Original Article

Characterizing healthcare delivery in the United States using Census Bureau's County Business Patterns (2000–2016)

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Abstract

Background: The US Census Bureau's County Business Patterns (CBP) series provides a unique opportunity to describe the healthcare sector using a single, national data source.

Methods: We analyzed CBP data on business establishments in the healthcare industry for 2000–2016 for all 50 states and the District of Columbia. Setting and facility types were defined using the North American Industry Classification System.

Results: In 2016, CBP enumerated 707,634 US healthcare establishments (a 34% increase from 2000); 86.5% were outpatient facilities and services followed by long-term care facilities (12.5%) and acute-care facilities (1.0%). Between 2000 and 2016, traditional facilities such as general medical surgical and surgical hospitals (−0.4%) and skilled nursing facilities (+0.1%) decreased or remained flat, while other long-term care and outpatient providers grew rapidly.

Conclusion: This analysis highlights the steady growth and increased specialization of the US healthcare sector, particularly in long-term care and outpatient settings.

The privatized and fragmented nature of healthcare delivery in the United States makes basic accounting of healthcare facilities challenging.[1] Although counts of hospitals, nursing care and skilled nursing facilities, and select Medicare-certified facilities are available from the Centers for Medicare and Medicaid Services (CMS), they are limited because they do not encompass the full spectrum of healthcare delivery. Previous studies have estimated volumes of healthcare services based on encounter-level data extracted from routinely conducted surveys and databases that track healthcare costs and utilization.[2,3] However, estimates describing healthcare delivery using facility-level data are limited to some regulated settings while excluding others (eg, outpatient data).[4,5] To our knowledge, a systematic characterization of the US healthcare landscape using facility-level data has not been published previously.

County Business Patterns (CBP), a yearly data series published by the US Census Bureau, represents a single comprehensive data source that encompasses all business establishments in the country.[6] The CBP database routinely captures annual counts of the full spectrum of known healthcare facilities. Here, we utilize CBP data to describe the US healthcare landscape, to explore changes over time, and to assess concordance with CMS data for select facility types.

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Methods

County Business Patterns data on business establishments in the healthcare industry (Sector 62. Health Care and Social Assistance) from 2000 to 2016 were analyzed for all 50 states and the District of Columbia. Setting and facility types were defined using the North American Industry Classification System (NAICS), a hierarchical coding system used by federal statistical agencies to classify business establishments according to the types of economic activity.[7]

Industries classified in NAICS subsector 621 (ambulatory health care) are defined as outpatient care facilities and services; those in subsector 622 (hospitals) are defined as acute-care facilities; and those in subsector 623 (nursing and residential care) are defined as long-term care facilities. In our analysis, 17 facility types comprised outpatient care, long-term care comprised 6 facility types, and acute care comprised 3 facility types (Fig. 1). Detailed NAICS definitions for each facility type are publicly available on the US Census Bureau website.[7]

Facility counts were calculated based on the number of establishments enumerated within each facility type, by year. Each establishment is defined by CBP as a physical location or permanent structure where some form of economic activity is conducted. Based on this definition, multiple establishments within a single health system were counted as separate facilities.[8]

Finally, to assess concordance of CBP with CMS, we compared facility count estimates from CBP with CMS counts for facility types where data were available from both data sources. We compared CMS counts of hospitals, skilled nursing facility and
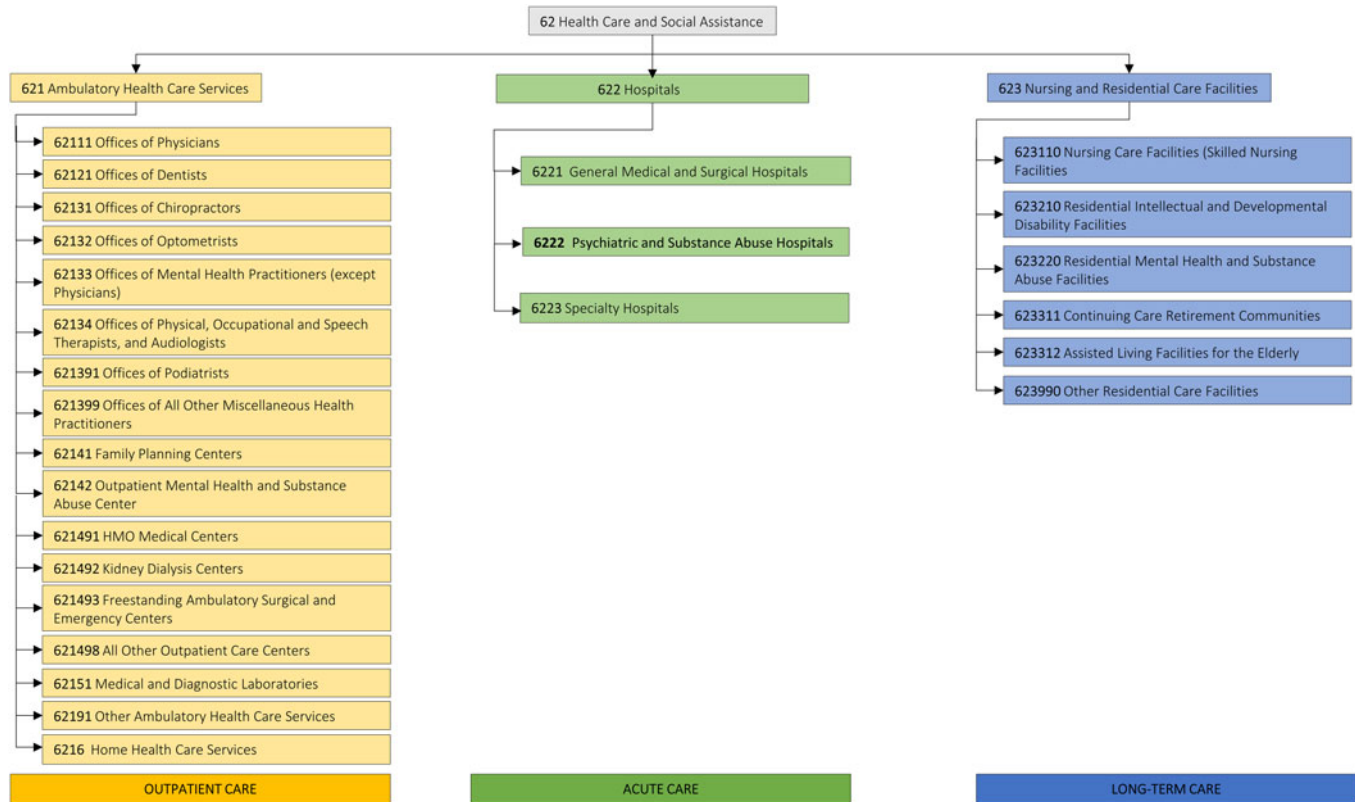
Fig. 1. North American Industry Classification System (NAICS) facility classification chart.

nursing facilities, intermediate care facilities for individuals with developmental disabilities, end-stage renal disease facilities, and home health agencies with CBP counts of hospitals, nursing care and skilled nursing facilities, residential intellectual and developmental disability facilities, kidney dialysis centers, and home healthcare services, respectively. CMS counts for these facility types were extracted from the Provider of Services (POS) files.[9] To assess agreement between the 2 data sources, we calculated Lin's concordance coefficients using state-level estimates for the aforementioned facility types for the years 2000, 2005, 2010, 2015, and 2016.[10]

Data management and analysis were conducted using StataSE version 14 software.[11] Lin's concordance coefficients were calculated using the *concord* command in Stata.[12] The Business Register, which is the primary source of data on business establishments for CBP, includes data on all US-based businesses. As a result, CBP data are not subject to sampling error, and there are no error terms attached to the estimates generated by our analysis.[13]

Results

Composition of healthcare delivery

In 2016, the CBP enumerated 707,634 US healthcare establishments. The breakdown by facility type was dominated by outpatient care facilities and services (86.5%), followed by long-term care facilities (12.5%) and acute-care facilities (1.0%) (Table 1). Provider-based facilities represented the majority of outpatient establishments, primarily the offices of physicians (n = 224,840; 37% of all outpatient facilities) and dentists (n = 134,620; 22%) (Fig. 2). Residential intellectual and developmental disability

facilities (n = 33,594) represented the largest share of long-term care facilities (38%), followed by assisted living facilities for the elderly (n = 19,146; 22%) and nursing care and skilled nursing facilities (n = 17,223; 19%). The share of general medical and surgical hospitals in the acute-care setting was 76% (n = 5,417), compared to 15% (n = 1,020) for specialty hospitals and 9% (n = 663) for psychiatric and substance abuse hospitals (Table 1).

Trends in healthcare delivery

Facility counts along with overall percent change and average annual rate of change for the study period across all three settings are detailed in Table 1. From 2000 to 2016, the outpatient category increased by 33%, representing a net gain of 152,560 facilities and 86% of overall growth in the number of healthcare facilities. Within the outpatient setting, the greatest relative growth occurred among freestanding ambulatory surgery and emergency centers (+4,344, 174%), kidney dialysis centers (+4,621, 159%), and offices of physical, occupational and speech therapists, and audiologists (+23,765, 158%).

The long-term care setting experienced a 41% overall increase, representing a net gain of 25,555 facilities between 2000 and 2016. This occurred despite a marginal (1%) increase in nursing care and skilled nursing facilities. The number of residential intellectual and developmental disability facilities more than doubled (111%), with a net increase of >18,000 facilities. Other facility types that experienced substantial growth in the long-term care category included continuing care retirement communities (+1,877, 48%) and assisted living facilities for the elderly (+4,660, 28%) (Fig. 2).

From 2000 to 2016, acute-care facilities experienced a nominal overall increase (0.2%). The number of psychiatric and substance abuse hospitals decreased by 20%, while general medical and

Table 1. Number of Establishments by Facility Type (2000–2016)

Facility Type	Year, No. (%)					Overall Change, %	Average Annual Rate of Change, %
	2000	2005	2010	2015	2016	2000–2016	
Acute-care facilities[a]	**7,087 (1.3)**	**7,081 (1.2)**	**6,792 (1.0)**	**7,012 (1.0)**	**7,100 (1.0)**	**0.2**	**0.01**
General medical & surgical hospitals	5,756 (81)	5,386 (76)	5,184 (76)	5,361 (76)	5,417 (76)	−6	−0.4
Specialty hospitals (except psychiatric and substance abuse)[b]	499 (7)	973 (14)	956 (14)	1,016 (15)	1,020 (15)	104	4.6
Psychiatric & substance abuse hospitals	832 (12)	722 (10)	652 (10)	635 (9)	663 (9)	−20	−1.4
Long-term care facilities[a]	**63,005 (11.9)**	**72,103 (12.0)**	**79,047 (12.1)**	**86,653 (12.4)**	**88,560 (12.5)**	**41**	**2.1**
Nursing care and skilled nursing facilities	16,891 (27)	17,268 (24)	16,568 (21)	17,085 (20)	17,223 (19)	1	0.1
Residential intellectual and developmental disability facilities	15,542 (25)	23,420 (32)	27,384 (35)	32,770 (38)	33,594 (38)	111	5.0
Assisted living facilities for the elderly	14,486 (23)	14,451 (20)	15,677 (20)	18,613 (21)	19,146 (22)	28	1.8
Continuing care retirement communities	3,590 (6)	4,320 (6)	6,459 (8)	5,316 (6)	5,467 (6)	48	2.7
Residential mental health & substance abuse facilities	6,185 (10)	6,230 (9)	6,937 (9)	7,613 (9)	7,943 (9)	23	1.6
Other residential care facilities	6,311 (10)	6,414 (9)	6,022 (7)	5,256 (6)	5,187 (6)	−17	−1.2
Outpatient care facilities & services[a]	**459,414 (86.8)**	**519,578 (86.8)**	**568,257 (86.9)**	**603,555 (86.6)**	**611,974 (86.5)**	**33**	**1.8**
Offices of physicians	195,655 (43)	213,611 (41)	223,797 (39)	225,095 (37)	224,840 (37)	15	0.9
Offices of dentists	116,494 (25)	122,918 (24)	129,830 (23)	134,631 (22)	134,620 (22)	16	0.9
Offices of chiropractors	32,191 (7.0)	37,156 (7.1)	37,970 (6.7)	39,129 (6.5)	39,338 (6.4)	22	1.3
Offices of optometrists	17,498 (3.9)	19,626 (3.8)	20,839 (3.7)	21,885 (3.6)	21,929 (3.6)	25	1.3
Offices of mental health practitioners (except physicians)	11,231 (2.4)	14,158 (2.7)	17,534 (3.1)	21,771 (3.6)	22,673 (3.7)	102	4.5
Offices of physical, occupational and speech therapists, and audiologists	15,048 (3.3)	24,846 (4.8)	32,697 (5.7)	36,541 (6.0)	38,813 (6.3)	158	6.1
Offices of podiatrists	8,329 (1.8)	8,681 (1.7)	8,668 (1.5)	8,361 (1.4)	8,177 (1.3)	−2	−0.1
Offices of other miscellaneous health practitioners[c]	7,694 (1.7)	10,911 (2.1)	13,982 (2.5)	18,450 (3.1)	20,139 (3.3)	162	6.2
Family planning centers	1,801 (0.4)	1,961 (0.4)	2,319 (0.4)	2,295 (0.4)	2,318 (0.4)	29	1.6
Outpatient mental health and substance abuse centers	6,371 (1.4)	8,167 (1.6)	9,178 (1.6)	10,474 (1.7)	10,967 (1.8)	72	3.4
HMO medical centers	744 (0.2)	601 (0.1)	585 (0.1)	812 (0.1)	892 (0.1)	20	1.1
Kidney dialysis centers	2,915 (0.6)	3,244 (0.6)	5,562 (1.0)	7,455 (1.2)	7,536 (1.2)	159	6.1
Freestanding ambulatory surgical and emergency centers	2,503 (0.5)	3,996 (0.8)	5,419 (0.9)	6,679 (1.1)	6,847 (1.1)	174	6.5
All other outpatient care centers[d]	7,869 (1.7)	8,932 (1.7)	9,558 (1.7)	11,672 (1.9)	12,029 (2.0)	53	2.7
Medical and diagnostic laboratories	9,750 (2.1)	11,856 (2.3)	13,220 (2.3)	17,265 (2.9)	17,494 (2.9)	79	3.7
Home healthcare services	16,092 (3.5)	20,184 (3.9)	27,314 (4.8)	30,981 (5.1)	32,464 (5.3)	102	4.5
Other ambulatory health care services[e]	6,779 (1.5)	8,730 (1.7)	9,785 (1.7)	10,059 (1.7)	10,898 (1.8)	61	3.0
Total	**529,506 (100)**	**598,762 (100)**	**654,096 (100)**	**697,220 (100)**	**707,634 (100)**	**34**	**1.8**

NOTE: Percentages may not total to 100% due to rounding; Denominator used to estimate %s for each facility type was the aggregate total for the setting.
[a]Denominator used to estimate %s for each setting type was the aggregate total across all settings (ie, 26 facility types).
[b]Specialty hospitals exclude psychiatric and substance abuse hospitals.
[c]Miscellaneous health practitioners include acupuncturists, hynotherapists, dental hygienists, respiratory therapists, denturists, midwives, dietitians, naturopaths, homeopaths, and registered nurses and/or licensed practical nurses.
[d]Other outpatient care centers include general and specialized outpatient providers such as pain therapy, community health, sleep disorder centers, and clinics.
[e]Other ambulatory health care services include ambulance services, blood or body organ banks, and other health screening and testing services.

surgical hospitals decreased by 6%. In contrast, the number of specialty hospitals more than doubled, from 499 facilities in 2000 to 1,020 in 2016. Within the acute-care category, the share of general medical and surgical hospitals decreased from 81% in 2000 to 76%, while the share of specialty hospitals doubled from 7% to 15% (Table 1).

Table 2. Facility Count Comparisons Between the Centers for Medicare and Medicaid Services (CMS) and the US Census Bureau's County Business Patterns (CBP)

Facility Type	Rho_c[a] (95% CI)				
	2000	2005	2010	2015	2016
Hospitals	0.989 (0.985–0.994)	0.971 (0.959–0.984)	0.993 (0.989–0.997)	0.990 (0.985–0.996)	0.987 (0.979–0.994)
Nursing care and skilled nursing facilities	0.987 (0.981–0.994)	0.976 (0.965–0.988)	0.970 (0.957–0.984)	0.956 (0.937–0.975)	0.954 (0.935–0.973)
Residential intellectual and developmental disability facilities	0.524 (0.367–0.681)	0.363 (0.231–0.495)	0.298 (0.177–0.418)	0.230 (0.126–0.334)	0.220 (0.199–0.321)
Kidney dialysis centers	0.912 (0.871–0.953)	0.888 (0.843–0.933)	0.979 (0.969–0.990)	0.965 (0.952–0.978)	0.973 (0.963–0.984)
Home health care services	0.530 (0.432–0.628)	0.585 (0.487–0.683)	0.698 (0.611–0.784)	0.67 (0.584–0.763)	0.630 (0.536–0.724)

Note. CI, confidence interval.
[a]Lin's concordance correlation coefficients (rho_c) was estimated using state-level estimates by facility type separately for each year.
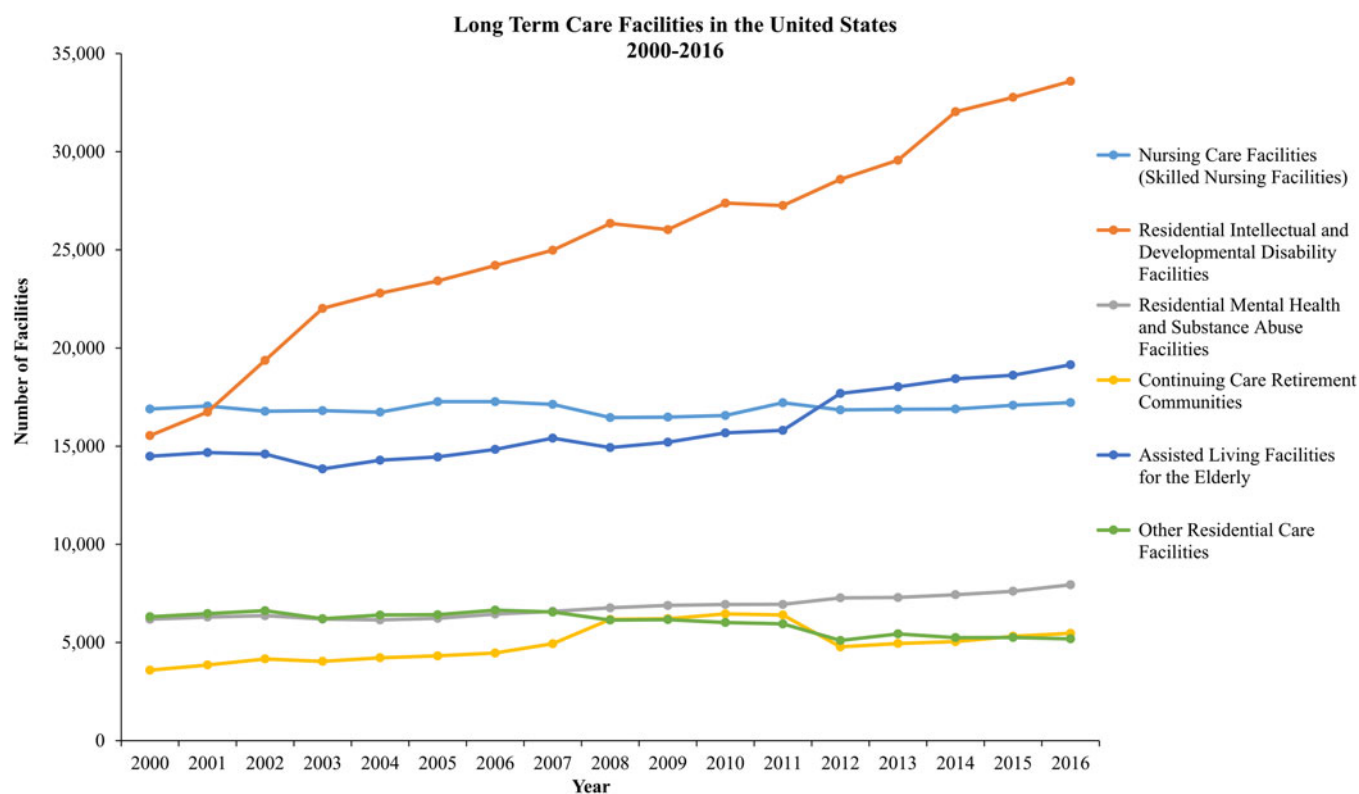
Fig. 2. Number of long-term care facilities in the United States (2000–2016).

Comparison with CMS

Concordance in facility count estimates between CBP and CMS varied by facility type (Table 2). In 2016, the concordance correlation coefficient was greatest for hospitals (0.987), kidney dialysis centers (0.973), and nursing care and skilled nursing facilities (0.954). Comparatively, the concordance was lower for facility counts of home health agencies (0.630) and residential intellectual and developmental disability facilities (0.220).

Discussion

Our analysis of facility-level data illustrates notable shifts in healthcare delivery in the United States between 2000 and 2016. The numbers of traditional institutional providers, such as general medical and surgical hospitals and nursing care and skilled nursing

facilities, decreased or remained flat despite a growing and aging US population.[14] In contrast, we observed steady growth and variability among other providers in long-term care and outpatient settings.

Changes in the acute-care setting

Compared with both long-term care and outpatient care settings, acute care experienced the slowest average annual rate of growth during the study period. We observed that 2 of 4 facility types that experienced any decline between 2000 and 2016 were acute-care facilities. Other sources have documented declines in both occupancy levels and average length of stay among inpatients in general medical and surgical hospitals over the same period.[5,15] The decline in number of psychiatric and substance abuse hospitals is particularly notable and consistent with the widely reported shortage

of inpatient psychiatric beds across the country.[16,17] In contrast, specialty hospitals that provide care related to narrow sets of conditions (eg, orthopedic, cardiac) more than doubled in number during the study period. A number of factors have been associated with these shifts and increasing specialization, including cost containment policies, decreased supplies of providers, technologic advances that have facilitated the delivery of more complex care, and changes in patient preferences.[3]

Rapid growth of and variability in long-term care facilities

In comparison to the rest of the industry, CBP data showed that the long-term care setting experienced the most rapid growth. However, our analysis indicates that long-term care facility types are not uniform in their experience, reflecting the varied levels of services they provide to a diverse patient population. Facility types that experienced higher growth rates, such as assisted living facilities for the elderly and continuing care communities, likely reflect a rapidly aging population and its increasing demand for care options that allow for greater independence.[18] The 2010 Census noted that the 65 and older population grew at a rate faster than the total US population.[19] Despite this growth, the numbers of traditional nursing care and skilled nursing facilities remained nearly flat while the overall occupancy levels declined.[20] This observation is consistent with the evolution of the role of nursing care and skilled nursing facilities within the US healthcare system as important post–acute-care providers serving a more medically complex patient population.[21]

Expanding outpatient care and its implications

We found that outpatient care facilities and services experienced steady growth. This trend is consistent with a study that examined US healthcare spending and demonstrated that utilization in the outpatient setting increased while utilization of inpatient and nursing facility care declined.[22] Our analysis also showed that most outpatient facilities are provider-based offices. This finding highlights an important strength of the CBP data because few if any existing data sources comprehensively account for the numbers and types of outpatient facilities including provider-based offices. Notably, even in the face of significant consolidation and hospital buyouts of physician practices the presence of provider-based offices remain a prominent feature in US outpatient care.[23] From a patient safety perspective, important gaps remain in our current understanding; many provider-based facilities do not fall within the purview of state or federal licensing or certification agencies and mechanisms for their oversight are highly variable.

Comparison with CMS

In comparison with CMS, we found that CBP estimates of overall facility counts were most consistent for hospitals, nursing care and skilled nursing facilities, and kidney dialysis centers. These facility types represent entities that very clearly fall under CMS oversight and have consistent administrative and functional definitions. The facility types with much lower concordance, residential intellectual and developmental disability facilities and home health care services, include those in which CMS certification may be less prevalent. This finding might also reflect varied state-level licensing requirements. Importantly, for outpatient facilities, even basic comparisons were not possible because timely updated databases of such facilities are unavailable.

This study has several limitations associated with the CBP data and our analysis that should be considered when interpreting the results presented here. First, these data are administrative in nature. Although the data are comprehensive and not subject to sampling error, they may be subject to nonsampling error (eg, misclassification of facilities) and should be interpreted with caution.[13] Second, this analysis was limited to facility types defined by the NAICS. A more detailed breakdown of some facility types, such as provider-based offices by specialty or ownership type, would offer useful insights but was not possible with these data. Third, we used physical establishment as the main unit of analysis. As a result, CBP data cannot be used to distinguish provider-based offices that are freestanding from satellite facilities that are part of hospital systems and may operate under different oversight and management conditions. Supplementing CBP data with state-based facility-level datasets might be helpful to better characterize relationships between outpatient facilities and their affiliated hospital systems. Finally, the comparison with CMS was limited because CBP data do not include facility-level identifiers. As a result, facility-level matching was not possible when comparing the 2 datasets; instead, the analysis was limited to aggregate facility counts.

In conclusion, this analysis presents a unique, systematic, facility-level characterization of healthcare delivery using a national data source. It shows that the US healthcare sector is dynamic and has undergone numerous changes and substantial growth over the last 16 years. We found that publicly available CBP data represent a valuable resource that can inform our knowledge of the US healthcare landscape, especially for facilities not routinely monitored by CMS programs. Future analyses of this data source should explore regional and other subnational trends including associations with patient health outcomes.

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