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Association between broadband capacity and telehealth utilization among Medicare Fee-for-service beneficiaries during the COVID-19 pandemic

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Abstract

Background: Telehealth is a rapidly growing modality for expanding healthcare access, especially in the post-COVID-19 era. However, telehealth requires high-quality broadband, thus making broadband a social determinant of health. The objective of this study was to evaluate the association between broadband access and telehealth utilization across the United States during the COVID-19 pandemic.

Methods: Using a cross-sectional, ecological study design, we merged county-level data on broadband capacity (Microsoft's Rural Broadband Initiative), telehealth utilization among Medicare Fee-for-Service beneficiaries from January through September 2020 (CareJourney), and county-level socioeconomic characteristics (Area Health Resources Files). Multivariable linear regression was used to estimate the association between broadband capacity, county-level characteristics, and telehealth utilization.

Results: Among the 3107 counties, those with the greatest broadband availability (quintile 5) had 47% higher telehealth utilization compared to counties with the least broadband availability (quintile 1). In the adjusted model, a 1 standard deviation (SD) increase in broadband access was associated with a 1.54 percentage point (pp) increase in telehealth utilization ($P < 0.001$). Rural county designation (−1.96 pp; $P < 0.001$) and 1 SD increases in average Medicare beneficiary age (−1.34 pp; $P = 0.001$), number of nursing home beds per 1000 individuals (−0.38 pp; $P = 0.002$), and proportion of Native Americans/Pacific Islanders (−0.59 pp; $P < 0.001$) were associated with decreased telehealth utilization.

Conclusion: The association between broadband access and telehealth utilization and the decreased telehealth utilization in rural areas highlight the importance of broadband access for healthcare access and the need to continue investing in broadband infrastructure to promote equitable healthcare access across populations.

Keywords

Broadband, telehealth, Medicare Fee-for-service beneficiaries, disparities

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Introduction

Telehealth is a rapidly growing tool for providing access to healthcare, and its use has been augmented by the COVID-19 pandemic.[1–6] In fact, a report by the Assistant Secretary for Planning and Evaluation concluded that the share of Medicare visits through telehealth increased 63-fold from 2019 to 2020, from 840,000 visits in 2019 to 52.7 million in 2020.[7] While in-person healthcare delivery is returning to pre-pandemic levels, the use of telehealth is likely to remain higher in a post-pandemic as compared to the pre-pandemic environment due to improved convenience and rural healthcare access as well as decreased transportation cost and lost wages associated with telehealth access.[8,9]

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High-quality telehealth visits require adequate broadband access. Broadband refers to access to high-speed internet that, per the Federal Communications Commission (FCC), is a minimum speed of 25 megabits per second (Mbps) for downloading and 3 Mbps for uploading.[10–12] Broadband internet with >25 Mbps in download speed and >3 Mbps in upload speed is sufficient to conduct a high-quality telehealth visit with a healthcare provider.[13] With telehealth increasingly becoming a necessary means of healthcare delivery during the COVID-19 pandemic and broadband access being a precursor to telehealth, broadband access is quickly becoming a key social determinant of health.[14,15]

Limited evidence exists on the association between broadband access and telehealth utilization during the COVID-19 pandemic. A study using 2016 telehealth utilization data found that counties with a low broadband availability among its residents had 34% fewer visits per capita compared to counties with high broadband availability as measured by the FCC.[16] Another study (2019) found broadband penetration rates were substantially lower in rural counties where access to primary care physicians and psychiatrists are also inadequate.[17] More recent studies are needed to understand whether broadband access, or lack thereof, has increased the "Digital Divide" by increasing gaps in the ability to use telehealth for their healthcare needs during the COVID-19 pandemic.[18] Therefore, the purpose of this study was to provide insights into the association between broadband access and telehealth utilization at the county level across the United States during the beginning phases of the COVID-19 pandemic. Telehealth was defined as a modality of healthcare delivery that allows a healthcare provider to provide care to a person without an in-person office visit and could be accomplished through phone calls, text messages, video chat, or use of remote patient-monitoring devices.[19] We hypothesized that broadband access would be positively associated with telehealth utilization.

Methods

Data sources

Information on broadband capacity, telehealth utilization among Medicare Fee-for-service (FFS) beneficiaries, and county-level demographic characteristics are not available as part of a single dataset. Therefore, we integrated multiple datasets to develop an analytical dataset. For broadband capacity, we used data from Microsoft's Rural Broadband Initiative which are licensed under the Open Use of Data Agreement.[20] The dataset from Microsoft's Rural Broadband initiative, in the calendar year (CY) 2020, was obtained from the Microsoft U.S. Broadband Usage Percentages GitHub repository.[20,21] Rural–urban residence was determined using the 2013 U.S. Department of Agriculture Economic Research Service Rural-Urban Continuum Codes (RUCC)[22] to obtain RUCC for each county. We used the 2020–2021 Area Health Resource Files (AHRF), a public-use dataset provided by the U.S. Health Resources & Services Administration, to obtain county-level socioeconomic and environmental characteristics, health status, healthcare professionals, and economic activity.[23] County-level rates of telehealth services utilization by Medicare FSS beneficiaries from January 2020 through September 2020 was obtained from a blogpost published by CareJourney, a healthcare analytics platform that helps in market assessment, understanding patient demographics, and identifying target populations.[24] These datasets were merged using Federal Information Processing Standards county codes for CY 2020.

Study design and cohort selection

We used a cross-sectional study design to evaluate county-level factors associated with telehealth service utilization among Medicare FFS beneficiaries from January 2020 through September 2020. The study sample included all the counties ($n = 3107$) for which data on telehealth services utilization, broadband usage, rural–urban residence, and county-level demographics were available.

Primary independent variable

Our primary variable of interest was the proportion of households having sufficient access to broadband internet, as obtained from Microsoft data and defined by the FCC (see Introduction). Microsoft calculates the percentage of devices with sufficient broadband speeds using the proportion of the number of devices with a download speed of ≥25 Mbps and upload speed of ≥3 Mbps divided by the total number of devices, by county or zip code.[25] We used the SASHELP.Zipcode file to map between zip codes and counties.

Covariates

Covariate inclusion was driven by previous studies assessing factors associated with telemedicine use during COVID-19 pandemic.[26–28] We used two categorical variables: rural/urban status of the county and whether ≥10% of individuals in a county had high school or lower education. All other covariates were continuous variables, including five-year averages (CY 2015 through 2019) of the following variables: the proportion of county population who were enrolled in Medicare FFS, the proportion of Medicare FFS beneficiaries who are dually eligible for Medicare and Medicaid, age of Medicare FFS beneficiaries, risk-adjusted cost per Medicare FFS beneficiary, number of ED visits per 1000 Medicare FFS beneficiaries, proportion of Medicare FFS beneficiaries who were males, median household income (in 1000 dollars), primary care physicians per 1000 individuals in a county, total medical doctors (MDs) per 1000 individuals in a county, number of nursing home beds per 1000 individuals in a county, the proportion of individuals in a county who were White, African American, Native American/Pacific Islander, Asian, Native Hawaiian, Hispanic, belonged to other races, and belonged to two or more races, and Hierarchical Condition Category (HCC) risk scores.[29] HCC were used to adjust for health status, which is an important factor associated with telehealth utilization.[28,30] The latest data on racial distribution among individuals aged ≥65 years was available for CY 2010.

Outcome variable

The outcome variable of interest was the percentage of Medicare FFS beneficiaries, by county, who had any telehealth services utilization during the period of January 2020 through September 2020. These county-level rates of telehealth utilization were derived from CareJourney (see Data Sources section for further details).

Statistical analyses

We determined the mean and standard deviation (SD) for all continuous variables and proportions for categorical variables. We computed Z-scores for all continuous variables. Descriptive statistics included tests for trends to test for differences in telehealth utilization among populations within counties that fall into quintiles of the Z-scores of continuous variables. A multivariable linear regression model was used to determine the factors associated with telehealth utilization among Medicare FFS beneficiaries. All independent variables were assessed for multicollinearity and only retained if found to not contribute significantly to multicollinearity. We used SAS v.9.4 to perform data manipulation and statistical analyses. The project was reviewed by the University of Arkansas for Medical Sciences Institutional Review Board and determined to be nonhuman subjects' research (#262537).

Sensitivity analysis

We conducted a sensitivity analysis including a covariate for U.S. Census Region and state as a random effect to cluster standard errors at the state level. This sensitivity analysis was conducted post-hoc to assess the impact of state- and region-level effects (e.g. state-level policies, regional differences in practice) on the relationship between broadband capacity and telehealth utilization.

Results

Out of the 3143 counties in the United States, we excluded 36 counties due to missing information on telehealth

Table 1. County-level demographic characteristics ($n = 3107$).

Variable	M	±SD
% Medicare FFS beneficiaries who utilized telehealth	22.24	8.66
% County population with broadband access	39.02	22.7
% Population aged 65 and above who are:		
African American	6.26	11.24
Native American/Pacific Islander	1.20	5.72
Asian	0.74	2.57
Native Hawaiian	0.03	0.22
Hispanic	3.44	9.43
Belong to two or more races	0.77	0.78
Belong to other races	0.81	1.87
Median household income β	51,485.86	13,266.92
Number of primary care physicians per 1000 individuals β	0.56	0.42
Number of MDs per 1000 individuals β	1.27	1.75
Percentage of population enrolled in Medicare β	15.33	5.07
Number of nursing home beds per 1000 individuals	0.43	2
Hierarchical condition category risk	0.96	0.1
Age of Medicare FFS beneficiaries β	71.34	1.7
% Male Medicare FFS beneficiaries β	46.46	2.16
% Medicare FFS beneficiaries who are dually eligible for Medicare/Medicaid β	20.8	8.58
Risk adjusted annual cost for Medicare FFS beneficiaries β	10,635.27	1201.66
Number of ED visits per 1000 Medicare FFS beneficiaries β	691.93	145.31
≥10% of the individuals having high school or lower education μ	1948	(62.7)
Rural μ	1961	(63.1)

μ denotes sample size (n) and percent (%).
β denotes a five-year average (CY 2015 through 2019).
MD: medical doctors; FFS: Fee-for-service.

utilization ($n = 18$), broadband availability ($n = 6$), counties in AHRF files ($n = 2$), dual eligibility status ($n = 9$), and number of ED visits ($n = 1$); a total of 3107 counties were included in our analyses. Table 1 provides county-level characteristics. On average, 39% of the county population had broadband availability, and at the county level, 22% of Medicare FFS beneficiaries utilized any telehealth services between January and September 2020. On average, 15% of the county population were Medicare FFS beneficiaries having average age of 71 years and HCC risk score of 0.96. Among FFS beneficiaries, 21% were dually eligible for Medicare and Medicaid and 46% were males. On average, racial/ethnic minorities constituted 13.3% of Medicare FFS beneficiaries and 86.7% were White. More than 60% of the counties were rural and had ≥10% individuals with high school or less education.

Table 2 provides the percentage of Medicare FFS beneficiaries who utilized telehealth (from January 2020 to September 2020) by quintiles of Z-scores for each continuous covariate. Counties with the most broadband users (Q5) had 47% higher telehealth utilization as compared to the counties with the least broadband users (Q1). Counties with the highest proportion (Q5) of African American, Asian, and Hispanic Medicare enrollees had 56%, 61%, and 40% higher telehealth utilization compared to counties with the least proportion (Q1) of these racial/ethnic groups. Similarly, counties with the highest HCC risk score (Q5) had 50% higher telehealth utilization as compared to the counties with least HCC risk score (Q1). Counties with the highest median household income (Q5) had 35% higher telehealth utilization as compared to the counties with the lowest median household income (Q1). However, counties with the highest proportion of Medicare enrollees (Q5) had 36% lower telehealth utilization as compared to the counties with the lowest proportion of Medicare enrollees (Q1). Similarly, counties with the eldest Medicare enrollees (Q5) had 19% lower telehealth utilization as compared to the counties with youngest Medicare enrollees (Q1). Moreover, counties with the highest proportion of male Medicare enrollees (Q5) had 23% lower telehealth utilization as compared to the counties with the lowest proportion of male Medicare enrollees (Q1). Counties with the highest risk-adjusted cost per Medicare enrollee (Q5) had 8% lower telehealth utilization as compared to the counties with the lowest risk-adjusted cost per Medicare enrollee (Q1).

Table 3 provides results from the adjusted linear regression assessing the associations between county-level factors and telehealth utilization among Medicare beneficiaries. A 1 SD increase in broadband capacity at county level

Table 2. Percent of the Medicare Fee-for-service beneficiaries who utilized telehealth (during January 2020–September 2020) by quintiles of Z-scores of continuous variables in regression model ($n = 3107$).

Variable	Z-score quintiles					Test of trends
	Q1	Q2	Q3	Q4	Q5	
% County population with broadband access	19.38	18.87	20.70	23.80	28.42	+
% Population aged 65 and above who are:						
African American	16.25	19.86	23.61	26.16	25.28	+
Native American/Pacific Islander	20.41	24.12	23.29	23.09	20.35	None
Asian	17.68	20.31	20.74	23.94	28.48	+
Native Hawaiian	NA	19.74	NA	27.33	24.17	+
Hispanic	18.30	21.01	22.43	23.89	25.60	+
Belong to two or more races	18.57	23.10	23.73	22.85	22.99	+
Belong to other races	18.45	20.85	23.00	24.00	24.98	+
Median household income β	20.52	20.67	20.55	21.78	27.69	+
Number of primary care physicians per 1000 individuals β	19.93	21.07	22.42	22.54	25.18	+
Number of MDs per 1000 individuals β	18.90	20.10	21.06	23.17	27.88	+
Percentage of population enrolled in Medicare β	27.01	24.15	22.34	20.40	17.27	–
Number of nursing home beds per 1000 individuals	NA	NA	22.13	NA	22.92	None
Hierarchical condition category risk	17.42	20.59	22.65	24.28	26.18	+
Age of Medicare FFS beneficiaries β	23.27	23.34	23.34	22.35	18.88	–
% Male Medicare FFS beneficiaries β	25.30	22.63	22.52	21.24	19.48	–
% Medicare FFS beneficiaries who are dually eligible for Medicare/Medicaid β	21.68	21.38	22.10	22.69	23.35	+
Risk adjusted cost for Medicare FFS beneficiaries β	22.41	22.42	22.82	23.01	20.53	–
Number of ED visits per 1000 Medicare FFS beneficiaries β	19.33	22.18	23.08	23.48	23.07	+

"–" and "+" tests for trends are all statistically significant at $P < 0.05$ using tests for trends between quintiles.
β denotes a five-year average (CY 2015 through 2019).
NA: Not applicable; FFS: Fee-for-service; MDs: medical doctors.

Table 3. Multivariable linear regression model estimates for telehealth utilization by Medicare Fee-for-service beneficiaries (during January 2020–September 2020).

Variable	Z-score estimate	95% Lower confidence interval	95% Upper confidence interval	P-value
% Of county population having broadband access per Microsoft	**1.54**	**1.20**	**1.87**	**<0.001**
% Population aged 65 and above who are:				
African American	**0.74**	**0.45**	**1.02**	**<0.001**
Native American or Pacific Islander	**−0.59**	**−0.87**	**−0.30**	**<0.001**
Asian	−0.33	−0.74	0.09	0.124
Native Hawaiian	0.04	−0.33	0.41	0.828
Hispanic	**1.14**	**0.66**	**1.61**	**<0.001**
Belong to two or more races	**0.65**	**0.33**	**0.97**	**<0.001**
Belong to other races	−0.24	−0.71	0.22	0.307
Median household income β	**3.77**	**3.36**	**4.19**	**<0.001**
Number of primary care physicians per 1000 individuals β	−0.11	−0.57	0.36	0.651
Number of MDs per 1000 individuals β	**0.52**	**0.05**	**0.98**	**0.029**
Percentage of population enrolled in Medicare β	**0.56**	**0.22**	**0.91**	**0.001**
Number of nursing home beds per 1000 individuals	**−0.38**	**−0.62**	**−0.14**	**0.002**
Hierarchical condition category risk	**2.36**	**1.92**	**2.80**	**<0.001**
Age of Medicare FFS beneficiaries β	**−1.34**	**−1.81**	**−0.87**	**<0.001**
% Male Medicare FFS beneficiaries β	−0.03	−0.36	0.31	0.880
% Medicare FFS beneficiaries who are dually eligible for Medicare/Medicaid β	0.46	−0.02	0.94	0.059
Risk adjusted cost for Medicare FFS beneficiaries β	0.21	−0.06	0.49	0.129
Number of ED visits per 1000 Medicare FFS beneficiaries β	0.01	−0.38	0.39	0.977
≥10% of the individuals having high school or lower education	**1.26**	**0.64**	**1.88**	**<0.001**
Rural	**−1.96**	**−2.61**	**−1.31**	**<0.001**

Bolded values are significant at P < 0.05.
β denotes a five-year average (CY 2015 through 2019).
FFS: Fee-for-service.

was associated with a 1.54 pp increase (P < 0.001) in telehealth utilization. Similarly, 1 SD increase in African American Medicare FFS beneficiaries, Hispanic FFS beneficiaries, and FFS beneficiaries with two or more races was associated with a 0.74, 1.14, and 0.65 (P < 0.001 for each) pp increase in telehealth utilization. An increase of 1 SD of county population's median household income and HCC risk score were associated with a 3.77 and 2.36 pp increase (P < 0.001 for each) in telehealth utilization. A 1 SD increase in county population's Medicare enrollment, number of MDs per 1000 individuals in counties, and ≥10% of individuals with a high school or lower education were associated with a 0.56 (P = 0.001), 0.52 (P = 0.029), and 1.26 (P < 0.001) pp increase in telehealth utilization. Conversely, rural counties (−1.96 pps; P < 0.001) and 1 SD increase in average age of Medicare beneficiaries (−1.34 pps; P = 0.001), number of nursing home beds per 1000 individuals (−0.38 pps; P = 0.002), and number of Native Americans/Pacific Islanders (−0.59 pps; P < 0.001) had decreased telehealth utilization.

Sensitivity analysis

In the sensitivity analysis (Supplementary Table 1), a 1 SD increase in broadband capacity at county level was associated with 1.39 pps increase (P < 0.001) in telehealth utilization. The association for African American Medicare FFS beneficiaries, Native American/Pacific Islander FFS beneficiaries, and FFS beneficiaries with two or more races became insignificant in the sensitivity analysis. The county population's Medicare enrollment, number of MDs per 1000 individuals in counties, and ≥10% of individuals with a high school or lower education also became insignificant. However, the other associations remained significant and in the same direction; a 1 SD increase in Hispanic FFS beneficiaries (0.91 pps; P = 0.0003), county population's median household income (3.46 pps; P < 0.0001), and HCC risk score (2.21 pps; P = 0.0005) were associated with an increase in telehealth utilization. Rural counties (−1.57 pps; P = 0.0003) and 1 SD increase in the average age of Medicare beneficiaries

(−1.11 pps; P = 0.0114), and number of nursing home beds per 1000 individuals (−0.31 pps; P = 0.0095) were still associated with a decrease in telehealth utilization.

Discussion

This study provides unique insights into the association of broadband access and other factors associated with telehealth utilization among Medicare FFS beneficiaries at the county level across the United States during the onset of the COVID-19 pandemic. We found that counties with the highest proportions of the population with broadband access had 47% higher telehealth utilization compared to those with the lowest proportions with broadband access. After adjusting for county-level characteristics, we found that a 1 SD (39.02%) increase in broadband access was associated with a 1.54 pps ($P < 0.0001$) increase in telehealth utilization among Medicare beneficiaries. Thus, increased broadband access was associated with increased use of telehealth during the COVID-19 pandemic.

Understanding factors leading to increased or decreased utilization of telehealth is important for expanding healthcare services and improving access to care especially in the post pandemic era.[31,32] The findings from our study align with previous literature using commercial and Medicare Advantage Data, where telehealth use among Medicare beneficiaries was found to be 1.6 pps higher in counties with broadband availability above the median.[26] Another study focusing on community-living older adults participating in the 2017 National Health and Aging Trends Study reported that subjects in the lowest tertile of broadband access were 40% less likely to use telehealth compared to those in highest tertile.[33] We add to this important literature by incorporating measures of broadband capacity and evaluating the Medicare Fee for Service population. Given the higher utilization of telehealth services found in counties with higher broadband access, efforts to increase broadband access may result in improved access to care. Additionally, studies on the effects of increasing broadband have found that improved broadband positively impacted employment rates,[34] reduced depopulation,[35] and improved health outcomes.[36]

Increasingly, broadband connectivity is seen as a social determinant of health that impacts length and quality of life[15] with some going so far as to say it is a "super-determinant" due to the multifaceted nature in which it can affect public health, such as by impacting educational or job-related opportunities.[37] Understanding why broadband affects health to such a degree will help inform decisions regarding resource allocation and interventions to improve equity across populations. The correlation between broadband and telehealth found in our study may help shed light on the importance of high-speed access and which populations are most at risk of facing barriers to telehealth access. For example, our results show rural counties and counties with a higher proportion of Native American/Pacific Islanders were associated with decreased telehealth utilization, irrespective of broadband capacity in the county. These results highlight the concerns that specific communities may experience systemic disparities in the shift to telemedicine use.[38] Previous studies have also demonstrated that escalation in racism may lead to decreased care-seeking because of fear of bias and discrimination.[39] Such behaviors may ultimately lead to poor long-term health outcomes. Furthermore, low-income Americans, based on data from the Pew Research Center, are more likely to report difficulty in paying home broadband and cell-phone service bills, have lower levels of technology adoption like smartphones and computers which can create or exacerbate the "digital divide" in adoption of such technologies across the racial/ethnic groups.[40–43] These findings highlight the need for determining clinical scenarios that improve health equity and effective use of telehealth services to bridge such "digital divides."

We further found that counties with the highest proportion of Medicare enrollees and eldest enrollees had lower telehealth utilization as compared to counties with the lowest proportion of Medicare enrollees. Older patients may be more likely to face added challenges when adopting new technologies; however, they may benefit more than younger patients from using telehealth services due to challenges of transportation and costs associated with in-person visits.[44] During the COVID-19 pandemic digital access gaps among older adults may have grown in view of economic hardship and social isolation.[45,46] Our findings suggest that additional interventions targeting care coordination and engagement of older Medicare beneficiaries are needed to avoid increasing disparities in healthcare access.

This study has some limitations. First, this study uses a cross-sectional design thus the estimates obtained may not be causal. However, the goal of this study was to assess associations between broadband access and telehealth and further identify various factors associated with telehealth use which may help shed light on areas and populations which might be prioritized during policy decisions. Second, the use of Microsoft data for these analyses may limit the generalizability to those in the United States using Microsoft products. However, utilization of these data gives a county-level estimate of broadband speeds. Third, there is some difference between the data periods of the several datasets which are merged in this study which may lead to under or over-estimation of study results. Fourth, this study focuses on telehealth utilization among Medicare beneficiaries, and results may have limited generalizability to non-Medicare populations. Fifth, the use of other broadband availability data may result in different findings as each are collected differently. For example, FCC uses Form 477 data to obtain information on broadband availability from internet service providers.[25] Data reported through Form 477 is self-reported and assumes that if an internet service provider offers service to at least one household in a census block, then that internet service provider covers the entire census block.[47] Sixth, telehealth utilization data may include utilization incurred prior to the period when COVID-19 was declared a public health emergency in the United States,[48] thus potentially overestimating the percentage of telehealth utilization in a county and its association with broadband capacity. Lastly, our sensitivity analysis showed an insignificant finding for some of the relationships with telehealth utilization controlling for broadband access, likely due to the clustering of standard errors at the state-level; therefore, these results should be interpreted cautiously. However, the relationship between telehealth utilization and our main independent variable of interest (i.e. broadband capacity of the county) remained significant and of a similar magnitude and direction as our primary analysis.

Conclusion

Using a county-level, ecological approach, this study found that increased broadband access was associated with increased telehealth utilization during the COVID-19 pandemic. We also found that rural counties, counties with higher proportions of older Medicare FFS beneficiaries, and counties with a higher proportion of Native Americans/Pacific Islanders were associated with lower use of telehealth, regardless of broadband access. These findings highlight the positive effect of having broadband access and the need to continue to invest in broadband infrastructure in the United States to improve healthcare access across populations. However, the disparities we found raise concerns about the "Digital Divide" and inequitable healthcare access. Future research should evaluate the long-term impact of lower telehealth utilization during the COVID-19 pandemic among rural and aging populations.

Declaration of conflicting interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Ambrish A. Pandit was a PhD candidate at the University of Arkansas for Medical Sciences when this study was conducted and is currently employed at Amerisource Bergen Corporation, Conshohocken, Pennsylvania, U.S.A. Rest of the author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Supplemental material

Supplemental material for this article is available online.

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