



Participation in delivery system reform programs and U.S. acute care hospital integration into behavioral health

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Background: Growing recognition of the prevalence and consequences of behavioral health disorders has reinvigorated efforts to transform how behavioral health is delivered, especially amongst acute care hospitals, and stimulated discussions about the ways to support these efforts. The purpose of this study was to examine the relationship between hospital participation in two delivery system reform programs—Accountable Care Organizations (ACO) and medical homes—and behavioral health integration among United States' acute care hospitals.

Methods: The study used a pooled, cross-sectional analysis with the hospital as the unit of observation. Our primary analysis utilized a negative binomial regression model to examine the relationship between hospital participation in delivery system reform programs and the breadth of behavioral health integration. Our secondary analysis used four binary logistic regression models to assess whether participation in delivery system reform programs was associated with behavioral health integration in specific areas of the hospital.

Results: On average, hospitals that were only participating in an Accountable Care Organization reported 1.09 times more behavioral health integration areas, relative to hospitals that were not participating in any delivery system reform programs (IRR =1.09, P<0.05). Similarly, hospitals with an established medical home program reported 1.21 times more behavioral health integration areas, on average, relative to hospitals that were not participating in any delivery system reform programs (IRR =1.21, P<0.001). Hospitals that were participating in both an Accountable Care Organization and had an established medical home program reported 1.31 times more behavioral health integration areas, relative to hospitals with neither (IRR =1.31, P<0.001).

Conclusions: Our analysis indicates that participation in either an Accountable Care Organization or medical home program, by itself, may be sufficient to support behavioral health integration, however, having an established medical home program may stimulate more robust integration than Accountable Care Organization participation. Likewise, hospitals participating in both programs may promote even greater behavioral health integration than single program participation. Collectively, our findings highlight opportunities to improve behavioral and physical health integration by U.S. acute care hospitals.

Keywords: Acute care hospitals; Accountable Care Organizations (ACO); medical home, behavioral health integration

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Introduction

It has been estimated that nearly 20% of people globally have experienced a mental disorder (1) and half of all people in the United States will be diagnosed with a behavioral health disorder, defined as a diagnosis for a mental health or substance use disorder, in their lifetime (2). Growing recognition of the prevalence and consequences of behavioral health disorders has led to calls to rethink how behavioral health is delivered (3,4). The need for such changes is especially salient amongst acute care hospitals. In 2014, behavioral health diagnoses ranked as the third most common reason for visiting an emergency department (ED) in the United States and the seventh most common reason for acute care hospitalizations (5,6). Moreover, the use of acute care hospitals for behavioral health issues is on the rise, with emergency department visits and acute care inpatient hospitalization rates for patients with a behavioral health disorder diagnosis increasing 48.1 and 23.2 percent, respectively, between 2005/2006 and 2014 (5,6). Patients with behavioral health disorders also present more challenging cases for acute care hospitals and consume more resources, with studies showing that ED visits and acute care hospitalizations of patients with a behavioral health diagnosis were 1.2 hours and 4.4 days longer, respectively, than patients without such a diagnosis (7,8).

Behavioral health experts increasingly advocate for integration between physical and behavioral health care to counteract these trends and improve the quality of behavioral health care (4,9,10). The Agency for Healthcare Research and Quality (AHRQ) defines integration as the systematic communication and coordination across behavioral and medical care providers (11). Studies have found that integrating primary and behavioral health care can improve access to services, improve outcomes for patients with conditions such as diabetes, cholesterol, and hypertension, and reduce hospital admissions and their associated costs (12,13).

Despite these benefits, health care delivery organizations face a number of challenges to integrating physical and behavioral health services. One evaluation of the integration of primary care into community behavioral health agencies, for example, found that these organizations struggled to recruit and retain qualified staff, secure adequate physical space, and share patient data between primary care and behavioral health providers (10). Moreover, to date most studies have focused on integrating behavioral health into primary care settings (e.g., primary care physician offices).

Given the aforementioned growth in behavioral health services provided by acute care hospitals, an important question is how to support efforts by acute care hospitals to integrate behavioral health care.

Delivery system reform models in the United States have been suggested as one means of supporting the integration of behavioral and medical care (14). Accountable Care Organizations (ACO) and medical homes, in particular, have been highlighted as having the potential to support behavioral health and physical care integration due to their whole-person approach to delivering care (14-16). An ACO is an organization that is formed for the purpose of managing the full continuum of care and assuming responsibility for the overall costs and quality of care for a defined population (17,18). The medical home attempts to transform the delivery of care through the adoption of the core principles of primary care (first-contact care that is comprehensive and coordinated across the care continuum), team-based care (using the full talents of a range of clinical professions), and patient-centered care (patient input into care decisions) by health care provider organizations, often primary care providers. Some experts have argued that these delivery system models are complementary and may offer synergies that neither alone can provide (18). For example, ACOs may be most successful when they are associated with a strong primary care foundation. Similarly, although the medical home encourages providers to take responsibility for providing and/or coordinating care, these providers may not have direct control or influence over other providers that can affect the cost and quality of care.

Despite their potential, empirical research is lacking on whether these reforms are, in fact, associated with greater efforts to integrate behavioral health into existing care activities. Given these gaps in the literature, the purpose of this study was to: (I) describe the extent to which acute care hospitals have integrated behavioral health into their existing service activities; and (II) describe the relationship between delivery system reforms and behavioral health integration by U.S. acute care hospitals. Study findings will provide important descriptive information for policy makers, practitioners, and patients who would like to understand current efforts by hospitals to integrate behavioral health activities and the potential impact of delivery system policies on these efforts.

Breadth of behavioral health integration

Hospitals have a number of opportunities to pursue

behavioral health integration given the range of services provided and conditions treated. For example, hospitals may have dedicated inpatient psychiatric units and, as noted earlier, many hospitals treat patients with a behavioral health diagnosis in the emergency department. Likewise, hospitals increasingly own physician practices (19-21) where a majority of behavioral health care is provided for conditions such as depression (22). Hospitals that pursue behavioral health integration in more of these areas arguably are better positioned to address the myriad behavioral health conditions and settings where patients seek care for these conditions. Thus, our primary focus in this study was the breadth of behavioral health integration, which we define as the number of different service areas that a hospital has routinely integrated behavioral health services.

Accountable care organizations (ACOs)

ACOs are an approach to aligning efforts across the care delivery continuum by creating accountability for a defined patient population (18,23). ACOs consist of different provider configurations (integrated delivery systems, hospital-based systems; virtual networks of physicians) to deliver care (24,25), which are designed, in part, to foster coordination of care activities between these different providers. Additionally, ACOs modify traditional fee-for-service reimbursement methods by incorporating shared savings arrangements, which allow ACO providers to share in the savings when the costs of care for the ACO population are below historical benchmarks (26).

Behavioral health disorders are among the most expensive conditions to treat, ranking second to only cardiovascular conditions in per capita spending as a primary diagnosis (27). Moreover, behavioral health disorders add substantial costs when they co-occur with other medical conditions (28). More effectively and efficiently managing these high-cost patients through the integration of medical and behavioral health services would ostensibly be a high priority for hospitals that participate in an ACO because doing so could create cost savings to be shared by a hospital. Likewise, integration into more service areas would likely increase the number of opportunities to create these cost savings. Therefore, we hypothesize that: “*H1: Relative to hospitals that are not participating in an ACO, hospitals that participate in an ACO will be associated with a greater breadth of behavioral health integration.*”

Medical home

The medical home, often referred to as the patient-centered medical home, can be defined as a team-based health care delivery model that provides personalized, continuous, and integrated medical care with the goal of improving the health of people, families, and communities (29). The medical home is based on a number of core principles, including individualized care that incorporates shared goal setting, whole person orientation that includes physical and behavioral needs, coordinated care that addresses the multifaceted needs of patients, and enhanced access to services (30,31). A number of experts have argued that these principles overlap considerably with models of integrated behavioral health and have suggested that medical homes may be one approach to integrating medical and behavioral health (30,32). That is, hospitals may use the medical home as a vehicle to integrate medical and behavioral health. Likewise, hospitals may learn from and leverage their experience with the medical home to integrate medical and behavioral health in other service areas. Consequently, we hypothesize that: “*H2: Relative to hospitals without an established medical home program, hospitals with an established medical home program will be associated with a greater breadth of behavioral health integration.*”

Complementary roles of ACOs and medical homes

ACOs and medical homes are argued to play complementary roles (18,33). As noted above, ACOs attempt to integrate care and manage the health of a population across the full continuum of care (e.g., primary care, specialty care, acute care, long-term care, behavioral health) by creating financial accountability among the participating organizations (i.e., financial incentives/disincentives for meeting cost goals). Medical homes, on the other hand, are more limited in their scope and typically emphasize the transformation of how primary care is delivered. This often entails the coordination and integration of care between primary care, specialty care, and acute care, again facilitated by financial payments, however accountability is much more limited in scope (e.g., primary care services, no downside loss). Extensive research has demonstrated that an effective primary care delivery system can achieve significant cost savings (34,35), which is why some have argued that ACOs, to be effective, may require a robust primary care infrastructure such as that provided by medical homes

(18,33). Thus, participation in an ACO and a medical home may provide complementary, even synergistic, incentives to integrate behavioral health into more service areas. That is, ACO participation may provide cost savings incentives to integrate behavioral health into more service areas, while participation in a medical home program may provide the means of accomplishing these cost savings. Consequently, we hypothesize that: “*H3: Relative to hospitals that are participating in only an ACO or only have a medical home program, hospitals participating in an ACO and have an established medical home program will be associated with a greater breadth of behavioral health integration.*”

Methods

Data sources

The data for this study were drawn from three sources: (I) the American Hospital Association’s (AHA) Annual Survey of Hospitals (years 2017–2019); (II) the Health Resources and Services Administration’s Area Health Resource File (AHRF; years 2017–2019); and (III) County Health Rankings and Roadmaps data. The AHA Annual Survey of Hospitals is an annual electronic survey of approximately 6,300 hospitals in the United States and provides extensive data regarding hospital organizational characteristics (36). The AHA reports an 80% response rate to this survey each year. The AHRF is a collection of data from different sources (e.g., Census Bureau, Bureau of Labor Statistics) that is used to construct the environmental characteristics considered in the study. The County Health Rankings and Roadmaps data is a collaboration between the Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute that was developed to provide insights into how local community factors may influence health (37). These data sources were merged together for each year and then combined to create a pooled, cross-sectional data set for analysis. The study received ethical approval (determined to be Not Human Subjects Research) by the Institutional Review Board of the University of Alabama at Birmingham (Protocol #: 300003568).

Dependent variables

Beginning in 2017, the AHA Annual Survey included a question that asked whether a hospital routinely integrates behavioral health services in one or more of the four following areas: (I) emergency services; (II) primary care

services; (III) acute inpatient care; and (IV) extended care (i.e., care for individuals who do not require acute care such as that provided in a hospital but who need more care than can be given at home (e.g., skilled nursing facilities, nursing homes). The survey defined integration as ranging from co-located medical and behavioral health providers, with some screening and treatment planning, to fully integrated care where medical and behavioral health providers function as a team in shared practice. The primary analysis focused on the extent to which hospitals integrated behavioral health services and was operationalized as the sum across these four areas (range, 0 to 4). A secondary analysis examined each of these areas independently as dichotomous variables (1 = Yes; 0 = No).

Independent variables

Our primary interest was in hospital participation in delivery system reform programs, which we measured with four mutually exclusive dichotomous variables. One variable reflected whether a hospital was a member of an ACO but did not have an established medical home program (1 = Yes; 0 = No). A second variable reflected whether a hospital had established a medical home program but was not a member of an ACO (1 = Yes; 0 = No). Our third variable reflected whether a hospital was both a member of an ACO and had established a medical home program (1 = Yes; 0 = No). Finally, our fourth variable reflected hospitals that did not participate in either program (1 = Yes; 0 = No) and served as the referent group.

The analysis also controlled for a number of hospital organizational characteristics that previous research has found associated with participation in delivery system reform programs (38) as well the physical, socioeconomic, and health delivery system characteristics of the surrounding community. *Table 1* provides a list of these variables and how they were operationalized.

Statistical analysis

The unit of analysis was the hospital. Univariate statistics were used to describe the sample hospitals, including their overall level of behavioral health integration as well as integration in individual areas. Our primary analysis utilized a negative binomial regression model to examine the relationship between hospital participation in delivery system reform programs and the breadth of behavioral

Table 1 Study variable operationalizations

Variable	Operationalization
Behavioral health integration activities	
Acute inpatient	1= hospital has integrated behavioral health in acute inpatient service area; 0= hospital has not integrated behavioral health in acute inpatient service area
Primary care	1= hospital has integrated behavioral health in primary care service area; 0= hospital has not integrated behavioral health in primary care service area
Emergency services	1= hospital has integrated behavioral health in emergency service area; 0= hospital has not integrated behavioral health in emergency service area
Extended care	1= hospital has integrated behavioral health in extended care service area; 0= hospital has not integrated behavioral health in extended care service area
Count of behavioral health integration activities	Sum of four types of behavioral health integration (acute inpatient, primary care, emergency service, and extended care integration)
Delivery system reform participation	
ACO program participation	1= hospital participates in any type of ACO; 0= hospital does not participate in any type of ACO
Medical Home Participation	1= hospital has an established medical home program; 0= hospital does not have an established medical home program
Both	1= hospital participated in both ACO and has an established medical home program
Organizational controls	
Ownership	Three dummy variables representing private not-for-profit hospitals, public/government not-for-profit hospitals, and for-profit hospitals (referent)
System affiliation	1= member of system; 0= independent hospital
Teaching status	1= either having a residency training approval by Accreditation Council for Graduate Medical Education, medical school affiliation reported to American Medical Association, member of Council of Teaching Hospital of the Association of American Medical Colleges, or residency approved by the American Osteopathic Association; 0= not a teaching hospital
Contract management	1= contract managed; 0= not contract managed
Sole community provider	1= hospitals that are the sole source of services available in a wide geographic area (e.g., 35 miles from another provider); 0= hospitals that are not the sole source of services available in a wide geographic area
Clinically integrated network	A collection of healthcare providers, such as physicians, hospitals, and post-acute care treatment providers, that come together to improve patient care and reduce overall healthcare costs. Clinically integrated networks rely on evidence-based care guidelines to provide high-quality care across participating providers
% of patient revenue from capitation	Total revenue from patients with capitated contracts/total patient revenue
Size	Four dummy variables representing the following hospitals: 1–99 beds (referent); 100–299 beds; 300–499 beds; 400 or more beds
Community controls	
Geographic location	Three dummy variables representing the geographic location of the hospital: urban (referent); suburban; and rural
Medicare managed care penetration	Number of Medicare beneficiaries in a county enrolled in a Medicare managed care plan / Total number of Medicare eligible beneficiaries in a county
Percent minority	Percentage of county residents that were non-white

Table 1 (continued)

Table 1 (continued)

Variable	Operationalization
Percent over 65	Percentage of county residents 65 and older
Percent over 65	Percentage of county residents 200% or more below the federal poverty level
Herfindahl-Hirschman index	Sum of square of hospital market share in a hospital service area (HSA), based on number of licensed beds set up and staffed for use
MH HPSA	Three dummy variables indicating whether the county had a shortage of mental health professionals: county not an MH HPSA (referent); partial county is MH HPSA; whole county is MH HPSA
Community health status	Composite index (z-score) of 16 items across four domains: clinical care (diabetic monitoring, preventable hospital stays, access of primary care physicians), health behaviors (adult smoking, adult obesity, excessive drinking, teen births, motor vehicle crash deaths), social and economic factors (children in poverty, social associations, unemployment, violent crimes), and the physical environment (air pollution, severe housing problems, limited access to healthy foods). Higher scores indicate worse health status. Data source: County Health Rankings and Roadmaps data

ACO, accountable care organization; MH HPSA, mental health professional shortage area.

health integration. Our secondary analysis used four binary logistic regression models to assess whether participation in delivery system reform programs was associated with behavioral health integration in specific areas of the hospital. Relationships in the primary analysis (negative binomial) were considered statistically significant using a 95% confidence interval. Statistical significance in the secondary (binary logistic) models was adjusted to account for multiple comparisons using a 99% confidence interval.

Results

Sample descriptives

On average, sample hospitals had integrated into less than half of the possible behavioral health areas in 2017 (mean 1.6, SD 1.5). The number of areas of behavioral health integration increased slightly although significantly to 1.8 areas (SD 1.5) by 2019 ($t=5.8$, $P<0.001$). Behavioral health integration was most prevalent in the emergency room, with 58.2% and 65.0% of the sample hospitals reporting integration in this area in 2017 and 2019, respectively. Behavioral health integration was least prevalent in extended care, with only 16.5% and 17.6% of the sample hospitals in 2017 and 2019, respectively, reporting integration in this area. Notably, this was the only area that did not experience a significant increase in the number of hospitals reporting integration over the study period ($\chi^2=1.3$, $P=0.26$).

More than half (56.1% in 2017 and 60.9% in 2019) of the sample hospitals were not participating in an ACO and

also did not have an established medical home program (Table 2). Nearly 13% of the sample hospitals were participating in an ACO only in 2017, but this percentage decreased by over half to 6.0% in 2019. A similar percentage (11.6%) of sample hospitals reported having an established medical home program but not participating in an ACO in 2017, but this percentage increased to 17.3% in 2019. Nearly one-fifth (19.8%) of the sample hospitals reported participating in an ACO and having an established medical home program in 2017. This percentage declined slightly to 15.8% by 2019. Additional sample characteristics, organized by behavioral health integration areas and delivery system reform programs, are provided in Tables S1,S2.

Breadth of behavioral health integration

On average, hospitals that were participating in an ACO only reported 1.09 times more behavioral health integration areas, relative to hospitals that were not participating in any delivery system reform programs (IRR =1.09, $P<0.05$; Table 3). Similarly, hospitals with an established medical home program reported 1.21 times more behavioral health integration areas, on average, relative to hospitals that were not participating in any delivery system reform programs (IRR =1.21, $P<0.001$). Hospitals that were participating in both an ACO and had an established medical home program reported 1.31 times more behavioral health integration areas, relative to hospitals with neither (IRR =1.31, $P<0.001$).

Table 2 Sample characteristics by year

Characteristics	2017	2019	Difference b/t 2017 and 2019
Behavioral health integration activities*			
Acute inpatient care, n (%)	1,531 (48.5)	1,680 (54.5)	$\chi^2=22.0$, $P<0.001$
Primary care, n (%)	1,311 (41.5)	1,488 (48.3)	$\chi^2=28.9$, $P<0.001$
Emergency room, n (%)	1,836 (58.2)	2,007 (65.0)	$\chi^2=31.0$, $P<0.001$
Extended care, n (%)	514 (16.5)	540 (17.6)	$\chi^2=1.3$, $P=0.26$
Total number, mean (SD)	1.6 (1.5)	1.8 (1.5)	$t=5.8$, $P<0.001$
Delivery system reform participation			
None, n (%)	2,503 (56.1)	2,659 (60.9)	$\chi^2=174.9$, $P<0.001$
ACO only, n (%)	555 (12.4)	263 (6.0)	
Medical home only, n (%)	519 (11.6)	753 (17.3)	
Both ACO & medical home participating, n (%)	885 (19.8)	691 (15.8)	
Organizational controls			
Ownership, n (%)			$\chi^2=1.9$, $P=0.38$
Private, not-for-profit	975 (21.8)	957 (21.9)	
Public, not-for-profit	2,761 (61.9)	2,745 (62.9)	
For-profit	726 (16.3)	664 (15.2)	
System affiliation			$\chi^2=1.2$, $P=0.28$
Member of system	2,880 (64.6)	2,866 (65.6)	
Independent	1,582 (35.4)	1,500 (36.4)	
Teaching status, n (%)			$\chi^2=23.0$, $P<0.001$
Teaching hospital	1,745 (39.1)	1,927 (44.1)	
Non-teaching hospital	2,717 (60.9)	2,439 (55.9)	
Contract management, n (%)			$\chi^2=2.7$, $P=0.10$
Contract managed	374 (8.4)	325 (7.4)	
Not contract managed	4,088 (91.6)	4,041 (92.6)	
Clinically integrated network, n (%)			$\chi^2=3.4$, $P=0.06$
Clinically integrated network	1,467 (32.9)	1,517 (34.8)	
Not a clinically integrated network	2,995 (67.1)	2,849 (65.2)	
# of beds, n (%)			$\chi^2=22.0$, $P<0.001$
6–99	2,247 (50.4)	2,216 (50.8)	
100–299	1,451 (32.5)	1,399 (32.0)	
300–499	480 (10.8)	462 (10.6)	
500 or more	284 (6.3)	289 (6.6)	
Sole community provider, n (%)	305 (6.8)	302 (6.9)	$\chi^2=0.5$, $P=0.92$
% of revenue from capitation, mean (SD)	0.75 (4.1)	1.7 (8.9)	$t=5.1$, $P<0.001$

Table 2 (continued)

Table 2 (continued)

Characteristics	2017	2019	Difference b/t 2017 and 2019
Community controls			
Geographic location, n (%)			$\chi^2=0.02, P=0.99$
Rural hospital	815 (18.3)	801 (18.3)	
Suburban	1,039 (23.3)	1,011 (23.2)	
Urban hospital	2,608 (58.5)	2,554 (58.5)	
Medicare managed care penetration, mean (SD)	28.9 (15.6)	30.0 (14.6)	t=3.4, P<0.001
Percent minority, mean (SD)	18.7 (15.7)	18.9 (15.8)	t=0.4, P=0.65
Percent over 65, mean (SD)	17.3 (4.4)	17.8 (4.5)	t=4.6, P<0.001
Percent below federal poverty level, mean (SD)	14.4 (5.4)	14.2 (5.3)	t=2.2, P=0.02
Herfindahl-Hirschman index, mean (SD)	0.62 (0.4)	0.63 (0.3)	t=1.2, P=0.22
Mental health professional shortage area, n (%)			$\chi^2=16.1, P<0.001$
County not MH HPSA	293 (6.6)	237 (5.4)	
Partial county is MH HPSA	2,037 (45.7)	1,867 (42.8)	
Whole county is MH HPSA	2,130 (47.8)	2,260 (51.8)	
Health status of community	0.002 (0.5)	-0.002 (0.5)	t=0.42, P=0.67
N	4,460	4,364	

*, number of hospitals not reporting (i.e., missing values): acute inpatient care (n=1,282); primary care (n=1,286); emergency room (n=1,279); extended care (n=1,300). ACO, accountable care organization; MH HPSA, mental health professional shortage area.

There were also several significant relationships between the control variables and the breadth of behavioral health integration areas. Relative to for-profit hospitals, private not-for-profit hospitals and public, government hospitals reported 1.25 (95% CI: 1.08, 1.45) and 1.35 (95% CI: 1.19, 1.53) times more areas of integration. Teaching hospitals reported 1.12 times more areas of integration compared to non-teaching hospitals (95% CI: 1.05, 1.18). Hospitals that were sole community providers reported 1.20 times more areas of integration (95% CI: 1.06, 1.35). Larger hospitals were associated with more integration areas. For example, relative to hospitals with fewer than 100 beds, hospitals with 500 or more beds reported 1.71 times more integration areas (95% CI: 1.54, 1.89). In general, the community level control variables were not significantly associated with the number of behavioral health integration areas. One notable exception was geographic location, where rural hospitals (IRR =0.86, 95% CI: 0.75, 0.99) and suburban hospitals (IRR =0.90, 95% CI: 0.81, 0.99) were associated with fewer areas of integration than urban hospitals. In the following sections, we discuss the relationships between delivery

system reform participation and the individual areas of behavioral health integration.

Acute care behavioral health integration

On average, the odds of integrating behavioral health in acute care were 1.35 (99% CI: 1.06, 1.73) times greater for hospitals with an established medical home program only, respectively, relative to hospitals that were not participating in either. Likewise, the odds of integrating behavioral health in acute care were 1.91 (99% CI: 1.44, 2.54) times greater for hospitals that were both members of an ACO and had an established medical home program, relative to hospitals that were not participating in either an ACO or medical home (Table 3).

Primary care behavioral health integration

On average, the odds of integrating behavioral health in primary care were 1.83 (99% CI: 1.44, 2.33) times greater for hospitals that had an established medical

Table 3 Delivery system reform participation and behavioral health integration

Variable	Number of areas, IRR (95% CI) ¹	Acute inpatient, OR (99% CI) ²	Primary care, OR (99% CI) ²	Emergency services, OR (99% CI) ²	Extended services, OR (99% CI) ²
Delivery system reform innovations					
None	Referent	Referent	Referent	Referent	Referent
ACO only	1.09 (1.01, 1.19)*	1.32 (0.98, 1.78)*	1.15 (0.87, 1.52)	1.19 (0.89, 1.59)	0.82 (0.57, 1.17)
Medical Home only	1.21 (1.13, 1.30)***	1.35 (1.06, 1.73)**	1.83 (1.44, 2.33)***	1.23 (0.95, 1.59)*	1.33 (0.96, 1.84)*
Both ACO and medical home	1.31 (1.21, 1.41)***	1.91 (1.44, 2.54)***	2.51 (1.91, 3.31)***	1.74 (1.29, 2.34)***	1.35 (0.96, 1.91)*
Organizational controls					
Ownership					
For-profit	Referent	Referent	Referent	Referent	Referent
Private, not-for-profit	1.25 (1.08, 1.45)**	1.30 (0.86, 1.96)	2.13 (1.32, 3.45)***	1.46 (0.97, 2.20)*	1.45 (0.77, 2.72)
Public, not-for-profit	1.35 (1.19, 1.53)***	1.55 (1.11, 2.18)***	2.47 (1.61, 3.79)***	1.68 (1.19, 2.36)***	1.65 (0.95, 2.87)*
System affiliated	1.02 (0.95, 1.09)	1.08 (0.84, 1.39)	0.85 (0.67, 1.08)	1.21 (0.95, 1.56)*	0.91 (0.66, 1.26)
Teaching	1.12 (1.05, 1.18)***	1.36 (1.07, 1.73)***	1.34 (1.06, 1.70)***	1.32 (1.04, 1.68)**	1.16 (0.85, 1.58)
Contract managed	1.00 (0.90, 1.12)	0.86 (0.61, 1.21)	0.89 (0.65, 1.23)	1.10 (0.80, 1.52)	1.36 (0.89, 2.07)
Sole comm. provider	1.20 (1.06, 1.35)**	1.58 (1.08, 2.31)**	1.20 (0.82, 1.76)	1.66 (1.13, 2.44)***	1.24 (0.75, 2.04)
Clinically integrated	1.11 (1.04, 1.18)***	1.33 (1.08, 1.64)***	1.16 (0.94, 1.43)	1.36 (1.10, 1.68)***	1.28 (0.96, 1.71)*
# of beds					
6–99 (referent)	Referent	Referent	Referent	Referent	Referent
100–299	1.37 (1.26, 1.48)***	2.51 (1.95, 3.23)***	1.30 (1.00, 1.69)**	2.29 (1.77, 2.95)***	1.63 (1.14, 2.34)***
300–499	1.46 (1.33, 1.61)***	3.11 (2.11, 4.57)***	1.59 (1.09, 2.32)***	2.77 (1.85, 4.16)***	2.04 (1.22, 3.42)***
500 or more	1.71 (1.54, 1.89)***	5.72 (3.32, 9.83)***	3.07 (1.96, 4.82)***	5.23 (3.06, 8.95)***	3.98 (2.39, 6.63)***
% of hospital patient revenue that is capitated	1.00 (1.00, 1.01)***	1.01 (0.99, 1.03)*	1.03 (1.01, 1.05)***	1.02 (1.00, 1.03)**	1.02 (1.01, 1.03)***
Community controls					
Geographic location					
Urban hospital	Referent	Referent	Referent	Referent	Referent
Suburban hospital	0.90 (0.81, 0.99)*	0.77 (0.55, 1.07)*	0.81 (0.58, 1.13)	0.78 (0.56, 1.08)*	0.97 (0.63, 1.50)
Rural hospital	0.86 (0.75, 0.99)*	0.65 (0.43, 0.98)**	0.85 (0.56, 1.30)	0.75 (0.50, 1.11)	0.92 (0.53, 1.58)
Medicare MCO penetration	0.99 (0.99, 1.00)	0.99 (0.98, 1.00)*	0.99 (0.98, 1.00)	0.99 (0.98, 0.99)*	1.00 (0.99, 1.01)
Percent minority	0.99 (0.99, 1.00)	1.00 (0.99, 1.01)	0.99 (0.98, 0.99)**	1.00 (0.99, 1.01)	0.99 (0.98, 1.01)
Percent over 65	0.99 (0.99, 1.01)	0.99 (0.96, 1.02)	1.01 (0.97, 1.04)	0.98 (0.95, 1.02)	1.01 (0.96, 1.03)
Percent below poverty	0.99 (0.98, 1.00)	0.99 (0.96, 1.04)	1.01 (0.98, 1.05)	0.97 (0.94, 1.01)	0.98 (0.94, 1.03)
HHI	1.02 (0.90, 1.14)	0.92 (0.57, 1.49)	0.73 (0.46, 1.17)	1.41 (0.90, 2.21)*	1.52 (0.87, 2.65)
Mental Health HPSA					
County not MH HPSA	Referent	Referent	Referent	Referent	Referent
Partial county is MH HPSA	0.92 (0.82, 1.04)	0.72 (0.46, 1.13)	0.93 (0.59, 1.47)	0.76 (0.47, 1.23)	1.09 (0.61, 1.96)
Whole county is MH HPSA	1.02 (0.92, 1.14)	0.92 (0.62, 1.47)	1.12 (0.72, 1.76)	1.00 (0.62, 1.62)	1.17 (0.66, 2.09)

Table 3 (continued)

Table 3 (continued)

Variable	Number of areas, IRR (95% CI) ¹	Acute inpatient, OR (99% CI) ²	Primary care, OR (99% CI) ²	Emergency services, OR (99% CI) ²	Extended services, OR (99% CI) ²
Health status of community	0.91 (0.81, 1.02)	0.72 (0.46, 1.10)	0.70 (0.46, 1.07)	0.82 (0.51, 1.30)	0.83 (0.50, 1.38)
Year					
2017	Referent	Referent	Referent	Referent	Referent
2018	1.09 (1.06, 1.11)***	1.28 (1.16, 1.41)***	1.24 (1.13, 1.35)***	1.28 (1.16, 1.40)***	0.99 (0.89, 1.12)
2019	1.10 (1.07, 1.13)***	1.33 (1.18, 1.49)***	1.30 (1.18, 1.44)***	1.35 (1.21, 1.50)***	0.95 (0.83, 1.08)
N	8,594	8,568	8,569	8,574	8,508

¹, results based on negative binomial regression model. ², results based on binary logistic regression model. *, P<0.05; **, P<0.01; ***, P<0.001. ACO, accountable care organization; MH HPSA, mental health professional shortage area.

home program only, relative to hospitals that were not participating in either an ACO or medical home (Table 3). The odds of integrating behavioral health in primary care were 2.51 (99% CI: 1.91, 3.31) times greater for hospitals that participating in an ACO and had an established medical home program, relative to hospitals that were not participating in either program.

Emergency services behavioral health integration

On average, the odds of integrating behavioral health in emergency services were 1.74 (99% CI: 1.29, 2.34) times greater for hospitals with an established medical home program and participating in an ACO, relative to hospitals that were not participating in either (Table 3).

Extended services behavioral health integration

There were no significant relationships between participation in delivery system reform programs and behavioral health integration in extended service areas.

Comparisons between delivery system reform programs

The previous analysis highlights differences between delivery system reform participation and non-participation; however, our analysis also found significant differences between hospitals participating in these different programs. In terms of the breadth of behavioral health integration areas, post-hoc comparisons indicate that hospitals that were neither members of an ACO nor had an established medical home program reported integrating behavioral

health into an average of 1.44 service areas, compared to 1.57 and 1.74 areas for hospitals participating in an ACO only and with an established medical home program only, respectively (Table 4). The number of integration areas for hospitals with only an established medical home program (1.74) were significantly greater than for hospitals that were only participants in an ACO (1.57). Hospitals that were members of an ACO and had an established medical home program reported behavioral health integration into 1.88 service areas, on average, which was significantly greater than hospitals that were only participants in an ACO or only had an established medical home program. Collectively, these findings provide support for hypothesis 1, hypothesis 2, and hypothesis 3.

Discussion

Our analysis points to a mixed pattern of behavioral health integration across the four service areas. The most prevalent area for integration was emergency services, followed by inpatient services then primary care, while the least prevalent area for integration was extended care services (e.g., nursing homes). One explanation for this pattern is the historical focus of acute care hospitals on acute care, such as inpatient and emergency services. Vertical expansion into “upstream” (i.e., primary care) and “downstream” (i.e., extended care) service areas, in comparison, is a more recent strategy by acute care hospitals that has waxed and waned over the past 30–40 years (39,40). Acute care hospitals may simply have more experience with inpatient and emergency services, and thus, may focus their efforts on integrating behavioral health into these areas. Similarly, because

Table 4 Predicted number and predicted probabilities of behavioral integration activities

Variable	Predicted number of total integration activities (95% CI)	Predicted probability of acute care service integration (99% CI)	Predicted probability of primary care service integration (99% CI)	Predicted probability of emergency services integration (99% CI)	Predicted probability of extended services integration (99% CI)
Neither	1.44 (1.36, 1.51) ^{2,3,4}	0.46 (0.42, 0.50) ^{2,3,4}	0.36 (0.32, 0.39) ^{3,4}	0.60 (0.56, 0.64) ⁴	0.14 (0.11, 0.16)
ACO only	1.57 (1.47, 1.68) ^{1,3,4}	0.53 (0.46, 0.60) ^{1,4}	0.39 (0.33, 0.45) ^{3,4}	0.64 (0.58, 0.70) ⁴	0.11 (0.08, 0.15) ^{3,4}
Medical Home only	1.74 (1.65, 1.83) ^{1,2,4}	0.54 (0.49, 0.59) ^{1,4}	0.50 (0.46, 0.55) ^{1,2,4}	0.65 (0.60, 0.69) ⁴	0.17 (0.14, 0.21) ²
Both ACO & Medical Home	1.88 (1.78, 1.98) ^{1,2,3}	0.62 (0.57, 0.67) ^{1,2,3}	0.58 (0.53, 0.63) ^{1,2,3}	0.72 (0.68, 0.77) ^{1,2,3}	0.18 (0.14, 0.21) ²

¹, significantly different than “Neither” at $P < 0.01$; ², significantly different than “ACO only” at $P < 0.01$; ³, significantly different than “Medical Home only” at $P < 0.01$; ⁴, significantly different than “Both ACO & Medical Home” at $P < 0.01$. ACO, accountable care organization.

inpatient and emergency services are often physically co-located, efforts to integrate behavioral health in these areas may occur in tandem and even leverage the same resources (e.g., professional staff, physical space). In contrast, primary care and extended care service areas are likely more numerous, geographically distributed, and varied in their capacity (e.g., limited staff, higher levels of turnover) to integrate behavioral health services to a similar extent.

Our findings suggest that participation in either an ACO or medical home program, by itself, is associated with more behavioral health integration. Notably, our findings related to having an established medical home program were more robust than those related to participation in an ACO. This pattern is somewhat surprising given the emphasis that ACO reimbursement mechanisms place on broad population health management across the continuum of care compared to medical home programs that often focus on primary care. One potential explanation for these differences is that ACOs are part delivery system reform and part financial reimbursement reform. If a hospital’s primary motivation for pursuing ACO participation is financial (e.g., access to contracts, upside incentives), behavioral health integration may not provide a strong enough return-on-investment to significantly alter its service mix. Medical home programs, by contrast, put more direct emphasis on transforming how care is delivered. A related explanation for this pattern is the difference in what these programs entail and how they are implemented. There is considerable variation in how ACOs can be configured, governed (e.g., hospital-led, physician-led, hybrid), and the degree to which they are horizontally and vertically integrated. While it is true that there are different medical home programs (e.g., NCQA, Joint Commission, proprietary programs), most build on the same general principles, and thus, exhibit less variation than

ACOs in how they are implemented. It is also notable that hospitals participating in both programs reported greater behavioral health integration than hospitals participating in ACOs only. ACOs and medical homes, in combination, may work synergistically by aligning incentives and fostering accountability (ACOs) and creating fundamental change in how care is delivered (medical homes).

The findings of our analysis presented above should be interpreted in light of several limitations. First, our analysis was cross-sectional and we cannot make causal inferences based on our results. For example, it is plausible that hospitals decide to join an ACO or pursue a medical home program, in part, because they already have a sufficient level of integration between physical and behavioral health that enables them to be successful with these models. A second potential limitation of the analysis pertains to our measures of behavioral health integration. Accurate responses to these questions require knowledge across the entire enterprise, which may be more difficult in certain types of hospitals (e.g., large, complex systems). The responses also assume respondents from different hospitals have similar definitions of integration, which may not be the case given different degrees of integration (e.g., co-location *vs.* team-based care with shared decision making). Furthermore, it is possible the responses reflect a level of social desirability, with respondents wanting their hospitals to appear more progressive in terms of their integration activities. However, we are not aware of other data sources that are currently available that would provide population level estimates of these integration activities as well as detailed information about behavioral health integration that could tease out these nuances. Future research may be able to address these issues and validate the degree of behavioral health integration but will likely require primary data collection,

given the data currently available.

Third, our measures of ACO and medical home participation were dichotomous indicators and did not reflect some of the nuances of participation. Moreover, given the secondary nature of our data, we were not able to validate responses as to whether hospitals were, in fact, participating in ACOs and medical homes. While our estimates of ACO participation are consistent with other studies (41), we are not aware of any sources that would enable us to make similar assessments for hospital participation in medical homes. Given the absence of such information, we consider our estimates an important contribution by providing initial estimates of how much hospitals may be associated with PCMHs. Nevertheless, future research could build on our results, for example, by validating these responses and examining whether integration, overall or for specific service areas, differs for certain types of ACOs (e.g., physician-led *vs.* hospital-led).

Practice implications

The findings of our study highlight several opportunities for practitioners and policy makers to improve behavioral health integration by acute care hospitals. First, integration of behavioral health into extended care areas like nursing homes, in particular, is needed by hospitals, with less than 20% of all sample hospitals reporting integration in this area. Mental health illness is one critical factor that can lead to nursing home placement (42), with one study finding that nearly 20% of newly admitted nursing home residents had a non-dementia mental health illness diagnosis (43). Moreover, nursing home patients with a mental health illness are associated with greater mortality, likelihood of hospital admission, and emergency services utilization (44,45). Unfortunately, extended care was the one service area that was not significantly associated with either ACO participation or having an established medical home program. It is possible the incentives of these programs and the benefits of pursuing behavioral health integration in these settings are not sufficient to justify the costs and challenges (e.g., staffing and coordination, physical space). Thus, policy makers, regulators, and even third-party payers may need to develop more targeted efforts (e.g., enhanced reimbursement, incentives/disincentives) to support integration in these areas. For example, in the United States the largest payer of nursing home services is the Centers for Medicare and Medicaid Services (CMS). CMS has

developed Nursing Home Compare, a consumer-oriented public reporting website that allows consumers to locate and compare nursing homes on key performance metrics like staffing levels and quality of care. Adding metrics like behavioral health integration to this website could incentivize hospitals (and even standalone nursing homes) to integrate these services with existing medical services.

Second, notwithstanding the results related to extended care, our findings suggest that one way to support behavioral health integration is to promote the adoption of delivery system reforms such as ACOs and medical homes by acute care hospitals. Our findings also indicate, however, that nearly two-thirds of all U.S. acute care hospitals are not participating in these programs; thus, continued efforts are needed from policy makers to stimulate participation in these programs. Findings from our analysis suggest that policy makers in particular may want to identify ways to support hospital participation in medical homes as it exhibited more robust relationships with behavioral health integration. Even so, the mixed findings with respect to whether these programs are associated behavioral health integration in different clinical areas suggest these programs are incomplete solutions, and thus, revisions to these programs may be needed or even new programs altogether that focus on behavioral health integration. Likewise, it is notable that research suggests that hospitals that are most likely to participate in these programs tend to be larger, well-resourced organizations located in urban areas (38,41,46). Consequently, participation in these programs may continue to foster behavioral integration, but it may have the unintended consequence of exacerbating uneven distribution of behavioral health resources and contribute to existing disparities in behavioral health care (47-49). Policy makers and organizational decision-makers should be attentive to such potential consequences when considering the adoption and implementation of these programs.

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Footnote

Data Sharing Statement: Available at <https://jhmhp.amegroups.com/article/view/10.21037/jhmhp-21-45/dss>

Peer Review File: Available at <https://jhmhp.amegroups.com/>

[article/view/10.21037/jhmhp-21-45/prf](https://jhmhp.amegrouppublishing.com/article/view/10.21037/jhmhp-21-45/prf)

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at <https://jhmhp.amegrouppublishing.com/article/view/10.21037/jhmhp-21-45/coif>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved. The study received ethical approval (determined to be Not Human Subjects Research) by the Institutional Review Board of the University of Alabama at Birmingham (Protocol #: 300003568).

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Table S1 Sample characteristics by behavioral health integration areas, 2019

Variable	Acute inpatient	Primary care	Emergency room	Extended care	Difference b/t areas
Organizational controls					
Ownership					$\chi^2=44.4$, $P<0.001$
Private, not-for-profit, n (%)	1 (0.26)	40 (10.6)	247 (65.2)	91 (24.0)	
Public, not-for-profit, n (%)	22 (1.4)	85 (5.3)	1,089 (67.3)	423 (26.1)	
For-profit, n (%)	6 (3.4)	2 (1.1)	143 (80.8)	26 (24.8)	
System affiliation					$\chi^2=20.6$, $P<0.001$
Member of system, n (%)	22 (1.4)	73 (4.5)	1,120 (69.6)	394 (24.5)	
Independent, n (%)	7 (1.2)	54 (9.5)	359 (63.4)	146 (25.8)	
Teaching status					$\chi^2=19.6$, $P<0.001$
Teaching hospital, n (%)	14 (1.2)	51 (4.2)	819 (67.5)	330 (27.2)	
Non-teaching hospital, n (%)	15 (1.6)	76 (7.9)	660 (68.7)	210 (21.9)	
Contract management					$\chi^2=2.7$, $P=0.10$
Contract managed, n (%)	0 (0.0)	9 (5.0)	117 (64.6)	55 (30.4)	
Not contract managed, n (%)	29 (1.5)	118 (5.9)	1,362 (68.3)	485 (24.3)	
Clinically Integrated Network					$\chi^2=18.0$, $P<0.001$
Clinically Integrated Network, n (%)	15 (1.2)	54 (4.5)	803 (66.6)	333 (27.6)	
Not a Clinically Integrated Network, n (%)	14 (1.4)	73 (7.5)	676 (69.7)	207 (21.3)	
# of beds					$\chi^2=69.4$, $P<0.001$
6–99, n (%)	10 (1.2)	82 (9.7)	570 (67.6)	181 (21.5)	
100–299, n (%)	13 (1.7)	33 (4.3)	546 (70.4)	184 (23.7)	
300–499, n (%)	6 (1.9)	8 (2.5)	220 (69.6)	82 (26.0)	
500 or more, n (%)	0 (0.0)	4 (1.7)	143 (59.6)	93 (38.8)	
Sole community provider status					$\chi^2=1.6$, $P=0.67$
Sole community Provider, n (%)	2 (1.3)	7 (4.7)	108 (72.5)	32 (21.5)	
Not sole community provider, n (%)	27 (1.3)	120 (5.9)	1,371 (67.7)	508 (25.1)	
% of revenue from capitation, mean (SD)	0 (0.0)	2.5 (9.4)	1.8 (8.5)	3.3 (14.8)	$F=2.8$, $P=0.04$
Community controls					
Geographic location					$\chi^2=28.9$, $P<0.001$
Rural hospital, n (%)	2 (0.7)	27 (9.9)	176 (64.5)	68 (24.9)	
Suburban, n (%)	9 (2.1)	39 (9.2)	286 (67.1)	92 (21.6)	
Urban hospital, n (%)	18 (1.2)	61 (4.1)	1,017 (68.9)	380 (25.8)	
Medicare managed care penetration, mean (SD)	34.9 (16.4)	28.1 (14.3)	30.6 (13.6)	31.5 (14.9)	$F=2.9$, $P=0.04$
Percent minority, mean (SD)	18.4 (14.4)	14.4 (14.3)	19.7 (15.2)	18.9 (14.6)	$F=4.9$, $P=0.002$
Percent over 65, mean (SD)	17.8 (3.7)	18.6 (4.5)	17.1 (4.1)	17.2 (4.0)	$F=5.8$, $P<0.001$
Percent below federal poverty level, mean (SD)	14.8 (5.5)	13.1 (4.8)	13.5 (5.0)	13.0 (4.4)	$F=2.7$, $P=0.05$
Herfindahl-Hirschman index, mean (SD)	0.55 (0.34)	0.70 (0.31)	0.58 (0.35)	0.58 (0.35)	$F=4.6$, $P=0.003$
Mental health professional shortage area					$\chi^2=12.5$, $P=0.051$
County not MH HPSA, n (%)	3 (2.1)	9 (6.2)	101 (69.7)	32 (22.1)	
Partial county is MH HPSA, n (%)	12 (1.6)	56 (7.6)	503 (68.5)	163 (22.2)	
Whole county is MH HPSA, n (%)	14 (1.1)	62 (4.8)	875 (67.5)	345 (26.6)	
Health status of community	0.01 (0.43)	–0.13 (0.45)	–0.05 (0.44)	–0.09 (0.42)	$F=2.5$, $P=0.06$
N	4,460			4,364	

Statistically significant difference at $P<0.05$ between areas of integration. MH HPSA, mental health professional shortage area.

Table S2 Sample characteristics by delivery system reform program, 2019

Variable	None	ACO only	Medical home only	Both ACO & medical home	Difference b/t programs ¹
Organizational controls					
Ownership					$\chi^2=627.0$, $P<0.001$
Private, not-for-profit, n (%)	751 (78.5)	26 (2.7)	126 (13.2)	54 (5.6)	
Public, not-for-profit, n (%)	1,300 (47.4)	213 (7.8)	603 (22.0)	629 (22.9)	
For-profit, n (%)	608 (91.6)	24 (3.6)	24 (3.6)	8 (1.2)	
System affiliation					$\chi^2=437.4$, $P<0.001$
Member of system, n (%)	1,449 (50.6)	231 (8.1)	549 (19.2)	637 (22.2)	
Independent, n (%)	1,210 (80.7)	32 (2.1)	204 (13.6)	54 (3.6)	
Teaching status					$\chi^2=256.9$, $P<0.001$
Teaching hospital, n (%)	933 (48.4)	148 (7.7)	389 (20.2)	457 (23.7)	
Non-teaching hospital, n (%)	1,726 (70.8)	115 (4.7)	364 (14.9)	234 (9.6)	
Contract management					$\chi^2=3.8$, $P=0.28$
Contract managed, n (%)	205 (63.1)	18 (5.5)	62 (19.1)	40 (12.3)	
Not contract managed, n (%)	2,454 (60.7)	245 (6.1)	691 (17.1)	651 (16.1)	
Clinically integrated network					$\chi^2=983.24$, $P<0.001$
Clinically integrated network, n (%)	289 (19.1)	152 (10.0)	543 (35.8)	533 (35.1)	
Not a clinically integrated network, n (%)	2,370 (83.2)	111 (3.9)	210 (7.4)	158 (5.6)	
# of beds					$\chi^2=338.6$, $P<0.001$
6–99, n (%)	1,564 (70.6)	106 (4.8)	337 (15.2)	209 (9.4)	
100–299, n (%)	808 (57.8)	74 (5.3)	253 (18.1)	264 (18.9)	
300–499, n (%)	208 (45.0)	49 (10.6)	99 (21.4)	106 (22.9)	
500 or more, n (%)	79 (27.3)	34 (11.8)	64 (22.2)	112 (38.8)	
Sole community provider status					$\chi^2=19.1$, $P<0.001$
Sole community provider, n (%)	208 (68.9)	12 (4.0)	58 (19.2)	24 (8.0)	
Not sole community provider, n (%)	2,451 (60.3)	251 (6.2)	695 (17.1)	667 (16.4)	
% of revenue from capitation, mean (SD)	0.5 (3.5)	2.7 (6.8)	3.9 (15.7)	1.1 (5.3)	$F=24.5$, $P<0.001$
Community controls					
Geographic location					$\chi^2=222.9$, $P<0.001$
Rural hospital, n (%)	618 (77.2)	27 (3.4)	112 (14.0)	44 (5.5)	
Suburban, n (%)	688 (68.1)	46 (4.6)	176 (17.4)	101 (10.0)	
Urban hospital, n (%)	1,353 (53.0)	190 (7.4)	465 (18.2)	546 (21.4)	
Medicare managed care penetration, mean (SD)	28.7 (15.6)	32.8 (12.3)	31.3 (14.2)	32.4 (11.4)	$F=18.7$, $P<0.001$
Percent minority, mean (SD)	18.6 (16.3)	18.2 (14.3)	17.5 (14.5)	21.5 (15.3)	$F=8.5$, $P<0.001$
Percent over 65, mean (SD)	18.2 (4.7)	17.0 (3.8)	18.0 (4.2)	16.4 (3.9)	$F=31.7$, $P<0.001$
Percent below federal poverty level, mean (SD)	14.9 (5.6)	13.7 (4.9)	13.7 (4.8)	12.3 (4.4)	$F=48.1$, $P<0.001$
Herfindahl-Hirschman Index, mean (SD)	0.67 (0.34)	0.57 (0.34)	0.62 (0.35)	0.52 (0.33)	$F=35.6$, $P<0.001$
Mental Health Professional Shortage Area					$\chi^2=200.1$, $P<0.001$
County not MH HPSA, n (%)	115 (48.5)	15 (6.3)	50 (21.1)	57 (24.1)	
Partial county is MH HPSA, n (%)	1,342 (71.9)	81 (4.3)	284 (15.2)	160 (8.6)	
Whole county is HPSA hospital, n (%)	1,200 (53.1)	167 (7.4)	419 (18.5)	474 (21.0)	
Health status of community	0.05 (0.48)	–0.002 (0.42)	–0.05 (0.43)	–0.13 (0.42)	$F=30.9$, $P<0.001$
N	4,460			4,364	

Statistically significant difference at $P<0.05$ between areas of integration. MH HPSA, mental health professional shortage area.