A Multi-Center Study of Home Infusion Services in Rural Areas

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ABSTRACT

Introduction

Approximately 15% of the U.S. population lives in rural areas. It is recognized that rural Americans have fewer health care opportunities when compared to metropolitan residents. One area of health care is home infusion with approximately 1,000 providers in the U.S. What is not understood is the availability of home infusion to rural patients. This study aimed to determine the annual percentage of home infusion patients living and receiving home infusion services in rural areas.

Methodology

This retrospective, multi-center study analyzed patient rural/non-rural status data collected from home infusion providers who utilize the CPR+® and CareTend® platforms for electronic health records. Patients were classified as rural if their zip code fell within the rural designation defined by the Centers for Medicare and Medicaid Services (CMS) DMEPOS Competitive Bidding Program. The analyzed data was from 2018, 2019, and 2020, and included calculating the total number of unique patients and those who were considered rural. From this information, the overall percentage of rural patients was determined. The rural percentage for each provider was coded into 1 of 4 categories (0-10%, 11-25%, 26-49%, and 50% or greater). The frequency and percentage of providers who fell into each category was calculated so that trends could be observed, and data summaries more easily determined.

Results

Rural/Non-rural data from 200 individual pharmacy locations was submitted for analysis. For the 3-year period, there were 545,280 unique home infusion patients of which 71,278 were considered rural. Overall, 13.1% of patients served by these home infusion providers lived in rural areas. The number and percentage of rural patients served increased over the 3-year analysis period.

Discussion

This is the first study to quantify the use of home infusion in rural populations. It is known that patients in rural areas experience challenges with health care, including increased travel time for physician visits and chronic disease management. Unquestionably, home infusion alleviates patient travel barriers. The study data shows that most home infusion providers are serving patients living in rural areas and the percentage of rural patients has increased from 2018 to 2020.

Conclusions

Home infusion use in rural areas is well-established. Home infusion may offer advanced, infusion-based treatments more accessible to patients with limited health care options due to lack of proximity to urban centers.

Keywords: *Rural population, infusion, health care disparity, access to care, travel barrier*

Introduction

The Centers for Disease Control and Prevention (CDC) estimates that more than 46 million Americans, approximately 15% of the population, live in rural areas.[1] According to the U.S. Census Bureau, a rural region is an area that falls outside of a metropolitan area while a metropolitan area has an urban core and a population of 50,000 or more.[2] Rural Americans are more likely to die from chronic diseases, are often under-insured, and have less access to health care compared to urban populations. Furthermore, a report published by The National Rural Health Association determined that the low patient-to-physician ratio for rural Americans contributes to poor health outcomes.[3] Another disparity is the patient-to-primary-care physician ratio which is 39.8 physicians per 100,000 people in rural areas compared to 53.3 physicians per 100,000 in urban areas.[3] Differences in access to physician specialists in rural areas is more pronounced with only 30 specialists for every 100,000 patients. By contrast, the ratio of specialists to patients in urban areas is 263 per 100,000.[3] Home infusion of parenteral medications for a range of diseases is routine in the United States. Even though a 2020 National Home Infusion Association (NHIA) report estimates there are 974 licensed home infusion providers caring for approximately 3.1 million Americans annually, no studies have been conducted that report the utilization of home infusion in rural areas.[4]

Study Objective

This study aims to determine the annual percentage of home infusion patients living and receiving services in rural areas of the United States.

Methods

This retrospective, multi-center study analyzed data from home infusion providers who utilize the CPR+® and CareTend® (WellSky®) prescription management platform and electronic health record (EHR) software products. Participation in the study was voluntary and open to all eligible client companies using the applicable software. Participation in the study was promoted to members of NHIA through postings on the association website and in e-newsletters. Data collection occurred from July 1, 2021, to August 31, 2021.

For this study, patients were classified as rural if their zip code fell within the rural designation defined by the Centers for Medicare and Medicaid Services (CMS) DMEPOS Competitive Bidding Program. Within the DMEPOS program, there are 4 categories of zip codes: Competitive Bidding Area, Non-Rural, Rural, and Non-contiguous. While this is a more constricted characterization of rural compared to the U.S. Census Bureau definition, it provides a reasonable method for classifying infusion patient data.

Participating providers were asked to generate a de-identified report that categorizes each unique patient as non-rural or rural. The report also filtered infused drug therapies based on the order type and excluded non-IV drug therapies (i.e., enteral, oral). Data was grouped by the number of unique patients who received an infusion therapy in each calendar year based on whether their zip code falls into a rural area as defined (see Figure 1 for a sample report). Sites were instructed to submit

FIGURE 1 | Sample Provider Report

Year	Unique Rural Patients	Unique Non-Rural Patients	% Rural Patients
Location 1	530	3,170	14.32%
2016	100	500	16.67%
2017	95	650	12.75%
2018	115	675	14.56%
2019	120	645	15.69%
2020	100	700	12.50%
Location 2	1,305	6,725	16.25%
2016	250	1,300	16.13%
2017	275	1,350	16.92%
2018	280	1,375	16.92%
2019	230	1,300	15.03%
2020	270	1,400	16.17%

data for a 5-year look-back period (2016 to 2020). The data was exported to Excel® files and submitted to NHIA either by email or through an anonymous data portal. The data was aggregated to a single Excel® file and imported to IBM SPSS® (Statistical Product and Service Solutions) for analysis.

Analysis

Determining the number of providers submitting data for each of the 5 years was the first step in the analysis. Next, the total number of unique patients per year was determined and the percent of those considered rural patients. Additionally, each provider's rural patient percent was calculated. Due to possible outlier data, the median provider rural percentage was determined. The rural percentage for each provider was also coded into 1 of 4 categories (0-10%, 11-25%, 26-49%, and 50% or greater). The frequency and percentage of providers in each category was calculated so that trends could be observed, and data summaries more easily determined.

IRB (Institutional Review Board) Status

The patients' care plan was not impacted by this study. All patient's rural/non-rural data was retrospectively recorded. No identifying patient data was provided by the participating provider locations. Therefore, this study was exempted from IRB review.

Results

Rural/Non-rural data was submitted for analysis from 200 individual pharmacy locations and represents 20.5% of all home infusion provider locations. The home infusion software implementation not being fully deployed for the full calendar year may have resulted in under-reporting in 2016 and 2017 from some providers, therefore, to minimize the risk of incomplete submissions, the data for 2016 and 2017 was removed from the analysis. Data submitted for 2018, 2019, and 2020 was used for the analysis.

For the 3-year period, there were 545,280 unique home infusion patients of which 71,278 were considered rural. Overall, 13.1% of patients served by these home infusion providers lived in rural areas as defined by Centers for Medicare and Medicaid Services (CMS) for the DMEPOS competitive bidding program. As noted in Table 1 and Figure 2, the number and percentage of rural patients served increased slightly over the 3-year analysis period.

FIGURE 2 | Rural and Non-Rural Patients

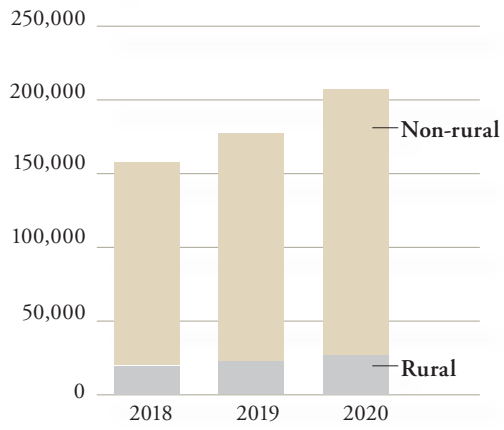


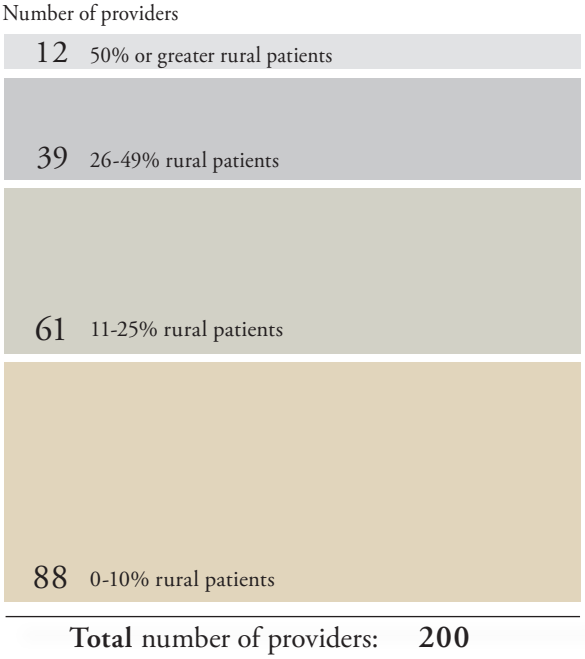
TABLE 1 | Comparison of Rural and Non-Rural Patients by Year

Year	N (sites)	Rural Patients	%	Non-Rural Patients	%	Total
2018	191	20,177	12.8%	137,791	87.2%	157,968
2019	191	23,219	13.0%	155,646	87.0%	178,865
2020	183	27,882	13.4%	180,565	86.6%	208,447
Total		71,278	13.1%	474,002	86.9%	545,280

TABLE 2 | Rural Percent Category

	Frequency	Percent
0-10% Rural Patients	88	44.0
11-25% Rural Patients	61	30.5
26-49% Rural Patients	39	19.5
50% or Greater Rural Patients	12	6.0
Total	200	100

FIGURE 3 | Location Groupings by Overall Percentage of Rural Patients



Further analysis revealed wide variation in the rural populations served by certain home infusion locations. It is surmised that providers with high percentages of rural patients may have been located nearer to the edge of, or outside a metropolitan area. Grouping the locations by their overall percentage of rural patients allows for closer examination of home infusion use in rural areas. Table 2 and Figure 3 illustrate that 25.5% of home infusion locations had rural populations of 26% or more, while 12 locations (6%) had rural populations greater than 50% of all patients served over the 3-year period. When the individual provider location's rural percentage is compared, the median (50th percentile) is 11.60% for 2018-2020. The median was slightly lower than the mean for each study year due to 12 providers who reported no rural patients. The medians for each year were: 2018 = 10.58%, 2019 = 11.80%, and 2020 = 12.26%.

Discussion

This is the first study to quantify the use of home infusion in rural populations. It is known that patients in rural areas experience challenges with health care, including increased travel time for physician visits and chronic disease management. Unquestionably, home infusion alleviates patient travel barriers. The study data shows that most home infusion providers serve patients living in rural areas, and the percentage of rural patients has slightly increased from 2018 to 2020. This study likely under-estimates the utilization of home infusion in rural populations due to the narrow definition of rural that was used to classify patients. Future research is needed to deepen understanding of rural home infusion and describe how rural patients gain entry to home infusion services, the therapies being provided, clinical outcomes, and financial impacts on providers serving rural patient populations.

Limitations

The primary limitation to the generalization of these results is data limited to a single software product for EHR data. Even though various client companies use the software, the study data does not include providers using other software products for electronic medical records. A secondary limitation of the study was not collecting demographic data from the pharmacies, which would allow for visibility of where the pharmacies are geographically, and the service areas covered. Future research should include variables contributing to the percentage of rural patients in the overall census.

Conclusions

The typical home infusion provider census is approximately 13.1% rural and 86.9% non-rural. There is broad variation among providers. Home infusion use in rural areas is well-established. It may offer advanced, infusion-based treatments that are more accessible to patients with limited health care options due to lack of proximity to urban centers.

Disclosures

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