Public Health Advisor in the Office of Health Policy in ASPE.
Nancy De Lew is the Acting Deputy Assistant Secretary in the Office of Health Policy in ASPE.
Benjamin D. Sommers is a Senior Counselor in the Office of Health Policy in ASPE.

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