Organization and Performance of US Health Systems

Nancy Beaulieu, Michael Chernew, Mary Beth Landrum, J. Michael McWilliams, Maurice Dalton, Angela Gu, Michael Briskin, Rachel Wu, Zakaria El Amrani El Idrissi, Helene Machado, Andrew Hicks, and David Cutler

Published in *JAMA*, January 24, 2023

Research support provided by AHRQ Grant Numbers U19HS024072 and 3U19HS024072-05S1

CONTEXT

Health systems in the United States have grown dramatically in size and importance, mostly through mergers and acquisitions

Research in this area has been stymied by the absence of national detailed organizational data that could be used to examine performance

WHAT WE DID

Research team brought together a large number of different data sources to identify health systems in claims data

Used Medicare and commercial claims to compare health system and non-system providers on 7 performance dimensions

Definition of a Health System

Working definition (along with AHRQ and other centers)

- Composition: ≥ 1 acute care hospital, 50 physicians, 10 primary care physicians
- Commonly owned or managed (includes foundation models)
- Within at least 1 Health Referral Region

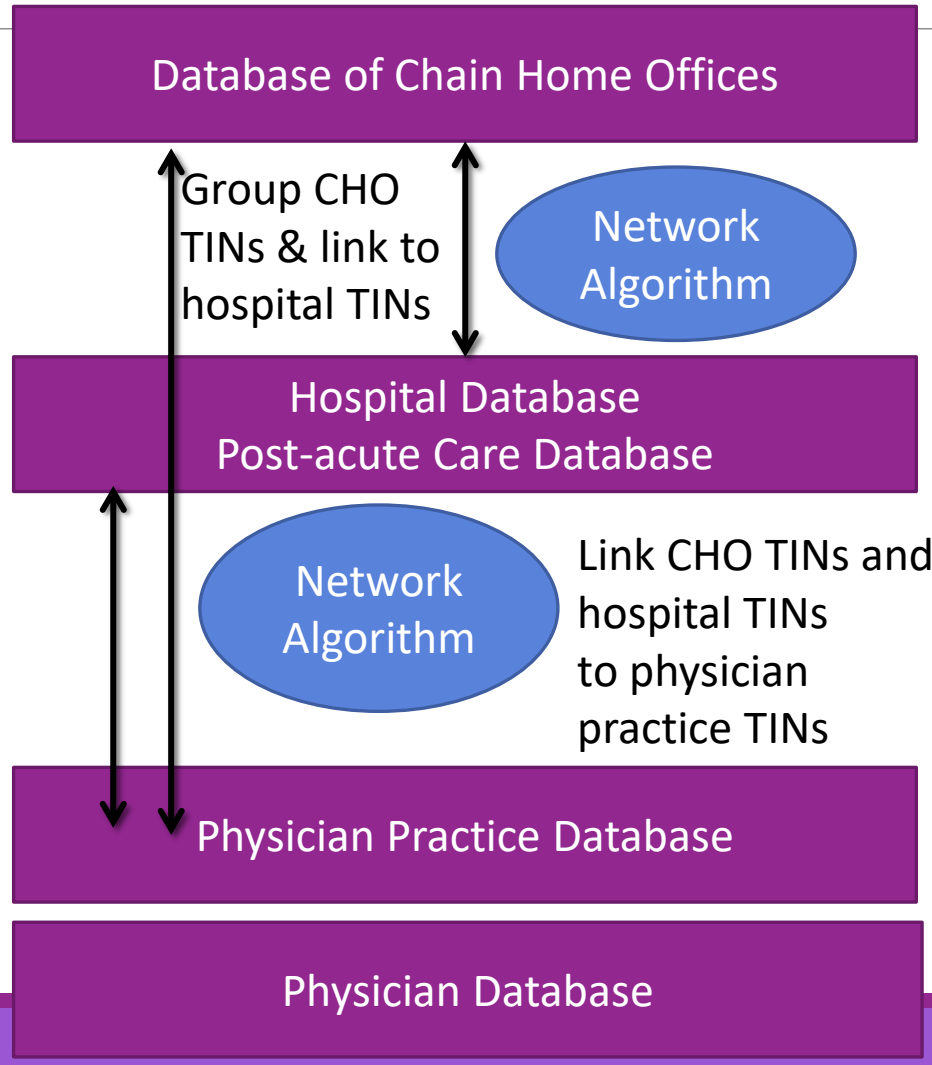
Vary in size and mission -> grouped into 5 categories

- Academic: (GME/GAC beds >=$30K) + (≥ 33% of GAC beds in major teaching hospital)
- Public: majority of GAC beds in public hospitals
- Large: (≥50 PCPs in HRR) + (≥ 100 PCPs in system)
  - Not-for-profit: + majority of beds in non-profit hospitals
  - For-profit: + majority of beds in for-profit hospitals
- Small/Other Private: all remaining systems

Identifying Health Systems

DATA SOURCES
Non-provider corporate TINs

- **PECOS**
- IRS 990 BMF
- **IRS 990 filings**
- SEC 10K filings
- Mergers & acquisitions
- AHA data
- POS data
- **SK&A data**
- **Medicare claims**
- **Commercial claims**
- **MD-PPAS**
- **MA-MDPPAS**



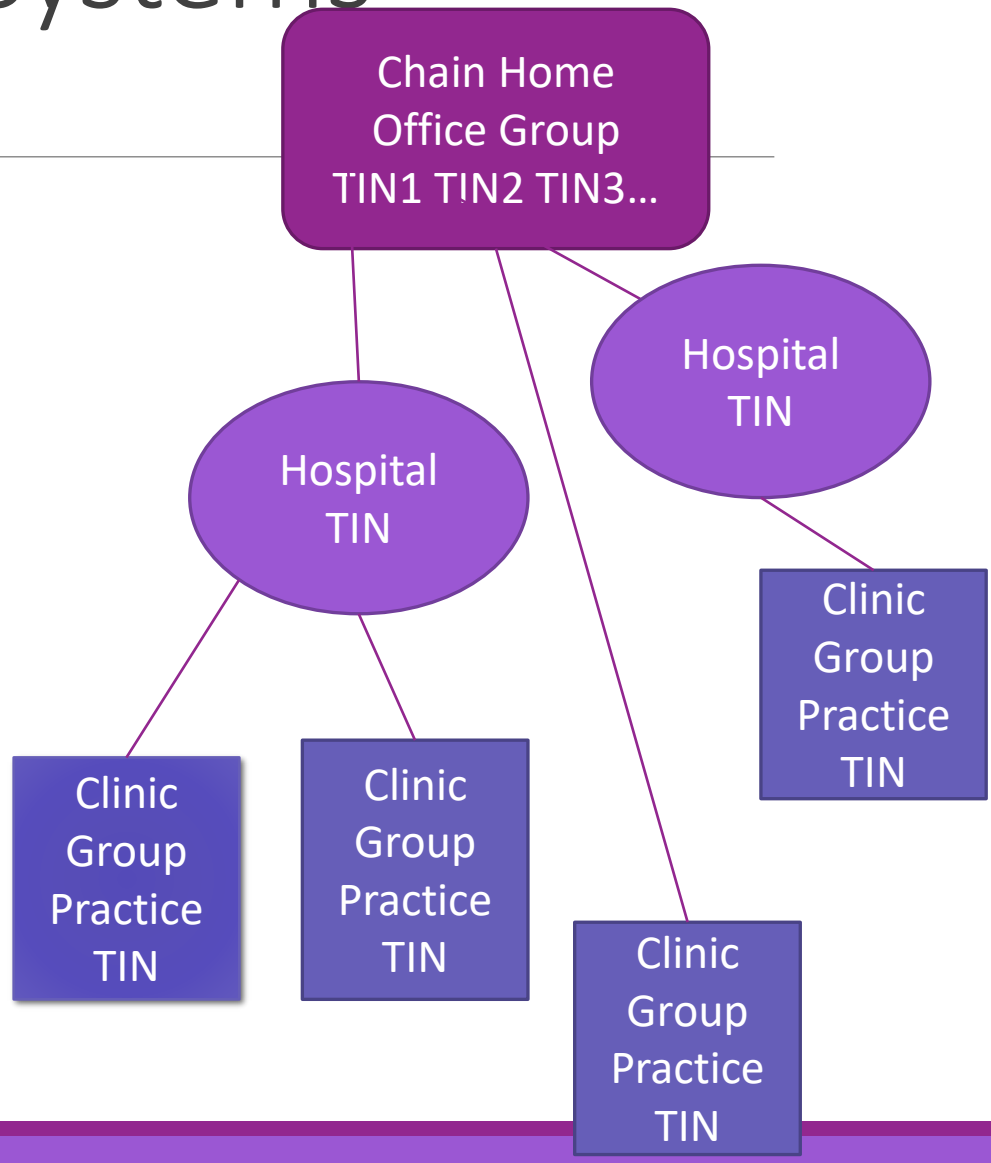
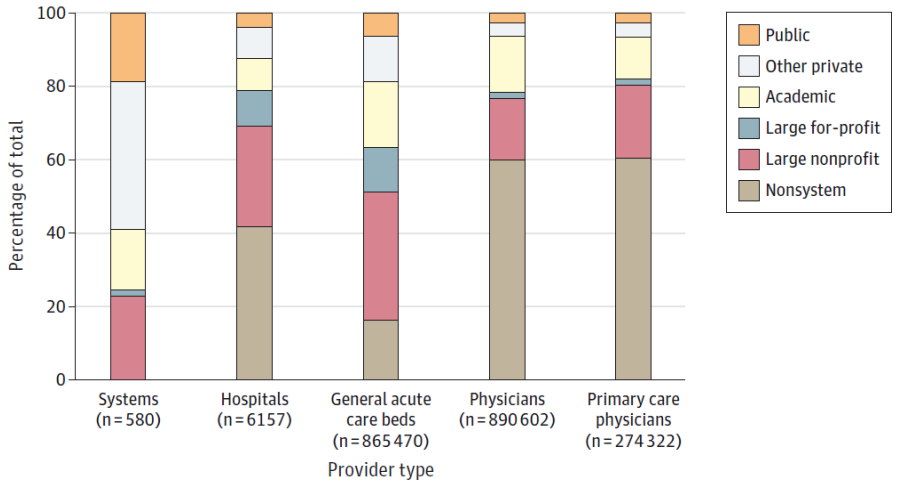


Figure 1. Health Systems by Type



	System-attributed patients	Non-system-attributed patients	p
Hospital Admissions			
% of Admissions to System Hospitals	94	84	<0.001
Specialty Physician Office Visits			
% of Office Visits with System Specialty Physicians	44	20	<0.001

Findings

A GOOD SHARE OF PROVIDERS AND MEDICAL CARE IS PROVIDED IN SYSTEMS.

Findings

1. A good share of medical care is provided in systems.

2. Medical care quality is *marginally* higher for people in health systems.

3. Medical care is *much* more expensive in systems, especially for small-medium providers.

Table 2. Comparative Performance of Health Systems on Quality and Patient Experience

Measure[d,e]	Nonsystem unadjusted mean[f]	System adjusted mean[a]	System[a]		Mean differences by system type[b,c]					
			Mean difference[c]	P value	Academic	Other private	Large for-profit	Large nonprofit	Public	P value
Preventive care, %										
Receipt of flu shot	76.1	78.8	2.7	<.001	4.3	1.3	1.5	2.6	2.2	<.001
Pneumonia vaccine	77.1	81.9	4.8	<.001	6.7	3.6	2.3	4.8	3.2	<.001
Cardiovascular, %										
Lipids test	78.7	75.9	−2.8	<.001	−5.0	−2.0	−1.1	−2.0	−3.2	<.001
AMI cardiac rehabilitation	23.5	24.6	1.1	<.001	0.7	0.8	−1.2	1.5	3.0	.004
Antiplatelet therapy adherence[d]	87.5	88.1	0.6	.02	0.2	0.1	−0.3	1.0	0.8	.41
ACE inhibitor adherence after HF[d]	51.4	51.1	−0.3	.13	−0.6	−0.6	−0.4	0	−0.4	.28
β-Blocker adherence after HF[d]	65.1	65.8	0.7	<.001	1.0	0.2	−0.2	0.8	0.3	.04
β-Blocker adherence after AMI[d]	73.8	73.7	−0.1	.78	−0.6	−0.5	−1.1	0.4	0.2	.52
Any statin	73.8	75.8	2.0	<.001	2.5	1.4	0.7	2.0	1.6	<.001
Statin adherence[d]	65.6	66.3	0.7	<.001	0.5	0.5	0.3	1.0	0.2	<.001
Diabetes, %										
HbA_{1c} test rate	84.5	85.9	1.4	<.001	1.5	0.7	0.6	1.9	0.2	<.001
LDL test rate	85.0	82.9	−2.1	<.001	−3.6	−1.3	−1.0	−1.3	−3.6	<.001
Any statin	72.3	75.2	2.9	<.001	3.8	1.9	1.9	2.7	3.0	<.001
Statin adherence[d]	74.2	75.0	0.8	<.001	0.8	0.4	0.6	1.1	0.4	.02
Any metformin	59.4	63.3	3.9	<.001	4.4	3.2	3.2	3.9	3.9	.002
Metformin adherence[d]	72.0	72.6	0.6	<.001	0.3	0.4	0.5	1.0	0.2	.002
Hospital mortality and readmissions, %										
Mortality in 2018 irrespective of hospital admission	3.0	3.0	0	.03	0.1	0	0	0	0.1	.04
Mortality 30-d post discharge from index hospital admission	5.7	5.5	−0.2	<.001	−0.4	−0.3	−0.2	−0.2	−0.2	.04
Readmissions 30-d post discharge from index hospital admission	15.7	16.3	0.6	<.001	1.1	0.5	0.6	0.3	0.3	<.001
Low-value care composites, %										
Cancer screening	16.4	13.9	−2.5	<.001	−3.2	−2.2	−1.2	−2.4	−2.5	<.001
Diagnostic testing	10.5	9.2	−1.3	<.001	−1.3	−1.1	−1.6	−1.3	−1.2	.57
Preoperative testing	8.3	8.1	−0.2	<.001	−0.3	−0.2	0.1	−0.2	−0.3	.04
Imaging	21.9	21.3	−0.6	<.001	−1.1	−0.3	−0.3	−0.4	−0.3	.002
Cardiovascular testing and procedures	10.9	10.3	−0.6	<.001	−0.9	−0.4	−0.2	−0.6	−0.5	<.001
Invasive procedures	4.9	4.8	−0.1	.03	−0.3	0	0.2	0	0.1	<.001
Patient experience										
Overall rating, %										
Rate care = 9 or 10	61	61.5	1.5	<.001	2.9	0.3	0.3	1.3	1.9	.006
Rate personal physician = 9 or 10	76	77.3	1.3	<.001	2.3	1.3	−1.9	1.2	1.1	.04
Rate specialist = 9 or 10	73	74.5	1.5	<.001	1.8	1.7	0.4	1.8	−0.3	.27
Composite[g]										
Physician communication composite	9.1	9.1	0.04	.002	0.05	0.04	−0.04	0.04	0.04	.41
Timely access composite	8.4	8.3	−0.06	<.001	−0.06	−0.07	−0.01	−0.05	−0.15	.28
Coordination and management[g]										
How often physician seemed informed about care from specialist	3.3	3.4	0.06	<.001	0.10	0.05	−0.02	0.05	0.07	<.001
How often personal physician has medical records and other information	3.9	3.9	0.01	.006	0.01	0.00	−0.02	0.01	0.02	.057
How often physician office followed up with test results	3.6	3.6	0.02	<.001	0.04	0.02	−0.04	0.03	0.01	.006
How often got test results as soon as needed	3.7	3.7	0.01	.007	0.02	0.00	−0.03	0.01	0.01	.04
How often personal physician talks about all medicines	3.4	3.5	0.05	<.001	0.06	0.05	0.01	0.06	0.05	.31
Physician had visit notes, %	44	58	14	<.001	18	10	6	16	9	<.001
Last 6 mo, got help from personal physician to manage care	1.2	1.2	0.00	.85	0.00	0.00	−0.02	0.00	0.00	.87
Last 6 mo, plan/physician office followed up about hospital stay	1.4	1.4	0.00	.76	−0.03	−0.01	−0.01	0.00	0.05	.55
Reminders from plan/physician office in last 6 mo[g]										
Make appointment for tests/treatment	1.5	1.5	−0.02	<.001	−0.02	−0.01	−0.01	−0.03	−0.01	.68
Get flu shot or immunization	1.6	1.6	−0.03	<.001	−0.06	−0.02	0.01	−0.04	−0.01	.004
Screening tests	1.7	1.7	−0.03	<.001	−0.03	−0.01	−0.02	−0.03	−0.01	.52

Abbreviations: ACE, angiotensin-converting enzyme; AMI, acute myocardial infarction; HbA_{1c}, hemoglobin A_{1c}; HF, heart failure; LDL, low-density lipoprotein.

[a] The system mean difference is the average difference in performance between patients attributed to system primary care physicians and patients attributed to nonsystem primary care physicians adjusted for patient characteristics and geographic area; it is equal to the health system coefficient in the performance regression. The *P* value refers to a test in which the null hypothesis is the mean system difference equals zero.

[b] The mean difference by system type is the average difference in performance between patients attributed to primary care physicians in each type of system and patients attributed to nonsystem primary care physicians adjusted for patient characteristics and geographic area; it is equal to the health system type coefficient in the performance regression. The *P* value refers to a test in which the null hypothesis is equality of mean differences across system types.

[c] 95% CIs are provided in eTable G12 in the Supplement.

[d] Separate regressions were estimated for each performance measure listed in left column of the table. (See eAppendices D and F in the Supplement for details on performance measure and regression specifications.)

[e] Adherence is measured as having a prescription or therapy covering at least 80% of days in the calendar year (eAppendix E in the Supplement).

[f] The unadjusted nonsystem mean for each performance measure equals the unadjusted average for patients attributed to primary care physicians not in a health system. It is provided here for comparison with the system mean difference to illustrate the magnitude of the difference between system and nonsystem performance.

[g] The adjusted system mean equals the sum of the unadjusted nonsystem mean and the adjusted system mean difference.

[h] The data sources and rating scales for the patient experience measures vary and are described in eAppendix D in the Supplement.

Table 3. Comparison of Spending and Prices for Physician and Hospital Services

	System		Mean difference by system type[a]					
					Large			
Service/spending category[b,c]	Difference[d]	P value	Academic	Other private	For-profit	Nonprofit	Public	P value
Physician service prices, %								
Inpatient visits	13.1	<.001	19.8	−3.2	6.3	13.1	3.9	<.001
Outpatient visits	26.0	<.001	35.0	8.3	14.5	24.8	15.2	<.001
Selected procedures								
Cardiologists	16.3	<.001	29.1	−1.1	−0.5	15.1	16.8	<.001
Gastroenterologists	16.3	<.001	24.5	−9.8	14.0	14.8	16.4	<.001
Orthopedic surgeons	18.9	<.001	18.1	0.8	25.1	23.3	13.8	.006
Other surgeons	12.0	<.001	20.5	−14.1	9.4	11.0	12.4	<.001
Hospital service prices, %								
Inpatient visits for various DRGs	30.6	<.001	37.6	18.0	31.8	31.0	11.0	<.001
Commercial spending/capita, $								
Hospital facility								
Inpatient (mean = 1564)	−55	<.001	−115	−160	68	−15	−127	<.001
Outpatient (mean = 1559)	495	<.001	1068	756	−38	227	697	<.001
Physician services (mean = 3336)	−95	<.001	−15	−374	−95	−86	−303	<.001
Total spending (mean = 7139)	333	<.001	912	234	−54	110	314	<.001
Medicare spending/capita, $								
Hospital facility								
Inpatient (mean = 3518)	311	<.001	518	304	290	197	321	<.001
Outpatient (mean = 2015)	455	<.001	779	461	97	306	537	<.001
Physician services (mean = 3833)	−206	<.001	−308	−233	23	−158	−289	<.001
Total spending (mean = 11 286)	591	<.001	1063	572	459	347	604	<.001

Abbreviation: DRG, diagnosis related group.

[a] In spending analyses, mean difference by system type is the average difference in spending between patients attributed to primary care physicians in each type of system and patients attributed to nonsystem primary care physicians adjusted for patient characteristics and geographic area; it is equal to the health system type coefficient in the spending regression. In price analyses, the mean difference by system type is the average percentage difference in price paid to physicians and hospitals in each type of system and compared with prices paid to nonsystem physicians and hospitals adjusted for care setting and geographic area; it is equal to the health system type coefficient in the price regression. The *P* value refers to a test in which the null hypothesis is the mean difference is equal across system types. 95% CIs are provided in eTable G13 in the Supplement.

[b] Separate regressions were estimated for each category of physician services, hospital services, and spending listed in the left column of the table (in the Supplement, see eAppendix D for details on price and spending measures and eAppendix F for details on regression specifications).

[c] Average unadjusted per-capita spending by beneficiaries attributed to nonsystem primary care physicians is shown in the left column next to spending category description.

[d] In price analyses, the system mean difference is the average percentage difference in price paid to system physicians and hospitals compared with nonsystem physicians and hospitals adjusted for care setting and geographic area; it is equal to the health system coefficient in the price regression. In spending analyses, the system mean difference is the average difference in spending between patients attributed to system primary care physicians and patients attributed to nonsystem primary care physicians adjusted for patient characteristics and geographic area; it is equal to the health system coefficient in the spending regression. The *P* value refers to a test in which the null hypothesis is the mean system difference equals zero. 95% CIs are provided in eTable G13 in the Supplement.

Conclusion

CONCLUSIONS AND RELEVANCE In 2018, health system physicians and hospitals delivered a large portion of medical services. Performance on clinical quality and patient experience measures was marginally better in systems but spending and prices were substantially higher. This was especially true for small practices. Small quality differentials combined with large price differentials suggests that health systems have not, on average, realized their potential for better care at equal or lower cost.