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Trends in Electronic Health Record Use Among Residential Care Communities: United States, 2012, 2014, and 2016

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Abstract

Introduction—This report presents a trend analysis of electronic health record (EHR) use and health information exchange capability among residential care communities. EHR systems and health information exchange have the potential to improve communication and facilitate care coordination, especially during care transitions.

Methods—Data in this report are from the residential care community survey component of the 2012, 2014, and 2016 waves of the biennial National Study of Long-Term Care Providers (NSLTCP), which is conducted by the National Center for Health Statistics. For the EHR use measure, respondents were asked if, for other than accounting or billing purposes, they used EHRs. Among those who indicated they did use EHRs, health information exchange capability was also measured using items that asked residential care communities if their computerized system supported electronic health information exchange with physicians or pharmacies. A weighted least-squares regression was used to test the significance of trends across the 2012, 2014, and 2016 NSLTCP waves by several residential care community characteristics, including bed size, ownership status, chain affiliation, U.S. Census division, and metropolitan statistical area (MSA) status.

Results—The percentage of residential care communities that used EHRs increased between 2012 and 2016 overall (20% to 26%), for all bed size categories, profit and nonprofit ownership, chain and nonchain affiliation, six out of nine census divisions, and MSA and non-MSA status. Among residential care communities reporting EHR use, computerized support for health information exchange with physicians or pharmacies also increased between 2012 and 2016 overall (47.2% to 55.0%) and among communities that had more than 100 beds, were for profit, chain affiliated, located in the East North and East South Central census divisions, and in both MSAs and non-MSAs.

Keywords: health information exchange • assisted living • National Study of Long-Term Care Providers

Introduction

Quality and efficiency of care experienced by older adults in residential care communities may be influenced by the way that health information is organized and shared. Electronic health record (EHR) systems and health information exchange have the potential to improve communication and facilitate care coordination, especially during care transitions (1).

Few studies have examined EHR use in residential care communities, and no study has reported use over time. However, evidence from the few studies that do exist collectively suggests an increasing use of EHRs among residential care communities (2–4). Holup et al. found that in 2010, only 3% of residential care facilities used EHRs, while Park-Lee et al. found that 2 years later in 2012, 20.2% of residential care communities were using EHRs (3,4). Both studies used complex survey methods to produce weighted estimates of EHR use among a sample of residential care communities, and both found a statistically significant association between EHR use and community ownership, chain affiliation, and number of beds.

Even less is known about whether residential care communities have the



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capability to electronically exchange health information with other providers, such as physicians or pharmacies. Among residential care communities that used EHRs in 2016, 24.3% had computerized support to exchange health information with physicians and 50.4% with pharmacies, but no study in the literature has reported capability to exchange health information over time (5–7).

To build upon existing studies and fill gaps in the literature, this analysis used 3 years of survey data from the 2012, 2014, and 2016 National Study of Long-Term Care Providers to describe EHR use and health information exchange capability among residential care communities by selected characteristics.

Methods

Data source

Data in this report are from the residential care community survey component of the 2012, 2014, and 2016 waves of the biennial National Study of Long-Term Care Providers (NSLTCP), which is conducted by the National Center for Health Statistics. To be eligible for the study, a residential care community must (a) have been regulated by the state to provide room and board with at least two meals per day, around-the-clock onsite supervision, and help with personal care such as bathing and dressing or health-related services such as medication management; (b) have four or more licensed, certified, or registered beds; (c) have had at least one resident currently living in the community at the time of the survey; and (d) have been serving a predominantly adult population. The survey used a combination of probability sampling and census taking.

Respondents to the survey were residential care community administrators, directors, or otherwise knowledgeable staff. The survey was administered by mail and web, with computer-assisted telephone interviewing (CATI) follow-up for nonrespondents. The questionnaire was completed for 4,694 eligible residential care communities, for a weighted response rate of 55.4% in 2012; 5,035 eligible

residential care communities, for a weighted response rate of 49.6% in 2014; and 4,578 eligible residential care communities, for a weighted response rate of 50.7% in 2016. For additional information about NSLTCP and residential care community survey methodology and variable construction, see the 2012, 2014, and 2016 NSLTCP survey documentation (8–13). The 2012, 2014, and 2016 NSLTCP data are accessible via restricted use only. Information on how to access the data is available from: <https://www.cdc.gov/rdc/>.

Measures

To measure EHR use, respondents were asked if, for other than accounting or billing purposes, they used EHRs. Health information exchange, according to the Office of the National Coordinator for Health Information Technology, allows health care providers and patients to electronically access and share a patient's vital medical information (7). This analysis assessed health information exchange capability (i.e., the ability for health care providers to electronically move clinical information among different entities while maintaining confidentiality and original data structure) and was measured by asking respondents if their computerized system supported electronic health information exchange with physicians or pharmacies. The 2014 and 2016 NSLTCP measured the capability to exchange health information with hospitals, but because this item was not available in the 2012 NSLTCP, this report does not analyze it. In this report, health information exchange capability is only described among residential care communities that reported using EHRs. More detailed information about the measures in this report can be found in the [Technical Notes](#).

Data analysis

Estimates of EHR use by selected characteristics for 2012, 2014, and 2016 are presented. Highlights for health information exchange capability among residential care communities that use EHRs by selected characteristics are also reported.

Analyses took into account the complex survey design of the 2012, 2014, and 2016 NSLTCP. Weights were used to adjust for unknown eligibility status of nonresponding residential care communities and for nonresponse bias. Results are nationally representative. See the 2012, 2014, and 2016 NSLTCP documentation for details about the weighting methods (9–14).

Cases with missing EHR use data were excluded from the analyses. The number of cases for the analyses of EHR use were 4,319 in 2012, 4,780 in 2014, and 4,489 in 2016. Cases with missing data on the independent variables were excluded on a variable-by-variable basis. The weighted percentage of cases with missing data for variables ranged from 0.81% for ownership to 10.67% for health information exchange with physicians in 2012, 1.70% for ownership to 7.09% for health information exchange with pharmacies in 2014, and 2.32% for chain affiliation to 2.87% for health information exchange with physicians and pharmacies in 2016. The analyses for health information exchange capability among residential care communities that used EHRs included 950 cases in 2012, 1,157 cases in 2014, and 1,418 cases in 2016. Data analyses were performed using the following statistical packages: SAS, version 9.3 (SAS Institute, Cary, N.C.) (15); SAS-callable SUDAAN, version 11.0.0 (RTI International, Research Triangle Park, N.C.) (16); and Stata/SE, version 14 (StataCorp, College Station, Tex.) (17).

A weighted least-squares regression was used to test the significance of trends across the 2012, 2014, and 2016 NSLTCP waves. Statistically significant trends were identified using the resulting z score produced by the weighted least-squares regressions—a score greater or equal to 1.96 or less than or equal to -1.96 is considered statistically significant at the 0.05 level. Statements of differences among subgroups are based on two-tailed chi-square and t tests with significance at the p less than 0.05 level. Unless otherwise noted, differences and trends are statistically significant.

Results

EHR use trends

Table 1 shows the percentage of residential care communities that used EHRs, by selected characteristics, for 2012, 2014, and 2016. Overall, the percentage of residential care communities that used EHRs increased, from 20.0% in 2012 to 26.0% in 2016. Figures 1–5 highlight the characteristics of residential care communities that used EHRs.

Table 2 shows the percentage of computerized support for health information exchange with a physician or pharmacy among residential care communities that used EHRs, by selected characteristics, for 2012, 2014, and 2016. Overall, an increase in the percentage of health information exchange capability among residential care communities that used EHRs was seen, from 47.2% in 2012 to 55.0% in 2016.

Bed size

- The percentage of residential care communities that used EHRs increased among each bed size category from 2012 through 2016 (Figure 1).
- Residential care communities with more than 100 beds had the highest percentage of EHR use in 2016 (50.0%), while residential care communities with 4–25 beds had the lowest percentage of EHR use in 2016 (16.0%).
- Among residential care communities of all bed sizes that used EHRs, increases in the capability to exchange health information were observed (Table 2). However, the increases in residential care communities with 4–25, 26–50, and 51–100 beds were not statistically significant. The percentage of residential care communities with more than 100 beds that used EHRs and had the capability to exchange health information increased from 48.4% in 2012 to 64.9% in 2016.
- In 2016, the percentage of residential care communities that used EHRs and had health information exchange capability was higher among those

with more than 100 beds (64.9%) compared with residential care communities with 4–25 beds (49.0%) and 26–50 beds (54.7%).

the increase in the percentage for nonprofit residential care communities (50.2% to 54.9%) was not statistically significant.

Ownership

- The percentage of residential care communities that used EHRs increased from 2012 through 2016 for both for profit (18.0% to 22.8%) and nonprofit (27.6% to 41.1%) ownership categories (Figure 2).
- The percentage that used EHRs in 2016 was greater in nonprofit residential care communities (41.1%) compared with for-profit residential care communities (22.8%).
- Among residential care communities that used EHRs, increases for both ownership types in the percentage that had the capability to exchange health information were seen (Table 2). The percentage of for-profit residential care communities that used EHRs and had the capability to exchange health information increased from 45.8% in 2012 to 55.3% in 2016. However,

Chain affiliation

- The percentage of residential care communities that used EHRs increased from 2012 through 2016 for both chain (24.8% to 33.1%) and nonchain (13.2% to 16.8%) categories (Figure 3).
- The percentage that used EHRs in 2016 was greater in chain residential care communities (33.1%) compared with nonchain residential care communities (16.8%).
- For both chain and nonchain residential care communities, an increase in the percentage that used EHRs and had the capability to exchange health information was seen (Table 2). Among chain-affiliated residential care communities that used EHRs, the percentage that also had the capability to exchange health information increased from 45.6%

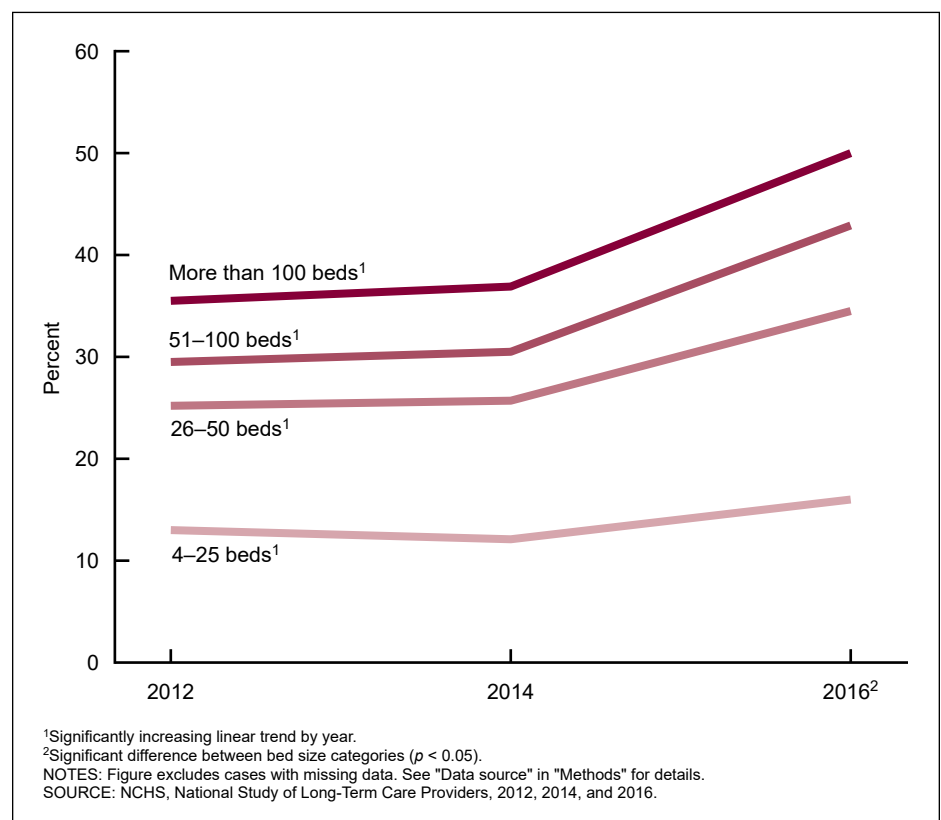


Figure 1. Percentage of residential care communities that used electronic health records, by bed size and year: United States, 2012, 2014, and 2016

to 53.7% from 2012 through 2016. However, the increase in nonchain residential care communities (51.4% to 58.0%) was not statistically significant.

U.S. Census division

- The percentage of residential care communities that used EHRs increased in each census division from 2012 through 2016. Increases in the percentage of residential care communities that used EHRs in the West South Central, Pacific, and Mountain divisions were not statistically significant.
- In 2016, 51.1% of residential care communities in the West North Central census division used EHRs, which was the highest percentage of EHR use among all census divisions and time periods (Figure 4).
- Among residential care communities using EHRs, increases in the percentage that had the capability to exchange health information were observed among all census divisions, except the New England and Pacific divisions (Table 2). In the East North Central and East South Central divisions, the change in the percentage of residential care communities that used EHRs and had the capability to exchange health information was statistically significant, increasing from 39.5% in 2012 to 62.6% in 2016 and from 30.6% in 2012 to 55.3% in 2016, respectively. However, the increases in the percentage of residential care communities that used EHRs and had the capability to exchange health information in the Mid-Atlantic, West North Central, South Atlantic, West South Central, and Pacific divisions were not statistically significant.
- In 2016, the percentage of residential care communities that used EHRs and had health information exchange capability was higher among those in the South Atlantic (63.6%), East North Central (62.6%), and Mid-Atlantic (60.7%) divisions compared with those in the West North Central (46.4%) and New England (41.1%) divisions.

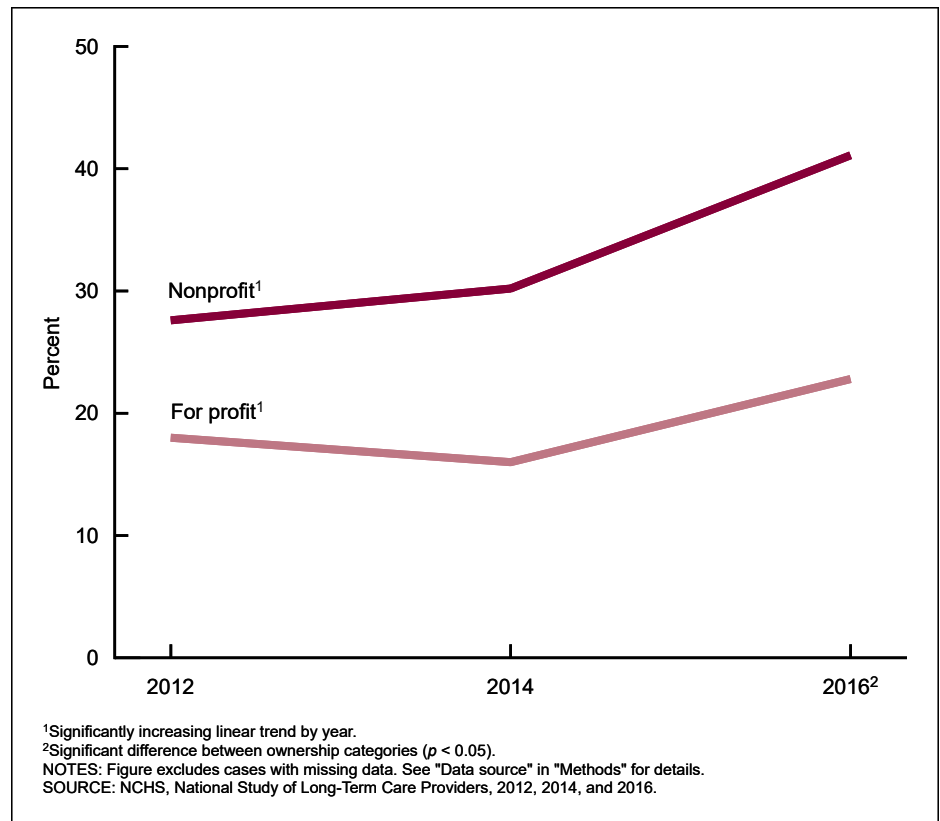


Figure 2. Percentage of residential care communities that used electronic health records, by ownership and year: United States, 2012, 2014, and 2016

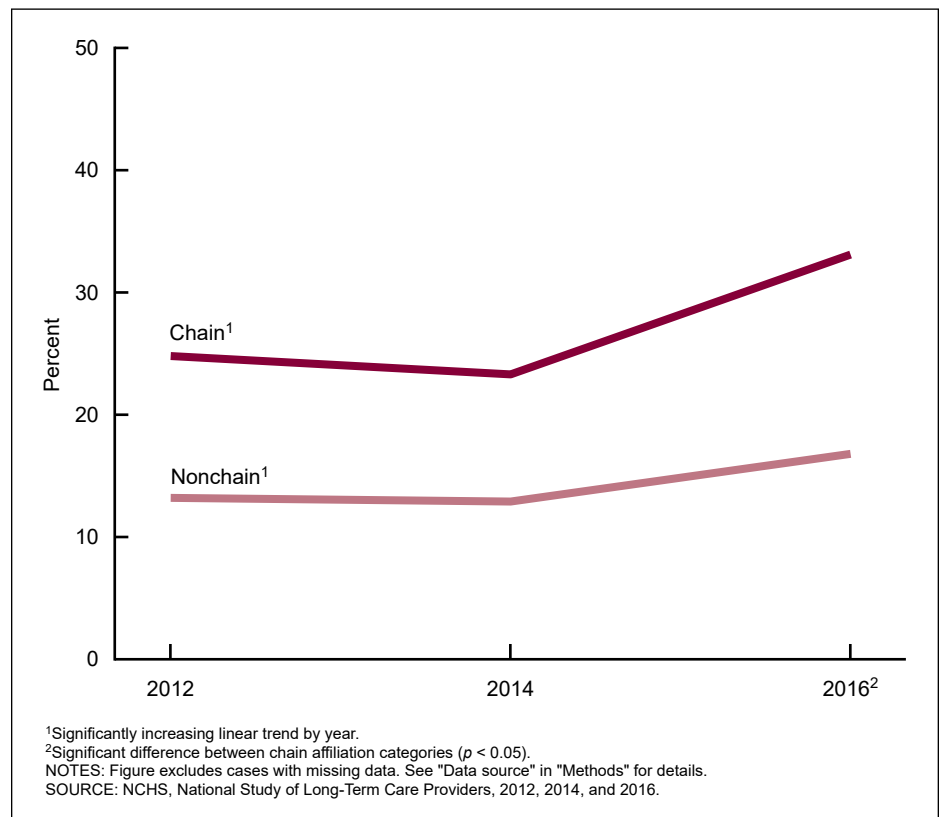


Figure 3. Percentage of residential care communities that used electronic health records, by chain affiliation and year: United States, 2012, 2014, and 2016

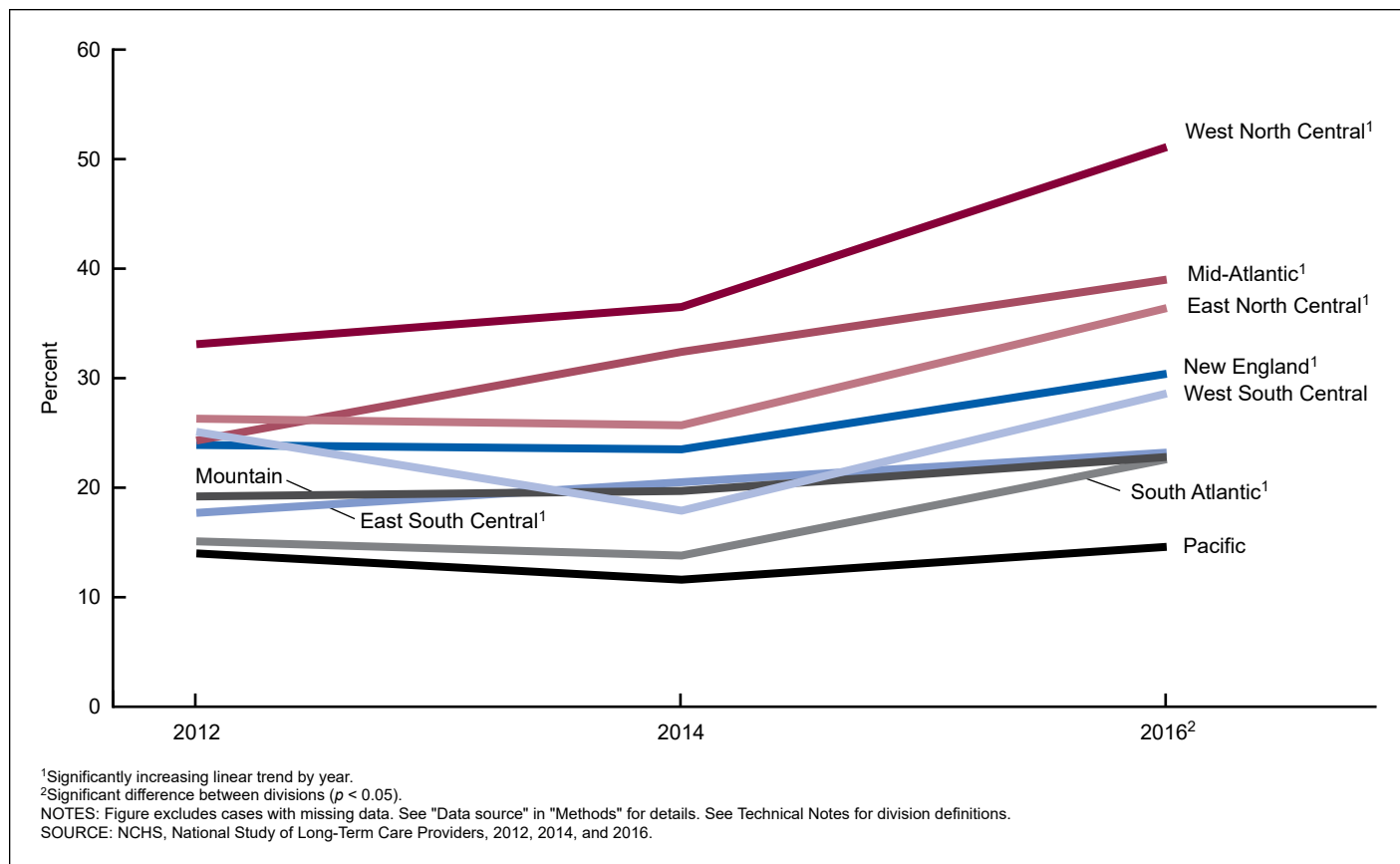


Figure 4. Percentage of residential care communities that used electronic health records, by U.S. Census division and year: United States, 2012, 2014, and 2016

Metropolitan statistical area (MSA) status

- The percentage of residential care communities that used EHRs increased in both MSAs (19.7% to 24.5%) and non-MSAs (21.1% to 33.0%) from 2012 through 2016 (Figure 5).
- In 2016, EHR use was higher in residential care communities in non-MSAs (33.0%) compared with residential care communities in MSAs (24.5%) (Table 1).
- Among residential care communities that used EHRs, a statistically significant increase in the percentage of communities that had the capability to exchange health information was seen in both MSAs (49.5% in 2012 to 56.5% in 2016) and non-MSAs (38.5% in 2012 to 49.7% in 2016) (Table 2).

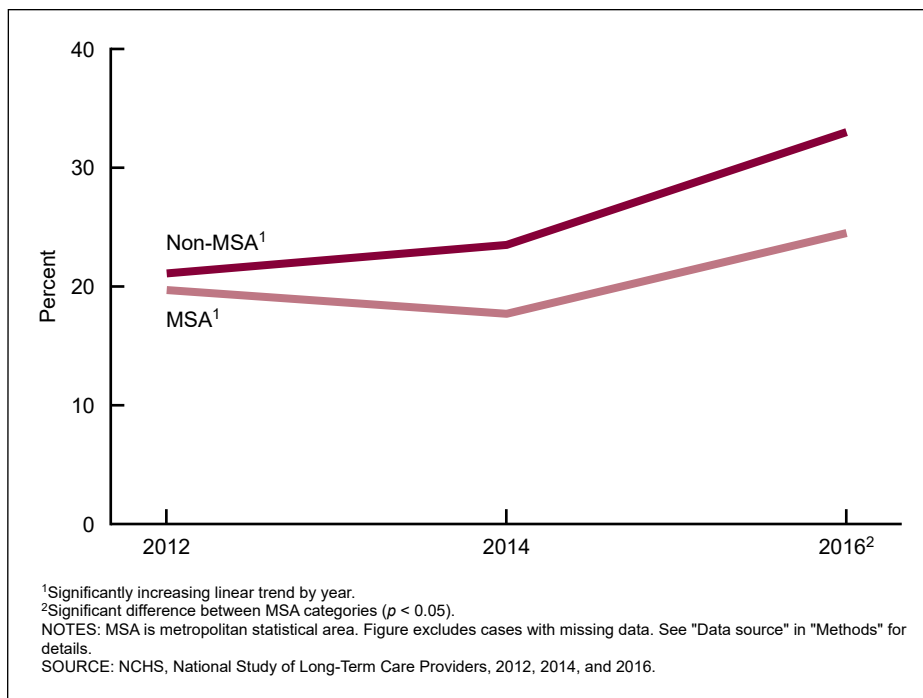


Figure 5. Percentage of residential care communities that used electronic health records, by metropolitan statistical area status and year: United States, 2012, 2014, and 2016

Discussion

This report presents national trends for EHR use and health information exchange capability among residential care communities, by selected organizational and geographic characteristics, which have not been described previously. Like previous studies on the use of EHRs in residential care communities, this report finds relationships between EHR use and bed size, ownership status, chain affiliation, MSA status, and U.S. Census Bureau divisions (2–4). Additionally, the findings in this report on health information exchange capability with physicians or pharmacies are similar to those found in previous health information exchange studies (6,8). As the Federal Health IT Strategic Plan 2015–2020, established by the Office of the National Coordinator for Health Information Technology, aims to advance health information technology, it is important to understand trends in EHR use and health information exchange capability over time in various health care sectors, including residential care communities (7).

This analysis has some limitations. Over time, fewer missing data in the EHR use and health information exchange capability measures were seen, and thus, the increase in these measures, over time, may reflect this rather than an actual increase in use or capability. The 2014 and 2016 residential care community survey did not measure the capabilities of EHR systems, nor did it track the various types of providers that may exchange health information electronically with residential care communities. For example, some residential care communities may not exchange health information with a physician or pharmacy but have the capability to exchange health information with other types of providers, which may lead to an underestimation in this report. Despite these limitations, this report provides the most recent national description of EHR use and computerized support for health information exchange among a major provider of community-based long-term services and supports—residential care.

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Table 1. Percentage (and standard error) of residential care communities that used electronic health records, by selected characteristics and year: United States, 2012, 2014, and 2016

Characteristic	2012	2014	2016
		Percent (standard error)	
All residential care communities	20.0 (0.8)	18.7 (0.7)	26.0 (0.8)
Bed size ¹			
4–25 beds	13.0 (1.0)	12.1 (0.8)	16.0 (1.0)
26–50 beds	25.2 (1.8)	25.7 (1.8)	34.5 (2.0)
51–100 beds	29.5 (1.9)	30.5 (1.8)	42.9 (2.1)
More than 100 beds	35.5 (2.5)	36.9 (2.3)	50.0 (2.5)
Ownership ¹			
For profit	18.0 (0.9)	16.0 (0.8)	22.8 (0.9)
Nonprofit	27.6 (1.7)	30.2 (1.7)	41.1 (1.9)
Chain affiliation ¹			
Chain	24.8 (1.1)	23.3 (1.0)	33.1 (1.1)
Nonchain	13.2 (1.0)	12.9 (0.9)	16.8 (1.1)
U.S. Census division			
New England ¹	23.9 (1.2)	23.5 (1.2)	30.4 (1.5)
Mid-Atlantic ¹	24.3 (2.7)	32.4 (3.0)	39.0 (3.3)
East North Central ¹	26.3 (2.1)	25.7 (2.0)	36.4 (2.2)
West North Central ¹	33.1 (1.8)	36.5 (2.2)	51.1 (2.6)
South Atlantic ¹	15.1 (1.6)	13.8 (1.4)	22.6 (1.9)
East South Central ¹	17.7 (1.2)	20.5 (1.2)	23.2 (1.3)
West South Central	25.1 (3.8)	17.9 (2.7)	28.6 (3.5)
Mountain	19.2 (1.9)	19.7 (1.5)	22.8 (1.9)
Pacific	14.0 (1.8)	11.6 (1.4)	14.6 (1.5)
Metropolitan statistical area (MSA) ¹			
MSA	19.7 (0.9)	17.7 (0.8)	24.5 (0.9)
Non-MSA	21.1 (1.5)	23.5 (1.4)	33.0 (1.6)

¹Significantly increasing linear trend.

SOURCE: NCHS, National Study of Long-Term Care Providers, 2012, 2014, and 2016.

Table 2. Percentage (and standard error) of residential care communities with computerized support for electronic health information exchange among those that used electronic health records, by selected characteristics and year: United States, 2012, 2014, and 2016

Characteristic	2012	2014	2016
		Percent (standard error)	
Residential care communities that used electronic health records ¹	47.2 (2.2)	47.0 (2.0)	55.0 (1.8)
Bed size			
4–25 beds	45.4 (4.1)	45.5 (3.7)	49.0 (3.3)
26–50 beds	45.1 (4.2)	43.3 (4.2)	54.7 (3.6)
51–100 beds	50.2 (3.9)	49.4 (3.4)	58.0 (3.2)
More than 100 beds ¹	48.4 (4.6)	51.6 (4.1)	64.9 (3.4)
Ownership			
For profit ¹	45.8 (2.7)	46.9 (2.5)	55.3 (2.2)
Nonprofit	50.2 (3.6)	46.3 (3.1)	54.9 (2.9)
Chain affiliation			
Chain ¹	45.6 (2.6)	45.7 (2.4)	53.7 (2.1)
Nonchain	51.4 (4.1)	50.4 (3.7)	58.0 (3.4)
U.S. Census division			
New England	42.5 (2.8)	34.0 (2.9)	41.1 (2.9)
Mid-Atlantic	49.5 (6.6)	57.0 (5.7)	60.7 (5.5)
East North Central ¹	39.5 (4.9)	52.4 (4.5)	62.6 (3.7)
West North Central	44.4 (3.8)	42.1 (4.0)	46.4 (3.8)
South Atlantic	54.1 (5.9)	47.4 (5.5)	63.6 (4.9)
East South Central ¹	30.6 (3.8)	43.5 (3.4)	55.3 (3.2)
West South Central	39.5 (8.6)	31.7 (7.4)	48.5 (7.7)
Mountain	50.4 (5.3)	48.5 (4.2)	50.9 (4.6)
Pacific	54.6 (6.8)	46.2 (6.2)	49.2 (5.5)
Metropolitan statistical area (MSA) ¹			
MSA	49.5 (2.6)	48.1 (2.4)	56.5 (2.1)
Non-MSA	38.5 (3.6)	42.8 (3.4)	49.7 (3.0)

¹Significantly increasing linear trend.

NOTE: Electronic health information exchange is with physicians or pharmacies.

SOURCE: NCHS, National Study of Long-Term Care Providers, 2012, 2014, and 2016.

Technical Notes

Definition of variables

U.S. Census division—States are grouped into the following nine divisions:

- *New England*: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont
- *Mid-Atlantic*: New Jersey, New York, and Pennsylvania
- *East North Central*: Illinois, Indiana, Michigan, Ohio, and Wisconsin
- *West North Central*: Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota
- *South Atlantic*: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, and West Virginia
- *East South Central*: Alabama, Kentucky, Mississippi, and Tennessee
- *West South Central*: Arkansas, Louisiana, Oklahoma, and Texas
- *Mountain*: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming
- *Pacific*: Alaska, California, Hawaii, Oregon, and Washington

Community size—Residential care communities were grouped based on the number of licensed, registered, or certified residential care beds (both occupied and unoccupied): 4–25 beds, 26–50 beds, 51–100 beds, and more than 100 beds.

Any electronic health record use—Respondents were asked, “An electronic health record is a computerized version of the resident’s health and personal information used in the management of the resident’s health care. Other than for accounting or billing purposes, does this residential care community use electronic health records?”

Any computerized support for health information exchange—Respondents were asked, “Does this residential care community’s computerized system support electronic health information exchange with each of the following providers (do not include faxing) a. physician, b. pharmacy?” Respondents were grouped by whether they said “Yes” or “No” to either a. physician or b. pharmacy. This measure could capture

emailing of information. Residential care communities may be able to exchange health information, but not do so with the two selected providers.

Residential care communities—Includes assisted living communities and other residential care communities (e.g., personal care homes, adult care homes, board care homes, or adult foster care) that meet the study eligibility criteria described in the “Methods” section.

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