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About the cover:

Conducting independent research and sharing the findings is critical to advancing patient care, protecting patient safety, and improving operations and care delivery systems. Over the past several years, the community of home infusion professionals has entered a new phase of exploration marked by more formalized research processes, amplified reporting, and enhanced collaboration. Poster abstracts, shared at NHIA's annual conference, are a primary vehicle for generating involvement. This issue highlights the 2023 posters, including a deep dive into the winner of the NHIF Outstanding Abstract Achievement Award.

Sociodemographic Factors Associated with Treatment for COVID-19 and Their Relationship with Short-Term Acute Care Utilization

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NHIF OUTSTANDING ABSTRACT ACHIEVEMENT AWARD WINNER

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- Innovative Multidisciplinary Management of Home Parenteral Nutrition Patients
- Development of Productivity Standards for Ambulatory Infusion Suite Nurses within a Multi-Entity Health System
- Home Parenteral Nutrition Workshop Take Off: A Pilot Program for Patient Support
- Time Utilization Study for Clinical Interventions Performed by a Complex Specialty Pharmacy

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From the Editor

Industry Research and Poster Presentations

Michelle C. Simpson, PharmD, BCSCP
Editor-in-Chief, *Infusion Journal*

Poster presentations are an effective mode of scientific communication involving science and the arts. Besides being aesthetically well-constructed, a research poster must incorporate scientific precision, with high-quality illustrations and compelling visual narratives to present information that balances attracting attendees to the poster and communicating research findings.

Poster presentations are a valuable component of professional conferences, meetings, and congresses. Presenters come together to share their research findings and innovative ideas with colleagues. Attendees view poster presentations to develop new ideas to incorporate into their practice. Poster presentations display visual summaries of research targeting people participating in a specific conference or meeting.

This issue of *Infusion Journal* contains research from the Poster Session at the 2023 NHIA Annual Conference. Each year, NHIF awards one poster with the Outstanding Abstract Achievement Award, and this year's winning poster research is detailed in the article by Klasen et al., "Sociodemographic Factors Associated with Treatment for COVID-19 and Their Relationship with Short-Term Acute Care Utilization." Additional *Infusion Journal* pages are devoted to showcasing the poster content and layout of finalists for the 2023 NHIF award. Titles, authors, and background information for the poster abstracts displayed at the 2023 annual conference are also listed.

Traditional poster layouts provide familiarity and detail using specific sections to introduce the topic and describe the methodology, results, and conclusions. This recognizable format, combined with tables of data and graphic analysis of large datasets, provides a detailed review of the study design and findings.

Still, presenters may want to consider the benefits of a different poster design when preparing for their next conference. Several alternatives for making posters more engaging for the audience are gaining popularity.[1] Poster authors have more options for creating their posters using a layout that fosters a concise presentation of ideas using graphic design principles, such as the placement of negative space and a simplified representation of ideas. Poster templates are available that emphasize typography and utilization of bright colors, with a summary of critical points as text or an infographic.[1]

A study by Oronje et al. evaluated the impact of traditional poster format compared to billboard-style poster designs on attendee and presenter attitudes and behaviors. The study found that attendees preferred billboard-style poster layout over the traditional layout for learning, ease of interaction, and facilitating scientific discovery. Presenters perceived the billboard-style layout as being easier to prepare and more interactive to attendees.[2]

Other non-traditional formats highlight the main idea or ask questions that start conversations with peers. A trend in emerging poster templates and layouts is to choose short statements that cover the direct result of the research and write them in prominent text so that it is impossible for attendees not to read them as they walk past.[1]

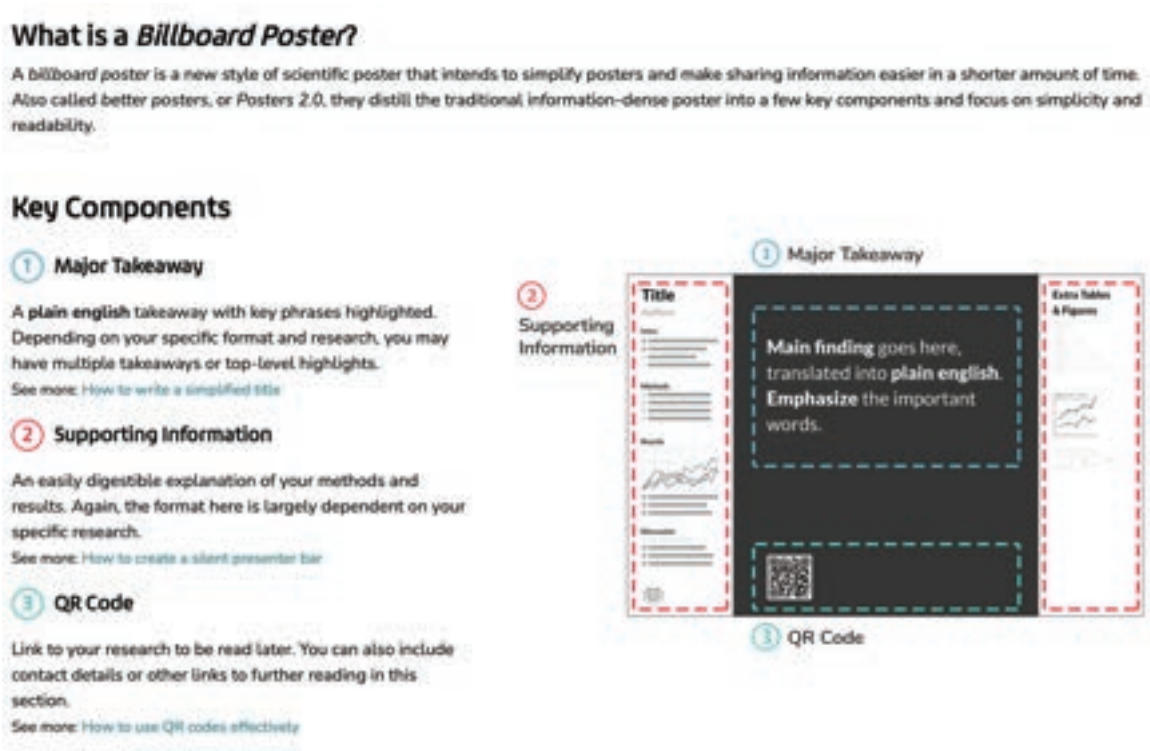
Presenters want their work to get noticed, and anticipating audience perception of a newer design may feel risky. Adding non-traditional poster layouts to standard traditional poster template options can help these designs gain popularity and more general use. When deciding amongst diverse poster layouts, discuss with your research project team which poster design would be most appropriate for the type of study, research question, audience, and presentation time allotment at the poster session. Participants in the study by Oronje et al. felt that future improvements to the billboard-style layout should focus on communicating study methods and rigor more prominently, in addition to the key takeaway.[2]

Poster abstract submission for NHIA's Annual Conference 2024 opens this summer, and NHIA offers valuable resources supporting infusion research, including poster development.

References

1. Andrea L Gray, PharmD and others, Innovative poster designs: A shift toward visual representation of data, *American Journal of Health-System Pharmacy,* Volume 79, Issue 8, 15 April 2022, Pages 625–628, https://doi.org/10.1093/ajhp/zxac002
2. Benard Oronje, Mike Morrison, Chris Suharlim, Kimberly Folkman, et al. (2022). A step in the right direction: Billboard-style posters preferred overall at two conferences, but should include more methods and limitations. *Qeios*. doi:10.32388/P7N5BO.

You can find information on optimally designing your poster at: https://www.posternerd.com/billboard-poster-templates



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Sociodemographic Factors Associated with Treatment for COVID-19 and Their Relationship with Short-Term Acute Care Utilization

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ABSTRACT

Background

Health disparities have been exacerbated during the COVID-19 pandemic. Despite COVID-19 treatments being associated with lower morbidity and mortality, recent data illustrates that treatment may be underutilized by certain patient populations. This study examines patient sociodemographic and clinical characteristics and their relation to COVID-19 treatment, focusing on intravenous bebtelovimab, oral nirmatrelvir/ritonavir, or no treatment; data is extrapolated to further understand the relationship of treatment and patient characteristics on short-term acute care outcomes.

Methods

This was a retrospective cohort of patients who tested positive for COVID-19 between March and December 2022 and were considered at high-risk of severe COVID-19. Sociodemographic factors were compared across treatment groups: intravenous bebtelovimab, oral nirmatrelvir/ritonavir, or no treatment; logistic regression estimated the odds of receiving acute care in the 14 days following COVID-19 infection.

Results

There were 18,751 patients at high-risk for COVID-19; 12,688 patients (67.67%) received no treatment. Interpreter use, African American/Black race, and Medicaid insurance were associated with 1.7, 1.8, and 1.4 times less likelihood to receive treatment, respectively. Patients who did not receive treatment were 3.2 times more likely to utilize acute care compared to patients treated with bebtelovimab, after controlling for confounders.

Conclusion

Disparities in receiving COVID-19 treatment remain; since lack of treatment increases short-term health care utilization, health systems must find unique methodologies to improve access to care while preserving health care resources. Home infusion services, which supplied bebtelovimab within the health system, may be a leading strategy to increase health equity through improvement of access and education across many disease states beyond COVID-19.

Keywords

COVID-19, oral antiviral, monoclonal antibody, social determinants of health

Background

The coronavirus disease 2019 (COVID-19) pandemic had a disproportionate impact on historically underserved, marginalized, or vulnerable populations in the United States. Racial and ethnic disparities contributed to increased COVID-19 cases, hospitalizations, and mortality for American Indian or Alaska Native, Black or African American, and Hispanic or Latino people.[1-4] Quarantine, vaccination, and treatment led to a shift in morbidity and mortality, whereby socioeconomically disadvantaged Americans were more likely to be exposed to COVID-19 and less likely to be vaccinated against the virus.[5-7] While age-adjusted COVID-19 death rates declined 47% from 2021 to 2022, Black, Hispanic, and American Indian or Alaska Native peoples remained at higher risk for severe COVID-19 infection, which led to an excess of hospitalization and deaths.[8,9]

As the landscape of COVID-19 treatment evolved over the course of the pandemic, there was a continual shift in morbidity and mortality.[10-13] Monoclonal antibodies were some of the first products to be utilized as COVID-19 treatment in home infusion or ambulatory settings.[14] As new variants surged, many monoclonal antibody products lost efficacy and authorization. In February 2022, bebtelovimab, administered as a single intravenous (IV) infusion, was authorized for emergency use by the U.S. Food and Drug Administration (FDA) for the improvement of COVID-19 symptoms and reduction in viral load, but the clinical studies were not designed to determine a difference in hospitalization or death.[15]

Similarly, the FDA authorized nirmatrelvir/ritonavir as the first oral antiviral treatment for COVID-19 in December 2021 for emergency use. Clinical studies supported its reduction in hospitalizations and deaths compared to placebo.[16] In addition, the availability of an oral antiviral allowed for greater convenience, accessibility, and utilization, with the percentage of patients seeking medical care for a prescription of nirmatrelvir/ritonavir increasing from 0.6% to 34.3% between January and July 2022.[3]

Despite vast increases in COVID-19 treatment availability throughout 2022 when the COVID-19 Omicron subvariant surged, socioeconomic and sociodemographic factors continued to be barriers to receiving care.[3,17] From April to July 2022, the percentage of adults treated with nirmatrelvir/ritonavir was 36% lower among patients of Black race than White, and 30% lower among Hispanic than non-Hispanic ethnicity.[3] In an effort to provide treatment to those who most need it, guidance from state and national health organizations limit treatment to only those who are considered high-risk, which included patients of older age groups or those with chronic health conditions that put them at a higher risk of developing severe COVID-19 infection.[18] Race and ethnicity are connected to factors that affect health including physical living or working environments, access to health care, socioeconomic and sociodemographic status, and the experience of racism as a chronic stressor.[1] While many studies have examined the effects of the experience of COVID-19 through the lens of social determinants of health, few have examined the upstream experience of receiving treatment in the first place, and how that may be associated with downstream effects.[4,7,19,20] This current study, thus, aims to evaluate the upstream sociodemographic factors related to receiving COVID-19 treatment for patients at high-risk of severe COVID-19 infection and, further, aims to understand how potential disparities in treatment may lead to downstream acute care utilization. Results may allow for a greater understanding of the impact of treatment for COVID-19 and consider ways to alleviate sociodemographic inequities as they exist in practice.

Methods

Study Design and Setting

This study was conducted within a large Midwestern, not-for-profit health system consisting of 12 community hospitals and academic medical centers, and 60 clinics in urban, suburban, and rural locations, and employing over 100 different types of specialists who treat over 2 million patients annually. The health system's pharmacy services consist of 26 community pharmacies, a large specialty pharmacy, and a home infusion pharmacy that led the system's COVID-19 monoclonal antibody treatment center. This study evaluated differences in patient characteristics of patients eligible for COVID-19 treatments based on whether or not they received pharmacologic treatment and compared short-term (14-day) health care utilization following COVID-19

infection by treatment group. The Institutional Review Board at the University of Minnesota approved this study.

Study Population

Patients were included if they were 18 years or older and were an established patient within the health system, as indicated by 1 or more primary care or specialist visits within 18-months prior to their positive COVID-19 test. Patients must have tested positive for SARS-CoV-2 (PCR or antigen) between March 1, 2022 and December 17, 2022; they must have met the qualification of high-risk for severe COVID-19 based on the definition provided by the Centers for Disease Control and Prevention (CDC), and utilized by Shah, et al. (2022).[21] Patients were excluded if they opted out of research participation, or if they were dispensed a medication to treat COVID-19 outside of the health system's community pharmacies or infusion center (i.e., the electronic medical record indicated prescription by a health provider, but no record of dispense occurred within the system).

Variables of Interest

Treatment Group

Patients in the treatment group must have been prescribed and dispensed either bebtelovimab or nirmatrelvir/ritonavir for COVID-19 within the health system. Bebtelovimab treatment was administered intravenously and occurred at the health system's COVID-19 monoclonal antibody treatment center which was led by the institution's home infusion pharmacy and located in a diverse urban community, specifically placed there to increase accessibility and capture a large patient population.

Nirmatrelvir/ritonavir tablets were prescribed by a physician within the health system and dispensed from 1 of the system's 13 community pharmacy sites that had access to the medication. Medication dispensing data were available through the health system's pharmacy software, EnterpriseRx® (McKesson, Corp.; Irving, TX). The non-treatment group contained patients testing positive for COVID-19 who were at high-risk for severe COVID-19 infection based on *International Classification of Diseases, Clinical Modification,* version 10 codes as per Shah, et al. (2022) who never were prescribed nor dispensed any treatment for COVID-19.[21]

Index Date

Each patient's index date was defined as the date of a positive COVID-19 PCR or antigen test for non-treatment group patients, and the date of medication dispense for treated patients. Bebtelovimab should be initiated within 7-days of COVID-19 symptom onset and nirmatrelvir/ritonavir tablets should be initiated within 5-days of symptom onset, according to FDA authorization.[15,16]

Sociodemographic Factors

The electronic medical record utilized within the health system (Epic; Verona, WI) contains patient self-reported race, ethnicity, and sex, as well as other patient factors like COVID-19 vaccine status, insurance status, age, and social factors. Interpreter use was included as a covariate of interest since use of interpreter considerably lengthens provider visits, and thus may lead to less information exchanged between providers and patients, especially in an era of shortened office visit times.[22,23] COVID-19 vaccine information was available through a state immunization system that feeds directly into the electronic medical record. Patient-level factors were reported from the health system visits nearest to the patient's index date so as to be mindful that social and health factors may change over time. Body mass index (BMI) was categorized into commonly defined groups as published by the CDC.[24] Further, patient address was utilized to match to the CDC's Social Vulnerability Index (SVI) based on household census tract via a zip code crosswalk available through the U.S. Department of Housing and Urban Development.[25,26] The SVI ranks each census tract on 16 social factors, resulting in a percentile ranking corresponding to social vulnerability of each census tract; lower SVI percentiles correspond to more vulnerable areas.[25]

Acute Care Utilization

Acute care use included urgent care, emergency department, or hospital visits that occurred within 14-days of the patient's index date within the health system.

Statistical Analysis

Patients were compared across treatment groups using chi-square tests to examine relationships between categorical variables. Continuous variables were examined for normality; ultimately, Wilcoxon rank-sum tests examined the relationships between continuous variables and treatment group. Categorical

TABLE 1. | Comparison of Patient Sociodemographic Factors by COVID-19 Treatment Group

		Total	Treatment Group			*p*-value
			Bebtelovimab	Nirmatrelvir-Ritonavir	None	
Total Population		n=18,751	n=656 (3.50%)	n=5,407 (28.84%)	n=12,688 (67.67%)	
Age Group	18-34 years	3,083 (16.44)	43 (6.55)	558 (10.32)	2,482 (19.56)	
	35-49 years	3,727 (19.88)	94 (14.33)	1,156 (21.38)	2,477 (19.52)	
	50-64 years	4,612 (24.60)	199 (30.34)	1,631 (30.16)	2,782 (21.93)	
	65-74 years	3,532 (18.84)	181 (27.59)	1,247 (23.06)	2,104 (16.58)	
	75+ years	3,797 (20.25)	139 (21.19)	815 (15.07)	2,843 (22.41)	**<.0001**
Sex	Male	7,352 (39.21)	323 (49.24)	2,130 (39.39)	4,899 (38.61)	
	Female	11,399 (60.79)	333 (50.76)	3,277 (60.61)	7,789 (61.39)	**<.0001**
Interpreter Needed	Yes	651 (3.47)	13 (1.98)	74 (1.37)	564 (4.45)	
	No	18,100 (96.53)	643 (98.02)	5,333 (98.63)	12,124 (95.55)	**<.0001**
Race	White	15,486 (82.59)	585 (89.18)	4,779 (88.39)	10,122 (79.78)	
	African American	1,370 (7.31)	30 (4.57)	183 (3.38)	1,157 (9.12)	
	Asian	956 (5.10)	28 (4.27)	215 (3.98)	713 (5.62)	
	Indigenous	127 (0.68)	1 (0.15)	30 (0.55)	96 (0.76)	
	Other/Unknown	812 (4.33)	12 (1.83)	200 (3.70)	600 (4.73)	**<.0001**
Ethnicity	Hispanic	277 (1.48)	9 (1.37)	67 (1.24)	201 (1.58)	**0.2067**
Insurance Type	Commercial	6,651 (35.47)	207 (31.55)	2323 (42.96)	4,121 (32.48)	
	Medicare	7,234 (38.58)	340 (51.83)	1,977 (36.56)	4917 (38.75)	
	Medicaid	2,260 (12.05)	38 (5.79)	300 (5.55)	1,922 (15.15)	
	Other/Unknown	2,606 (13.90)	71 (10.82)	807 (14.93)	1,728 (13.62)	**<.0001**
Marriage Status	Married	10,405 (55.49)	450 (68.60)	3,694 (68.32)	6,261 (49.35)	
	Single	5,224 (27.86)	120 (18.29)	1,004 (18.57)	4,100 (32.31)	
	Divorced/ Legally Separated	1,521 (8.11)	42 (6.40)	371 (6.86)	1,108 (8.73)	
	Widowed	1,450 (7.73)	35 (5.34)	277 (5.12)	1,138 (8.97)	
	Unknown	151 (0.81)	9 (1.37)	61 (1.13)	81 (0.64)	**<.0001**

		Total	Treatment Group			*p*-value
			Bebtelovimab	Nirmatrelvir-Ritonavir	None	
Total Population		n=18,751	n= 656 (3.50%)	n=5,407 (28.84%)	n=12,688 (67.67%)	
Employment Status	Full-Time	7,124 (37.99)	197 (30.03)	2,475 (45.77)	4,452 (35.09)	
	Part-Time	1,029 (5.49)	27 (4.12)	265 (4.90)	737 (5.81)	
	Self-Employed	577 (3.08)	25 (3.81)	234 (4.33)	318 (2.51)	
	Retired	6,382 (34.04)	284 (43.29)	1,733 (32.05)	4,365 (34.40)	
	Disabled	812 (4.33)	45 (6.86)	105 (1.94)	662 (5.22)	
	Not Employed	1,964 (10.47)	49 (7.47)	354 (6.55)	1,561 (12.30)	
	Student	363 (1.94)	8 (1.22)	70 (1.29)	285 (2.25)	
	Unknown	500 (2.67)	21 (3.20)	171 (3.16)	308 (2.43)	**<.0001**
Social Vulnerability Index, median (IQR)		0.81 (0.62, 0.92)	0.83 (0.63, 0.93)	0.79 (0.56, 0.89)	0.78 (0.57, 0.91)	**<.0001**
BMI	Missing	356 (1.90)	22 (3.35)	114 (2.11)	220 (1.73)	
	Underweight, <18.5 kg/m2	386 (2.06)	6 (0.91)	59 (1.09)	321 (2.53)	
	Normal weight; 18.5-24.99 kg/m2	4,358 (23.24)	153 (23.32)	1,075 (19.88)	3,130 (24.67)	
	Overweight, 25.0-29.99 kg/m2	5,453 (29.08)	205 (31.25)	1,653 (30.57)	3,595 (28.33)	
	Obese, ≥ 30.0 kg/m2	8,198 (43.72)	270 (41.16)	2,506 (46.35)	5,422 (42.73)	**<.0001**
Alcohol Use	Missing	788 (4.20)	25 (3.81)	162 (3.00)	601 (4.74)	
	No	8,893 (47.43)	313 (47.71)	1,962 (36.29)	6,618 (52.16)	
	Yes	9,070 (48.37)	318 (48.48)	3,283 (60.72)	5,469 (43.10)	**<.0001**
Tobacco Use	Missing	156 (0.83)	9 (1.37)	49 (0.91)	98 (0.77)	
	Never	10,133 (54.04)	379 (57.77)	3,247 (60.05)	6,507 (51.28)	
	Quit	6,333 (33.77)	248 (37.80)	1,735 (32.09)	4,350 (34.28)	
	Passive	123 (0.66)	1 (0.15)	27 (0.50)	95 (0.75)	
	Yes	2,006 (10.70)	19 (2.90)	349 (6.45)	1,638 (12.91)	**<.0001**
COVID-19 Vaccination Status	None/Incomplete Primary Series	2,889 (15.41)	41 (6.25)	354 (6.55)	2,494 (19.66)	
	Primary Series	2,643 (14.10)	42 (6.40)	448 (8.29)	2,153 (16.97)	
	Primary + ≥1 Booster	13,219 (70.50)	573 (87.35)	4,605 (85.17)	8,041 (63.37)	**<.0001**

variables were presented as frequency and percent, while continuous variables were presented as median and interquartile range (IQR). Univariate logistic regression models evaluated the outcome of treatment vs. no treatment for COVID-19 across sociodemographic and clinical variables of interest. Univariate logistic regression models also evaluated odds of acute care utilization within the 14-days following index date across treatment groups and sociodemographic variables. Multiple regression models were examined to assess odds of receiving treatment and odds of utilizing acute care services within 14-days of index date; all variables deemed statistically significant in univariate models were initially included in multivariable regression models, and backward selection was utilized to determine the most efficient model, examining each model's Type 3 analysis of effect *p*-values from Wald chi-square tests for guidance. All logistic regression results were presented as odds ratios (OR) and their corresponding 95% confidence intervals (CIs). All analyses were conducted in SAS®, version 9.2 (Cary, NC), and the level of significance was set *a priori* as $\alpha=0.05$.

Results

There were 18,751 patients comprising the study population, including 12,688 patients (67.67%) who were at high-risk for severe COVID-19 infection but did not receive outpatient treatment; 6,063 (32.33%) patients received pharmacological treatment for COVID-19, including 5,407 patients (89.18%) who were treated with nirmatrelvir/ritonavir and 656 patients (10.82%) who were treated with IV bebtelovimab. Patients were predominantly female (N=11,399, 60.79%), of self-reported White race (N=15,486, 82.59%), and had Commercial or Medicare insurance (N=6,651, 35.47%; N=7,234, 38.58%; respectively).

Table 1 indicates details on patient sociodemographic factors and characteristics by treatment group. Patients differed by treatment group across many social variables, including age, sex, insurance type, interpreter status, race, marriage and employment statuses, COVID-19 vaccine status, BMI, alcohol use, tobacco use, and SVI (all comparisons significant at $p<0.0001$). Specifically, the IV bebtelovimab treatment group had a larger proportion of patients in older age groups (ages 65-74 years: N=181, 27.59%; age 75+ years: N=139, 21.19%), males (N=323, 49.24%), and patients with a complete vaccine series and at least 1 booster (N=573, 87.35%). Correspondingly, high-risk patients without COVID-19 treatment tended to be younger (18-24-year age group: N=2,482, 19.56%), require interpreters (N=564, 4.45%), be insured by Medicaid (N=1,922, 15.15%), of self-reported Black race (N=1,157, 9.12%), be unemployed (N=1,561, 12.30%), use tobacco (N=1,638, 12.91%), and have incomplete COVID-19 primary vaccine series (N=2,494, 19.66%).

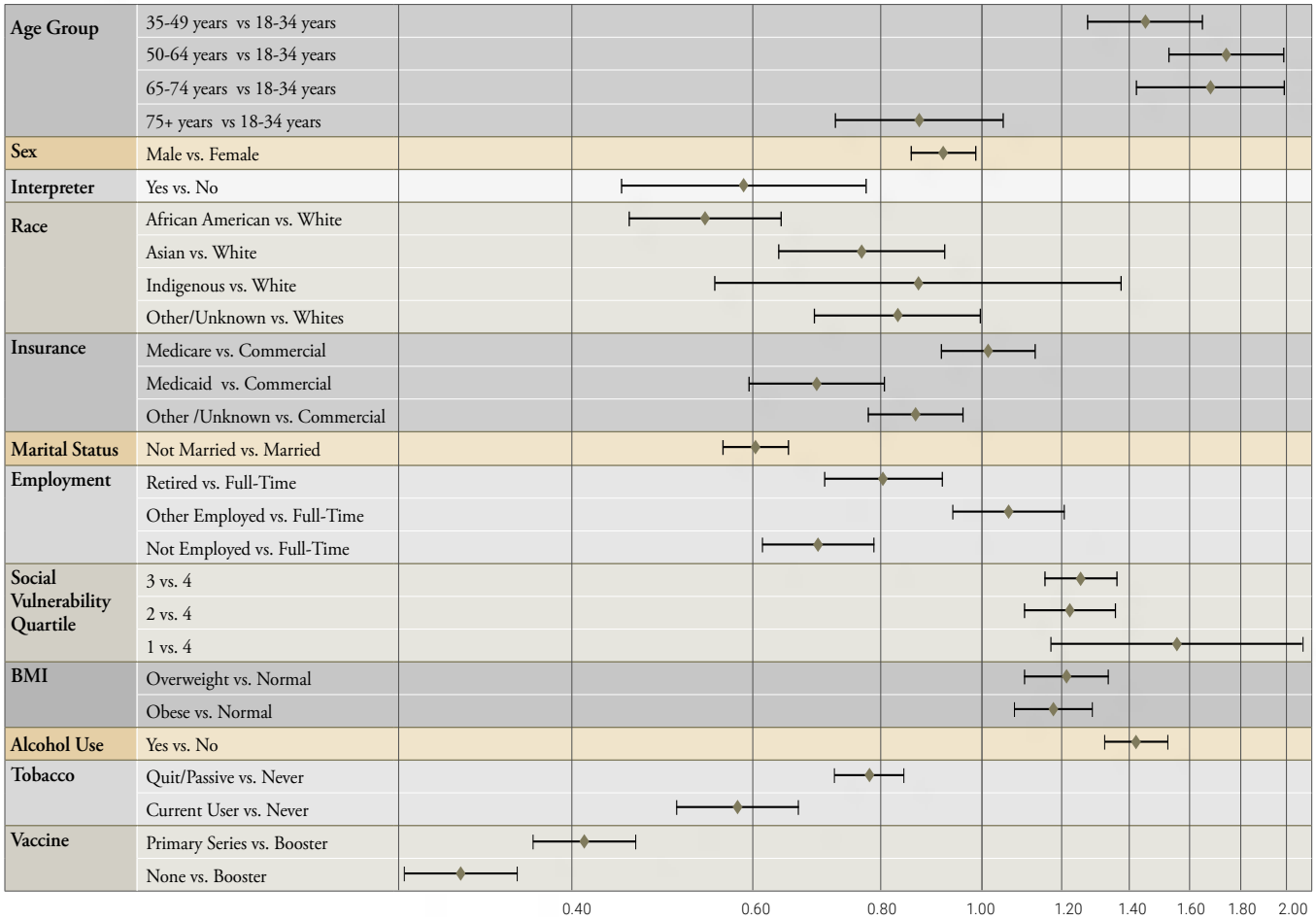
Table 2 indicates the unadjusted and adjusted odds ratios (OR) and their associated 95% confidence intervals (CI) predicting COVID-19 treatment based on sociodemographic factors. Interestingly, once adjusted for confounders, males were less likely to receive treatment than females (OR: 0.92, 95% CI: 0.86-0.99), whereas they were more likely than females to receive treatment within univariate models (OR: 1.08, 95% CI: 1.02-1.15). Additionally, Figure 1 depicts the adjusted ORs of receiving treatment and their 95% CIs and indicates that patients needing an interpreter were 1.7 times less likely than those not requiring an interpreter to receive COVID-19 treatment (OR: 0.59, 95% CI: 0.45-0.77). Race was also significantly associated with receiving treatment even after adjusting for other variables ($p<0.0001$); African American/Black patient populations and Asian patient populations were both less likely to receive treatment compared to White patients (African American/Black: OR: 0.54, 95% CI: 0.45-0.64; Asian: OR: 0.76, 95% CI: 0.63-0.92). Patients receiving Medicaid insurance were less likely than their commercially insured counterparts to receive treatment (OR: 0.69, 95% CI: 0.59-0.80), as were patients who were unemployed (OR: 0.70, 95% CI: 0.61-0.79). Additionally, vaccine status was associated with receiving treatment; patients who have never been vaccinated against COVID-19 or had incomplete primary series were 3.2 times less likely to receive COVID-19 treatment than those who were fully vaccinated with a booster (OR: 0.31, 95% CI: 0.27-0.35). Interestingly, patients with higher BMIs were more likely to be treated for COVID-19 compared to patients of lower BMIs (Overweight: OR: 1.21, 95% CI: 1.10-1.33; Obese: OR: 1.18, 95% CI: 1.08-1.29), as were patients who reported drinking alcohol (OR: 1.42, 95% CI: 1.32-1.52). Middle and older age groups (35-49 year-olds: OR: 1.45, CI: 1.27- 1.65; 50-64 year-olds: OR: 1.73, CI: 1.53-1.97; 65-74 year-olds: OR: 1.68, CI: 1.42-1.97) were also more likely to receive treatment compared to the younger patients (18-34 year-olds); however, there was no significant difference found between the oldest age group (75+ years) and the 18-34 year-old group after adjusting for other variables. Overall, 1,950 (10.40%) patients at high-risk for severe

TABLE 2. | Odds Ratios (ORs) and Adjusted ORs and Their Corresponding 95% Confidence Intervals (CIs) Predicting the Receival of Treatment for COVID-19 Infection Among High-Risk Patients

		Unadjusted OR (95% CI)	Adjusted OR (95% CI)*
Age Group	18-34 years	*reference*	*reference*
	35-49 years	2.08 (1.86, 2.33)	1.45 (1.27, 1.65)
	50-64 years	2.72 (2.44, 3.02)	1.73 (1.53, 1.97)
	65-74 years	2.80 (2.51, 3.13)	1.68 (1.42, 1.97)
	75+ years	1.39 (1.24, 1.56)	0.87 (0.72, 1.05)
Sex	Female	*reference*	*reference*
	Male	1.08 (1.02, 1.15)	0.92 (0.86, 0.99)
Interpreter Needed	No	*reference*	*reference*
	Yes	0.31 (0.25, 0.39)	0.59 (0.45, 0.77)
Race	White	*reference*	*reference*
	African American / Black	0.35 (0.30, 0.40)	0.54 (0.45, 0.64)
	Asian	0.64 (0.55, 0.75)	0.76 (0.63, 0.92)
	Indigenous	0.61 (0.41, 0.92)	0.86 (0.54, 1.37)
	Other/Unknown	0.67 (0.57, 0.78)	0.83 (0.69, 0.99)
Ethnicity	Non-Hispanic	*reference*	
	Hispanic	0.79 (0.61, 1.03)	
Insurance Type	Commercial	*reference*	*reference*
	Medicare	0.77 (0.72, 0.82)	1.02 (0.92, 1.13)
	Medicaid	0.29 (0.25, 0.33)	0.69 (0.59, 0.80)
	Other/Unknown	0.83 (0.75, 0.91)	0.86 (0.78, 0.96)
Marital Status	Married	*reference*	*reference*
	Not Married	0.44 (0.41, 0.47)	0.60 (0.56, 0.65)
Employment Status	Full-time	*reference*	*reference*
	Retired	0.77 (0.72, 0.83)	0.80 (0.70, 0.92)
	Other Employment	0.78 (0.70, 0.87)	1.06 (0.94, 1.20)
	Not Employed	0.41 (0.37, 0.46)	0.70 (0.61, 0.79)
SVI Quartile	0.75-1.0	*reference*	*reference*
	0.50-0.74	1.41 (1.32, 1.52)	1.25 (1.16, 1.36)
	0.25-0.49	1.41 (1.29, 1.55)	1.22 (1.10, 1.35)
	0-0.24	1.98 (1.52, 2.57)	1.55 (1.17, 2.07)
BMI	Underweight/Normal	*reference*	*reference*
	Overweight	1.38 (1.27, 1.50)	1.21 (1.10, 1.33)
	Obese	1.37 (1.26, 1.48)	1.18 (1.08, 1.29)
Alcohol	No	*reference*	*reference*
	Yes	1.92 (1.80, 2.04)	1.42 (1.32, 1.52)
Tobacco	Never	*reference*	*reference*
	Quit/Passive	0.81 (0.76, 0.87)	0.78 (0.72, 0.84)
	Yes	0.40 (0.36, 0.46)	0.58 (0.50, 0.66)
COVID-19 Vaccination Status	Primary + ≥1 Booster	*reference*	*reference*
	Primary Series Only	0.35 (0.32, 0.39)	0.41 (0.36, 0.46)
	None/Incomplete Primary Series	0.25 (0.22, 0.28)	0.31 (0.27, 0.35)

* Model adjusted for all variables shown

FIGURE 1 | Adjusted Odds Ratios with 95% Wald Confidence Limits Estimating Treatment Receival Based on Sociodemographic Factors



COVID-19 utilized acute care within 14 days following COVID-19, including 4.42% of patients who had the monoclonal antibody bebtelovimab infused (N=29), 5.23% of patients dispensed nirmatrelvir/ritonavir (N=283), and 12.91% of patients at high-risk for severe infection who received no treatment (N=1,638). Table 3 indicates unadjusted and adjusted ORs and 95% CIs estimating the utilization of acute care in the 14 days after infection, while Figure 2 depicts the adjusted ORs and their 95% CIs visually. While interpreter use was associated with greater acute care utilization in unadjusted models (OR: 1.29, 95% CI: 1.02-1.63), it was no longer significant and therefore not included in adjusted models of acute care utilization. Similarly, in univariate models, unvaccinated patients or those with incomplete primary COVID-19 vaccines series had greater odds of utilizing acute care services (OR: 1.24. 95% CI: 1.09-1.40), however, surprisingly, vaccination status was no longer significant when examined with respect to other variables.

After adjustment for race, employment status, alcohol and tobacco use, COVID-19 treatment remained the largest measured predictor of utilizing acute care within 14 days of COVID-19 diagnosis, even after adjusting for other factors. Patients at high-risk for severe COVID-19 who did not receive treatment were 3.15 times (95% CI: 2.16-4.60) more likely than those receiving IV bebtelovimab to utilize acute care. To note, the adjusted model also indicated that retired and unemployed patients were more likely than patients employed full-time to utilize acute care (Retired: OR: 1.26, 95% CI: 1.12-1.41; Unemployed: OR: 1.29, 95% CI: 1.11-1.49), after adjusting for other factors.

Discussion

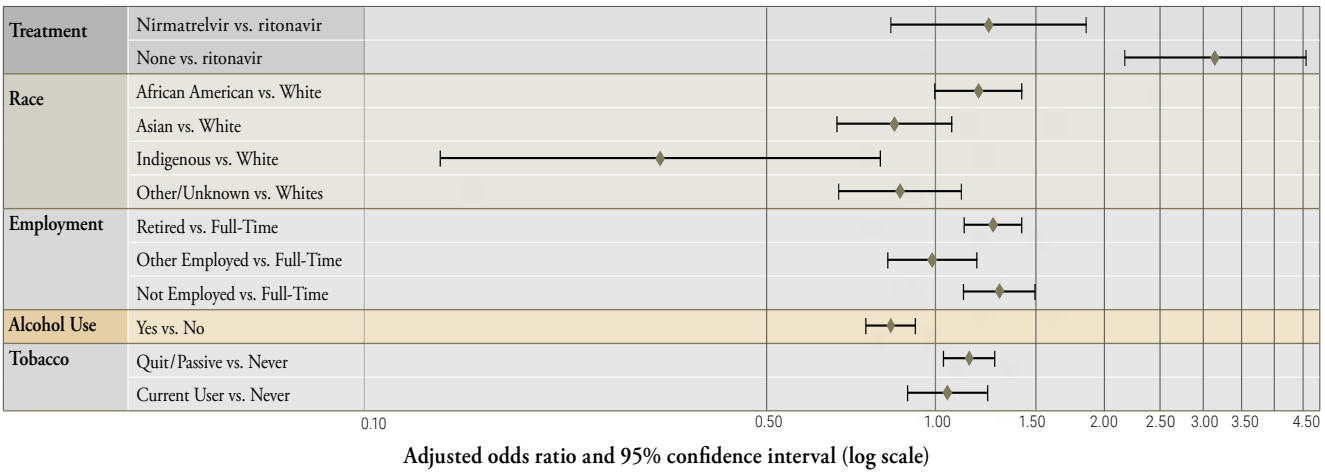
COVID-19 vaccination and treatment efforts throughout the second and third year of the pandemic made a substantial impact on mortality, as there was a 47% decrease in age-adjusted COVID-19 deaths in the U.S. between 2021 and

TABLE 3. | Odds Ratios and Corresponding 95% Confidence Intervals Estimating Acute Care Utilization Within 14-days of COVID-19 Infection

		Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Treatment Group	Bebtelovimab	*reference*	*reference*
	Nirmatrelvir/ritonavir	1.19 (0.81, 1.77)	1.24 (0.83, 1.83)
	None	3.20 (2.20, 4.67)	3.15 (2.16, 4.60)
	65-74 years	2.80 (2.51, 3.13)	1.68 (1.42, 1.97)
	75+ years	1.39 (1.24, 1.56)	0.87 (0.72, 1.05)
Age Group	18-34 years	*reference*	
	35-49 years	0.89 (0.76, 1.04)	
	50-64 years	0.85 (0.73, 0.99)	
	65-74 years	0.91 (0.77, 1.06)	
	75+ years	1.23 (1.06, 1.43)	
Sex	Female	*reference*	
	Male	0.95 (0.87, 1.05)	
Race	White	*reference*	*reference*
	African American / Black	0.35 (0.30, 0.40)	0.54 (0.45, 0.64)
Interpreter Needed	No	*reference*	
	Yes	1.29 (1.02, 1.63)	
Race	White	*reference*	*reference*
	African American / Black	1.37 (1.17, 1.62)	1.19 (1.00, 1.41)
	Asian	0.93 (0.75, 1.16)	0.84 (0.66, 1.07)
	Indigenous	0.51 (0.24, 1.10)	0.32 (0.13, 0.80)
	Other/Unknown	0.90 (0.71, 1.15)	0.86 (0.67, 1.11)
Ethnicity	Non-Hispanic	*reference*	
	Hispanic	1.09 (0.75, 1.58)	
Insurance Type	Commercial	*reference*	
	Medicare	1.29 (1.15, 1.44)	
	Medicaid	1.42 (1.22, 1.65)	
	Other/Unknown	0.94 (0.80, 1.10)	
Marital Status	Married	*reference*	
	Not Married	1.23 (1.12, 1.35)	
Employment Status	Full-time	*reference*	*reference*
	Retired	1.34 (1.20, 1.50)	1.26 (1.12, 1.41)
	Other Employment	1.05 (0.88, 1.25)	0.99 (0.83, 1.18)
	Not Employed	1.56 (1.36, 1.79)	1.29 (1.11, 1.49)
SVI Quartile	0.75-1.0	*reference*	
	0.50-0.74	1.11 (0.99, 1.24)	
	0.25-0.49	0.94 (0.81, 1.09)	
	0-0.24	0.82 (0.52, 1.31)	
BMI	Underweight/Normal	*reference*	
	Overweight	0.89 (0.78, 1.00)	
	Obese	0.87 (0.78, 0.97)	
Alcohol	No	*reference*	*reference*
	Yes	0.73 (0.67, 0.81)	0.83 (0.75, 0.92)

* Model adjusted for all variables shown

FIGURE 2 | Adjusted Odds Ratios With 95% Wald Confidence Limits Estimating Acute Care Utilization Within 14-Days Among Patients With High-risk COVID-19



2022.[8] The safety and efficacy of nirmatrelvir/ritonavir has withstood COVID-19 subvariants and received full FDA approval in May 2023.[27] Despite the federal government providing nirmatrelvir/ritonavir, and other treatments for COVID-19 at no charge to patients throughout the pandemic, access to them is still not equitable. This study found that differences exist in receiving COVID-19 treatment by several sociodemographic factors including interpreter use, race, vaccine status, insurance, marital status, employment status and smoking status. More specifically, patients identifying as Black/African American were 1.8 times less likely than White patients to receive treatment for COVID-19, patients with Medicaid insurance were 1.4 times less likely to be treated for COVID-19 than patients with commercial insurance, and patients who require an interpreter were 1.7 times less likely to receive treatment, even after adjustment for other confounders. Patients who were unvaccinated were also 3.2 times less likely to receive treatment compared to people who were vaccinated and boosted, which could be attributed to opposition or resistance to COVID-19 vaccination and treatments. These factors indicate need for greater outreach, access, and education within specific community groups.

Social determinants play a large role within health equity and outcomes, ultimately contributing to 30-55% of health outcomes.[28] Social determinants of health include financial security, education, employment, food security, housing, community factors like pollution and safety, access to health care, racism, and more. These are directly correlated with the development of chronic health conditions like heart disease and diabetes. While race, itself, is not a social determinant of health, it is associated with individual- and community-level factors that affect health due to the effects of systemic racism.[29]

Overall, minority race populations tend to have higher rates of undiagnosed chronic conditions compared to White populations in the U.S.[30] Undiagnosed and undertreated chronic conditions then put patients at higher risk of developing severe COVID-19 infection. The current study among patients at high-risk for severe COVID-19 infection reveals additional gaps that extend beyond merely chronic conditions. Results show the reduced prescribing of COVID-19 treatments among patients at high-risk for severe COVID-19 infection according to CDC criteria, indicating an additional opportunity for health systems and payers to provide education and resources toward individuals who are less likely to receive treatment due to risk complacency or mistrust in medical science, as well as greater protocolization to decrease implicit bias among providers caring for high-risk COVID-19 patients.[18] These results parallel those presented by Boehmer, et al. who found Black patients and Hispanic patients were less likely to be treated with nirmatrelvir/ritonavir than White and non-Hispanic patients, respectively.[3] The current study found many additional sociodemographic factors beyond race and ethnicity, such as employment and insurance status, that remained unequal even when evaluating a multivariable regression model.

The pandemic has exacerbated racial and ethnic inequalities that affect health outcomes, for example, stable housing, access to health care, wealth, and employment opportunities.[31] These inequities result in downstream disparities. For example, studies have continually found that Black, Hispanic and Asian populations are at a higher risk of COVID-19 infection, hospitalization and death compared to White people.[17,32] Not only is this the case nationally, but globally as well.[33] Given the risk for hospitalization, thromboembolic events, and respiratory effects of COVID-19, the disease has been associated with increased health care burden and cost. This increase in cost and health care utilization has been observed for several months following infection.[34] The association between treatment for COVID-19 and downstream acute care utilization is not unexpected, as others have reported decreased acute care use following nirmatrelvir/ritonavir treatment.[21,35] The current study further noted the importance in accessing treatment for COVID-19 in order to avoid downstream acute care utilization. While socioeconomic indicators were associated with receiving treatment in the first place, the downstream effect was that of higher acute care utilization for patients who did not receive COVID-19 treatment—3.2 times as many patients who were not treated for COVID-19 utilized acute care services in the 14 days following infection compared to patients who received IV bebtelovimab, indicating higher health care costs for these patients.

Transportation is a primary barrier to health care access, which can result in poor disease management through missed or delayed appointments and medication use.[36] In an attempt to lower the barriers to receiving treatment for COVID-19, the health system offered infusions for monoclonal antibodies first in the home setting and then transitioned to an ambulatory "Monoclonal Antibody Treatment Center" in November 2021, which expanded the health system's capacity to provide these infusions by 80%. Home infusion services, however, may fill the gap needed to alleviate physical and financial barriers to receiving treatments even beyond COVID-19, and thus may create more equitable health outcomes downstream in the case of acute illnesses; home infusion services would likely have a great effect across the spectrum for chronic disease care where the frequency is great and inequities are prevalent.[30] However, despite reducing barriers in access to care, home infusion services are still limited through Centers for Medicare & Medicaid Services' coverage, thus imposing additional barriers to equitable care solutions.[37,38]

This was a retrospective review of electronic medical records and thus suffers the limitations commonly found within studies of this type, for example the potential for misreporting of medical information through data entry errors, or inconsistencies across medical data sources. The study did have a robust sample size, and, within the health system, efforts are made to collect patient-reported demographics annually to combat misreporting of essential patient information. Further, if patients were to present to other hospital systems for acute care utilization in the short-term after COVID-19 infection, the data is not accessible; thus, acute care utilization is likely an underreport. Additionally, other medications like oral antiviral molnupiravir and intravenous remdesivir were excluded from analysis due to limited prescribing practices within the health system. Further, it should be noted that bebtelovimab is no longer authorized for emergency use in the U.S.[39] Moreover, this study does not account for patients who tested for COVID-19 at home, may have qualified for treatment, but did not ultimately reach out to seek treatment, indicating a certain underreport in patients who qualified for treatment but did not receive it. Investigating these patients and their health care utilization and treatment opportunities, especially in the height of the Omicron waves of the COVID-19 pandemic, would be an interesting next step to better understand how access and availability of care may have affected downstream acute care needs.

Conclusions

Differences in receiving COVID-19 treatment exist by age, interpreter use, insurance type, race, and other sociodemographic factors. Further, pharmacologic treatment for COVID-19 significantly reduces the need for acute care visits in the 14 days following infection. Taken together, upstream inequities in receiving treatment for COVID-19 may contribute to downstream acute care utilization disparities; high-risk COVID-19 patients left untreated indicate more than 3 times the odds of utilizing acute care services in the weeks following initial infection compared to patients who received bebtelovimab.

Sociodemographic factors associated with COVID-19 treatment and health care utilization may be proxies for lower socioeconomic status or health literacy that create barriers in access to or trust in medical care.[29] To alleviate this gap, home infusion services may be able to aid patient populations in receiving timely and appropriate medical care for conditions even beyond COVID-19, and thus may create more equitable health outcomes downstream.

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OUTSTANDING ABSTRACT ACHIEVEMENT AWARD FINALISTS

Innovative Multidisciplinary Management of Home Parenteral Nutrition Patients

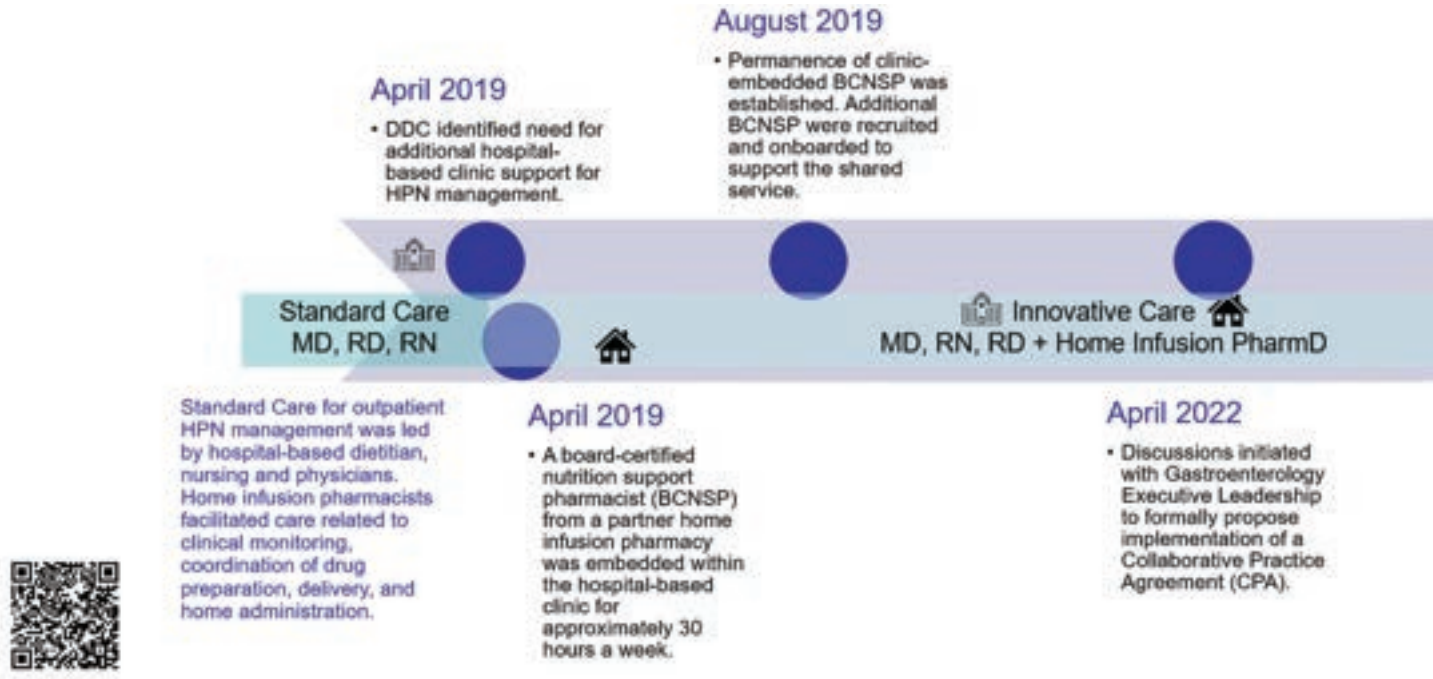
BACKGROUND

- The need for experienced nutrition teams throughout transtions of care from acute to post-discharge settings is critical to optimizing home parenteral nutrition (HPN).
- Nutrition support pharmacist roles commonly described in the literature are representative of hospital or institution-based settings.
- An innovative shared service was developed between clinical pharmacy specialists from a health-system based home infusion and specialty pharmacy and a hospital-based Digestive Disorder Center (DDC) to manage adult HPN patients.
- This partnership introduced a unique clinic-embedded role for home infusion pharmacists.

PURPOSE

This quality improvement project describes the transition of an innovative shared clinical service to an outpatient Collaborative Practice Agreement (CPA) for HPN patients.

METHODS



CarepathRx Pharmacy Services and Chartwell Pennsylvania, LP Home Infusion and Specialty Pharmacy

Johanna Bezjak, PharmD, BCNSP, Stephanie Pancheri, RPh, Kayla Szabo, PharmD, BCNSP, Rebecca Tokarski, PharmD, BCNSP, David Benedict, PharmD, BCPS

RESULTS

- The transition from Standard Care to Innovative Care highlighted the skillsets a pharmacist brings to a nutrition team. Both provider and pharmacy teams were receptive to establishing a Collaborative Practice Agreement based on demonstrated success of this model.
- A CPA document was drafted by the pharmacy team in accordance with State Board of Pharmacy Code and Regulations.
- Legal and administrative staff from both organizations reviewed and vetted the contact. A final draft was shared with all stakeholders.
- A meeting between the providers and pharmacists was conducted to review and approve the final version. Subsequently all parties accepted and signed the CPA, effective September 1, 2022.

DISCUSSION

- The role of home infusion pharmacists was expanded to support writing of HPN formula, clinical interventions, and outpatient care management.
- Subspecialized care needs combined with physician champions can create opportunities to expand clinical pharmacy programs, notably in home-based settings.
- Pharmacists represented in this collaborative practice agreement have background in traditional infusion pharmacy, PGY1 residency training, and achieved BPS nutrition support certification. This holistic experience bridges knowledge gaps in the complexity of this patient population and transitions of care.

CONCLUSION

- A longitudinal partnership between a tertiary care, academic digestive disorder center and health-system based home infusion pharmacy led to the development of a pharmacist-led collaborative practice agreement. Further research is needed to evaluate the impact of this innovative model on patient outcomes.

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DISCLOSURES

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation: Johanna Bezjak: nothing to disclose; Stephanie Pancheri: nothing to disclose; Kayla Szabo: nothing to disclose; Rebecca Tokarski: nothing to disclose; David Benedict: nothing to disclose.

Development of Productivity Standards for Ambulatory Infusion Suite Nurses within a Multi-Entity Health System

Introduction

Current state: Infusion sites use **chair capacity** as a metric to gauge the productivity of their operations.

- Direct reflection of physical chair utilization
- Based on inputs of total time patients occupy chairs and total time the chair is available
- Simple to calculate: *Hours of operation × Chair count*

Information gap: Chair capacity is a continent metric but its ability to provide insight is limited.

- Need for metrics that can track productivity and staffing needs with an **actionable level of detail**
- These metrics should reflect the tasks which infusion nurses spend their time on each day.
- Minimal literature describes specific methods to obtain more accurate **clinician-focused capacity.**

Purpose

(1) Identify a **standardized set of tasks** that account for clinician-focused capacity.

(2) Create an **operational tool** that ambulatory infusion suites (AIS) can use to inform productivity and business standards.

Methods

Two time studies were conducted across 3 AIS locations within our organization:

(1) **In-person time study:** 7 infusion nurses' workflow was observed over approx. 52 hours, logging time spent on actions in clinical and non-clinical care. Observations were aggregated into distinct tasks.

(2) **Electronic time study:** Epic EHR appointment reports over 1 month (n=408) were analyzed. Appointment length, patient check-in time, and discharge time were grouped by 34 different infusion therapies.

Results were used to develop and validate metrics for an **infusion nurse productivity scorecard.**

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Part I: In-Person Time Study

50 distinct tasks were identified, grouped, and measured. Times given in parentheses are averages for an 8.5 hour.

Direct Patient Care (81.6 min)

1. Take vitals (15.3 min)
2. Conduct pre-infusion assessments (10.2 min)
3. Insert IV or access port (25.5 min)
4. Draw labs (5.1 min)
5. Check in on patient (15.3 min)
6. Patient med reaction (0.0 min)
7. Patient observation/monitoring (5.1 min)
8. De-access IV (5.1 min)
9. Patient teaching/education/AVS (5.1 min)

Meds (56.1 min)

1. Prep premeds (5.1 min)
2. Administer premeds (5.1 min)
3. Prep infusion (25.5 min)
4. Administer infusion (10.2 min)
5. Prep hydration (5.1 min)
6. Administer hydration (5.1 min)
7. Prep injection (0.0 min)
8. Administer injection (0.0 min)

Operations (81.6 min)

1. Opening (20.4 min)
2. Patient admission (10.2 min)
3. Clean patient area (15.3 min)
4. Restock supplies (5.1 min)
5. Organize meds/supplies delivery (15.3 min)
6. Order supplies (0.0 min)
7. Closing (5.1 min)
8. Drop off tubes at lab (5.1 min)

- Nurses spent the most time on chart checks and scheduling.

Part II: Electronic Time Study

Analysis of patient appointments in the EHR informed proposals to shorten, extend, or make no change to appointment lengths for

Therapy	Appointment Lengths (min)
Natalizumab	90, 120, 150, 180
Ocrelizumab	150, 360, 480
Patisiran	210, 240
Rituximab	480
Zoledronic acid	90

Five therapies given as examples. Full therapy list can be provided upon request.

Jennifer Zhao, PharmD Candidate
Brian Sherman, RN
Ashley McCracken, PharmD, MBA
Stephanie Watkins, RN
Kristopher Rusinko, PharmD, PhD, MBA, MEd,MS

Johns Hopkins Home Care Group, Baltimore, MD, USA

Documentation (86.7 min)

1. Document vitals (20.4 min)
2. Document pre-infusion assessments (5.1 min)
3. Complete labs paperwork (5.1 min)
4. Update MAR (15.3 min)
5. Write patient note (25.5 min)
6. Document IV assessment (10.2 min)
7. Fill out patient wrap-up (5.1 min)
8. Document ADR (0.0 min)
9. Update REMS program (0.0 min)

Communications (76.5 min)

1. Talk with another nurse (25.5 min)
2. Talk with doctor (5.1 min)
3. Talk with pharmacy (0.0 min)
4. Talk with supervisor (5.1 min)
5. Talk with another team member (20.4 min)
6. Check email (10.2 min)
7. Answer phone call (5.1 min)

Indirect Patient Care (96.9 min)

1. Release orders (5.1 min)
2. Call patient (5.1 min)
3. Scheduling (35.7 min)
4. Review patient chart (40.8 min)
5. Patient troubleshooting (5.1 min)

Other (35.7 min)

1. Take lunch (10.2 min)
2. Take break (15.3 min)
3. Use bathroom (5.1 min)
4. Attend meeting (0.0 min)

- Similar time was spent on Communications (76.5 min), Direct Patient Care (81.6 min), Documentation (86.7 min), and Indirect Patient Care (96.9 min) groups.

different therapies (appointment lengths and proposed lengths include 30-minute buffer time in EHR).

Averaged Actual Length (min)	Proposed Length (min)
134	150 (180 with premeds)
368	390
199	210
291	300 *[decrease length]*
112	150 *[increase length]*

Part III: Proposed Productivity Scorecard

- Non-therapy tasks from the in-person time study were selected and synthesized into a list of auxiliary tasks in discussion with nurses.
- For therapy tasks, 1 point was awarded per hour. For auxiliary tasks, points were awarded based on magnitude of impact on AIS operations and patient care.
- Retrospective grading of in-person time studies in consultation with the AIS sites determined 15 points was the threshold to be considered "productive."

Therapy	Proposed Scheduling Length (min)	Points (per appt)
Natalizumab	150	2.5
Ocrelizumab	390	5
...	...	...
Auxiliary Tasks	**Description**	**Points**
Labs + paperwork	Drawing labs & completing paperwork	0.25 (per pt)
Labs drop off	Delivering lab samples to internal and/or external lab	0.25 (per run)
Mix med	Reconstitute & dilute medication for infusion/injection	0.5 (per pt)
Organize delivery	Receiving & organizing medications for patient	0.5 (per day)
Scheduling	Scheduling patient appointments & emailing intake	0.25 (per pt)
Call patient (e.g., conduct COVID-19 screen)	Calling patient to confirm appt & screening for COVID-19	0.5 (per day)
Chart checks (e.g., assess appts 1-2 weeks out)	Reviewing patient chart for future orders and labs	0.5 (per day)
Patient teaching/ education	Counsel patient on treatment/line care	0.5 (per pt)
Help another nurse's patient	Help nurse to e.g., insert IV, take vitals for another patient	0.25 (per pt)
Patient med reaction + documentation	Stop infusion & administer rescue meds/ interventions	1 (per pt)
Patient troubleshooting	E.g., patient shows up but not on schedule	1 (per pt)
TOTAL SCORE (GOAL 15 POINTS)		

Conclusion

(1) Time studies highlighted trends and potential areas of improvement in AIS nurse workflow, scheduling, and resources.

(2) Creation of operational scorecard will allow AIS management to better evaluate productivity during business performance reviews.

Next Steps

(1) Adoption across all AIS sites within our organization. Operational differences at non-studied AIS sites may warrant further tuning prior to universal adoption.

(2) Further research is needed to identify comprehensive productivity metrics for other AIS personnel (e.g., pharmacists, medical assistants).

All authors report no disclosures.

Home Parenteral Nutrition Workshop Take Off: A Pilot Program for Patient Support

Background

A national home infusion company piloted a virtual home parenteral nutrition (HPN) workshop program after a potential gap in health care was observed by clinicians surrounding support for long term HPN patients and caregivers. Support is an important aspect of HPN patients' overall care, quality of life (QoL), mental and emotional health. Studies show enhancing support for long term therapies, such as HPN, improves patient outcomes and compliance. The workshops created an inclusive environment to share concerns and questions regarding HPN therapy.

Purpose

The purpose of this abstract is to evaluate the effectiveness of a HPN workshop pilot program.

Table 1. Demographics

Characteristics	Value
Aggregate attendees	47
Unique attendees	32
Male % (No.)	22% (7)
Female % (No.)	75% (24)
Relationship % (No.)	
Patient	66% (21)
Caregiver	31% (10)
Anonymous	3% (1)
Patient age, mean years	49 ± 19
Length or time patient on HPN, % (No.)	
<1 year	6% (2)
1-3 years	47% (15)
>3-5 years	16% (5)
>5 years	28% (9)
Anonymous	3% (1)
Primary diagnosis related to HPN, % (No.)	
Gastroparesis	41% (13)
Short Bowel syndrome	28% (9)
Other	16% (5)
Cancer	9% (3)
Inflammatory bowel disease	3% (1)
Anonymous	3% (1)

Disclosures
All authors are employees of Optum Infusion Pharmacy.

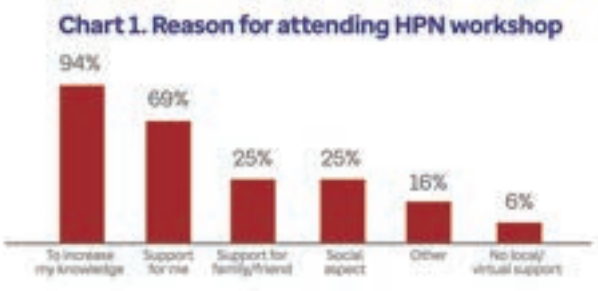
Methods

A preliminary survey was sent to HPN patients identifying workshop topics of interest. The workshops were held 6 times during February – September 2022 on a monthly schedule to promote attendance. All active adult and pediatric HPN patients and caregivers who provided an email were sent a workshop invitation. Facilitators for the 1-hour workshops included nurses, dietitians, and HPN peer advocates. Post-workshop, an 11-question evaluation was emailed to all attendees.

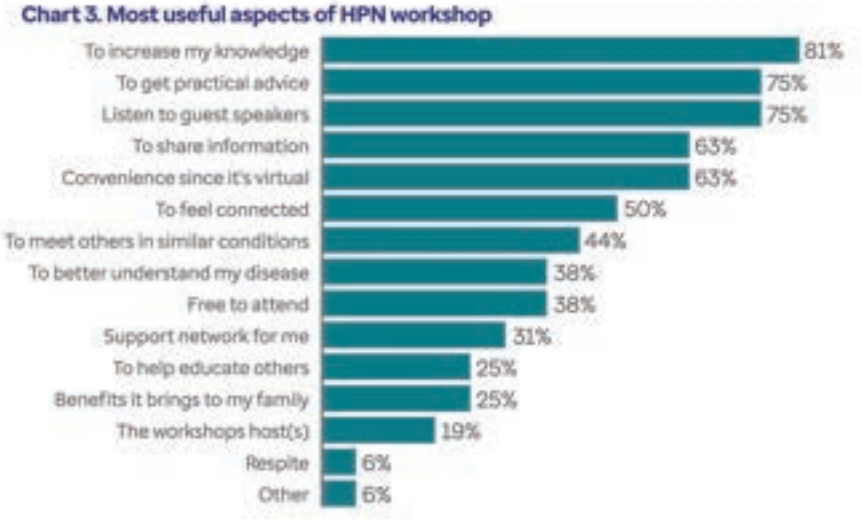
Results

Workshop attendees included 66% patients, 31% caregivers, 3% anonymous; with 75% being female (Table 1). On average 41% of registrants attended each month. The most common diagnosis was gastroparesis (41%), followed by short bowel syndrome (28%). Most patients had been on HPN 1-3 years (47%).

Post-workshop evaluations were completed by 34% of attendees. Results showed 66% attended 1 workshop, 31% attended 2-3 times and 3% unknown due to anonymous option. Most respondents reported attending the workshops to increase their knowledge (94%) and find support for themselves (69%) (Chart 1). Prior to attending the workshops, respondents



reported receiving support from their medical team, social media, nutrition support organizations, and online searches. Participants felt attending the workshop had a positive effect on several aspects of their QoL (Chart 2). Respondents reported the most useful aspects of the workshops were to increase their knowledge, get practical advice, and listen to guest speakers (Chart 3). In addition, 63% rated the overall experience of the workshop very good and 69% rated the content of the discussions very good (scale very poor to very good).



Discussion

Post-evaluation results reveal attendees felt the HPN workshops improved their knowledge and QoL. Since topics included reinforcement of HPN care standards of practice, workshops could potentially help patients maintain complication free therapy, improve compliance, and understanding regarding HPN.

Conclusions

Barriers identified during this pilot program include comfort level with the virtual platform, registrants unable to attend last minute, time of workshop, and combining pediatrics and adults. Participants commented they would like more time to exchange information and talk after the presentation. Registrants who were unable to attend expressed interest in the workshops being recorded. Despite barriers, the positive experience of attendees suggests the pilot program was successful and fills a gap for additional support for long term HPN patients and caregivers.

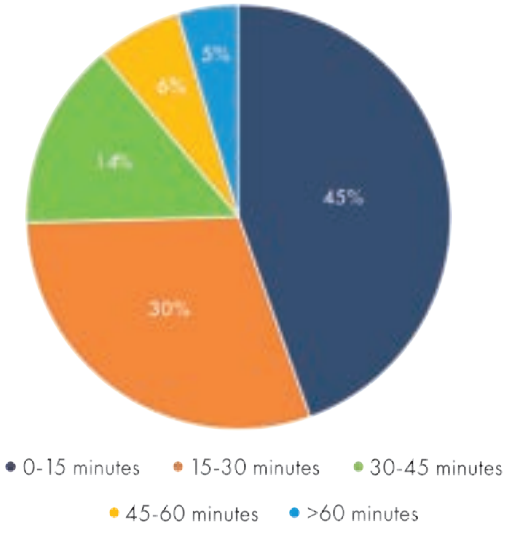
Time Utilization Study for Clinical Interventions Performed by a Complex Specialty Pharmacy

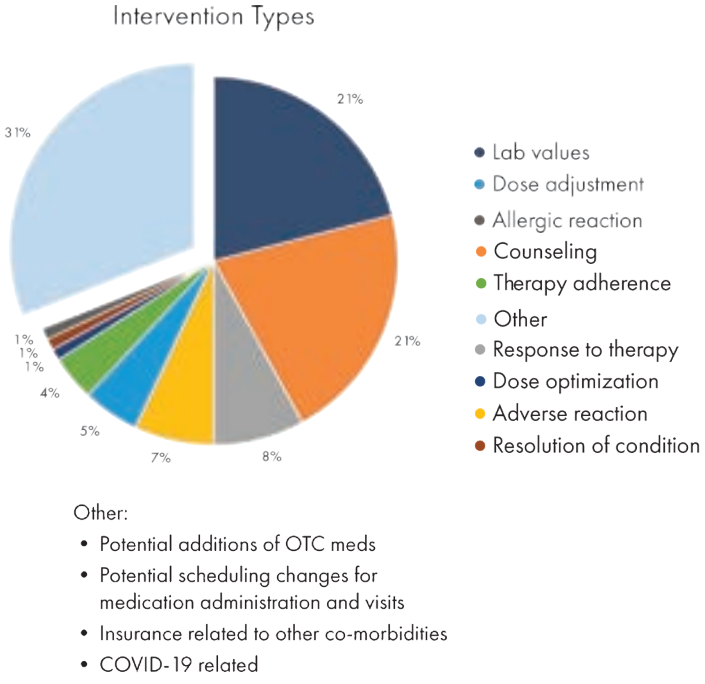
Background

Clinicians providing complex specialty infusion services (e.g. pharmacists, nurses, dietitians) perform many tasks throughout their day related to dispensing, compounding, drug administration, and overall patient care. Within this organization, activities performed outside of the customary dispensing and administration processes are documented as clinical interventions. Through continuous patient assessment, clinicians can intervene in the patient's care plan to avoid care disruptions or complications. Interventions to recommend therapy modifications, mitigate side effects, promote adherence, decrease waste by educating on storage, and address insurance concerns all help to keep patients on therapy. Capturing the time it takes to perform these types of interventions delivers objective measurements to demonstrate the value specialty infusion clinicians provide to the overall healthcare system. The purpose of this study is to identify trends in the time it takes to perform an intervention along with the reasons and therapy types associated with the interventions for patients receiving infusion therapy in the alternative care setting.

Methods

A modification to this organization's clinical intervention assessment to include a time measurement was implemented on October 1, 2022. The time it takes to perform an intervention is documented in 15-minute increments ranging from 0-15 minutes to >60 minutes. The reason for the intervention is selected from standardized options within the assessment. Multiple options may be selected for one intervention event. A comprehensive analysis of clinical interventions documented between October 1, 2022 – December 31, 2022, was performed using the proprietary clinical outcomes program SoleMetrics®.





Other:

- Potential additions of OTC meds
- Potential scheduling changes for medication administration and visits
- Insurance related to other co-morbidities
- COVID-19 related

Authors of this presentation disclose the following concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation: Nothing to disclose.

Authors: Christine Miller, PharmD; Timothy Walton, MHS, CCRP; Barbara Prosser, RPh; Donald Filibeck, PharmD, BCSCP; Tracie Anderson, RN, BSN, CRNI, IgCN – Soleo Health

Results

A total of 9,626 patients received at least one dispense during Q4 2022. During this same time period, 783 patients had 1,269 clinical interventions documented. Most interventions took 0-15 minutes to complete (45%). The majority of the interventions that took 30 minutes or longer to perform were related to parenteral nutrition (64%). Nursing visits were prevented in 367 (29%) interventions, reasons including pump troubleshooting, dosing adjustment counseling, and flushing protocol review. Based on current estimates of nursing visit costs to payors, this represents a potential $44,000 in savings for Q4 2022.

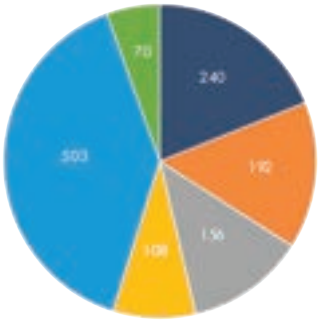
Discussion

After this first in-depth analysis of time utilization related to interventions, the next steps include a gap analysis to further investigate the intervention reasons marked as 'Other' to identify trends, if any, and modify the company's intervention assessment accordingly to include more options, further standardizing the responses and enhancing analytics capabilities. The organization's policy on clinical interventions will be reassessed and modified based on the gap analysis, and staff re-education will be performed.

Conclusion

Time utilization studies evaluating intervention activities objectively demonstrate the value specialty infusion clinicians provide to the overall healthcare system and to help forecast staffing models. Additional staff may be needed for patients receiving therapies that require lengthier or more frequent interventions, such as parenteral nutrition. Intervention analyses like this study can be replicated across the specialty infusion industry and used to develop care planning, practice guidelines, and training documentation. Continued studies will be utilized to further standardize responses and identify trends.

Number of Interventions by Therapy Type



Other Category	Number of Interventions
Related to Medication Not Dispensed by SP	11
Chemotherapy	10
C-GSF	10
Inotrope	9
Steroids	9
Edaravone IV	8
Ancillary Injectables	5
Iron	5
Factor	3

● Anti-infective ● Biologic therapies (mAbs,etc. ● IVIg ● SCIg ● Nutrition ● Other

Intervention Time by Therapy Types

Therapy Type	0-15 minutes	15-30 minutes	30-45 minutes	45-60 minutes	> 60 minutes	Grand Total
Ancillary Injectables	3	0	2	0	0	5
Anti-infective	170	40	18	5	7	240
Biologic therapies (mAbs, etc.)	96	63	19	8	6	192
C-GSF	10	0	0	0	0	10
Chemotherapy	8	1	1	0	0	10
Edaravone IV	8	0	0	0	0	8
Factor	0	3	0	0	0	3
Inotrope	7	2	0	0	0	9
Iron	4	1	0	0	0	5
IVIg	83	41	13	9	10	156
Nutrition	97	197	120	56	33	503
Related to Medication Not Dispensed by SP	10	1	0	0	0	11
SCIg	62	31	9	4	2	108
Steroids	7	1	0	0	1	9
Grand Total	560	381	182	83	63	1269

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2023 POSTER ABSTRACTS*

Home Initiated Parenteral Nutrition Is a Safe and Cost-Effective Approach to Nutrition Support

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Background: Home initiation of parenteral nutrition (PN) has been a successful practice for over 20 years. Request for home start PN has increased to prevent hospital readmissions, reduce costs and decrease the risk of hospital-acquired infection. Some health care teams are not comfortable initiating PN in the home setting. The principal concern is related to patient safety and the risk of refeeding syndrome.

Unique Study Tools for Quality Improvement (QI) Research in Home Parenteral Nutrition (HPN)

Rebecca Brown, *RDN, CNSC*
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Metabolic Medicine Consultants

Background: The Amerita QI project for HPN (QIP-PN) successfully completed a 3-phase, 29-month analysis of HPN care which utilized 3 unique study tools to measure quality of life (QOL) multimorbidity (MM) and qualitative assessment of benefit (QAB). These tools were needed to resolve specific problems we encountered in our QI research efforts.

How Collaboration with a University Institution and a Home Infusion Pharmacy Provided Positive Clinical Outcomes to Support Site of Care Home Infusion Initiatives for Infusion Therapy Services

Ashley Banks, DNP, RN
Amerita Specialty Infusion Services

Lou Anne Epperson, MSN, RN, *IgCN*
Amerita Specialty Infusion Services

Background: Patients who have received institution-based infusions need an alternative care setting during the SARS-COV-2 pandemic. Ocrelizumab has been delivered to patients at home; this study was important to reinforce the safety and positive outcomes for patients receiving this therapy using a shorter infusion protocol as a safer alternative to an outpatient treatment facility.

Achievement of Therapeutic Trough Levels of Total IgG and Analysis of the Four IgG Subclasses in Adult and Pediatric Patients With Primary Immunodeficiency Receiving a 5% or 10% IVIG Product

Kim Clark, PharmD, MBA, IgCP®
Bio Products Laboratory

Eric Wolford, PharmD
Bio Products Laboratory

Miranda Norton, PhD
Bio Products Laboratory

Background: Patients with primary immunodeficiency (PI) are at a significantly increased risk of infection due to low IgG levels. Intravenous immunoglobulin (IVIG) therapy is a mainstay of PI treatments, and trough total IgG concentrations of at least 500 mg/dL have been identified as protective for a variety of serious infections. In addition, four IgG subtypes are present in human serum, each playing an important role in defending the body from pathogenic microorganisms.

* This listing does not include the poster selected as the NHIF Outstanding Abstract Achievement Award (see page 3) or the posters that were presented as finalists for the award (see pages 16-23).

Successful Transition from Subcutaneous Immune Globulin Therapy to Intravenous Immune Globulin Therapy in Two Patients With Primary Immunodeficiency

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Advanced Infusion Care
Erin Mullis, RN, IgCN®
Advanced Infusion Care
Kim Clark, PharmD, MBA, IgCP®
Bio Products Laboratory
Amy Mulgrew, RN, CRNI, IgCN®
VA-BC Advanced Infusion Care

Background: For patients with primary immunodeficiency (PI), immune globulin (Ig) is a life-saving therapy. Intravenous immune globulin (IVIG) and subcutaneous immune globulin (SCIG) are both clinically proven effective treatments for PI and offer distinct advantages and disadvantages per route of administration. Regardless of route, Ig therapy must be individualized to meet individuals' needs with consideration for patient preference.

Safety and Efficacy Outcomes for Pharmacist-Directed Vancomycin Dosing in a Home Infusion Setting

Claire Meredith, PharmD
CarePathRx
Megan Zielke, PharmD, BCCCP
CarePathRx
Leita Frey, PharmD, BCPS
CarePathRx
Shelby Schott, PharmD
CarePathRx

Background: Pharmacokinetic vancomycin protocols are widely utilized in inpatient health care settings. Currently, there is not robust data guiding vancomycin protocols in the home infusion setting. A review of this institution's pharmacokinetic dosing practices identified inconsistencies in its internal management of patients requiring vancomycin therapy. Internal dosing inconsistencies are likely due to lacking an institutional protocol.

Insights from Home TPN Infusion Data

Moran H. Ithaki, MD, *Rabin Medical Center*
Neta Tamam, N.R., *Rabin Medical Center*
Anna Lester, MSc, BSc, MRCPOD, *Eitan Medical*
Talia Harouche, BSc, *Eitan Medical*
Ilya Kagan, MD, *Rabin Medical Center*
Pierre Singer, MD, *Rabin Medical Center*

Background: Home infusion of Parenteral Nutrition (HPN) is increasingly prevalent in patients with chronic intestinal failure. They are trained to self-infuse at home, using smart infusion pumps enabling independence, while maintaining an optimal nutritional status. HPN is improving quality of life and nutritional outcomes in many clinical conditions and can increase weight in cancer patients. With clinical resources often remote, patients are at risk of non-compliance. Follow ups for HPN infusion treatment plans can be infrequent with assessments of effectiveness based on lab results and subjective patient reports. Objective delivery data from Infusion Pump reports have the potential to support lab results and subjective patient reports both remotely and at follow ups, supporting treatment progress monitoring and medication planning.

A Comparison of Clinical Outcomes Following Infliximab Infusion Between Home Infusion and Hospital-Based Infusion Center Sites of Care in Patients with Inflammatory Bowel Disease

Jacob Richie, PharmD, *Fairview Pharmacy Services*
Alicia Zagel, PhD, MPH, *Fairview Pharmacy Services*
Eric Betzold, MS, *Fairview Pharmacy Services*
Sofia Shrestha, PharmD, *Fairview Pharmacy Services*
Alicia Ranasinghe, PharmD, IgCP
Fairview Pharmacy Services
Susan Chhen, PharmD, *Fairview Pharmacy Services*
Brett Benfield, PharmD, MS, FNHIA
Fairview Pharmacy Services

Background: Inflammatory bowel disease (IBD) is a group of chronic, relapsing autoimmune diseases characterized by inflammation and destruction of the GI tract. About 1.6 million individuals are affected by IBD in the United States, and complications can be severe. Infliximab, a TNFα-inhibiting monoclonal antibody is a mainstay of treatment for IBD and is delivered via IV infusion. Infliximab is often considered a specialty medication, and associated warnings include infusion-related reaction and infection. When a patient is on infliximab, one must consider the site of care (SOC), or the physical location the infusion is administered (infusion center, hospital, patient's home, etc.). Choosing a SOC can depend on many factors including patient's disease severity, allergies, accessibility, or payer restrictions.

Cefazolin-Induced Neutropenia Development: Preliminary Results from the BLIND-OHIO Trial

Nick Panchak, PharmD, *M Health Fairview*
Jessica Das, PharmD, BCPS, *M Health Fairview*
Jennifer Ross, PharmD, BCIDP, *M Health Fairview*
Ryan McFarland, PharmD Candidate
M Health Fairview

Background: Beta-lactam-induced neutropenia (BLIN) is a serious adverse and enigmatic reaction seen with beta-lactam antibiotics. The underlying mechanism is complex and varied, ranging from immune-mediated hypersensitivity, to direct toxic effects, to suppression of metalloprotein-mediated humoral immunity. Proposed risk factors include high dose and long duration of beta-lactam treatments (>10 days). One recent study showed a possible correlation between BLIN and faster administration rates in patients receiving cefazolin. This study compares the incidence of neutropenia between IV push and intermittent infusion in patients receiving cefazolin in the home infusion setting.

Safety Outcomes in Patients Receiving Oncology Infusions via Home Infusion and Hospital-based Outpatient Infusion Centers

Marrea Peters, PharmD
Fairview Pharmacy Services
Alicia Zagel, PhD, MPH
Fairview Pharmacy Services
Eric Betzold, MS
Fairview Pharmacy Services

Background: Site of care (SOC) optimization is appealing to third-party payers because it improves access to therapy, patient satisfaction and allows patients to transition from higher-cost to lower-cost settings, without compromising quality of care. Payment for infusion services differ significantly between SOC options. Hospital outpatient costs are reflective of higher reimbursement rates, rather than intensity of therapy, complexity of patient or quality of care. They found that administration of specialty drugs in physician offices or home settings can improve care and save between 33 to 52% of cost. Oncology patients receiving home-based therapies have high satisfaction rates and report improved physical and mental well-being, without an increased risk of adverse drug reactions.

Usability Study for a Novel Intravenous and Subcutaneous Syringe Infusion System

Melody Bullock, MS, BSN, RN, BS, CRNI, IgCN
Innovative Health Sciences
Mark Baker, MD
James Astero, RN
Riad Gani

Background: While intravenous and subcutaneous routes of medication therapy have primarily been used for the infusion of medications in the hospital and clinic, they are also used in the home where patients perform their own infusion, or the infusion is performed by a caregiver/home care nurse. Home health care is on the rise; according to the Centers for Medicaid and Medicare Services, home infusion therapy visits increased from 20,520 to 24,469 in 2020. Common medications given in the home setting include intravenous antibiotics and subcutaneous immunoglobulin. Adults and pediatric patients without systemic symptoms are frequently treated for diseases such as bone and joint infections, staphylococcal bacteremia, endocarditis, lung infections, soft tissue infections, neurologic disorders, cancer, and immunodeficiency diseases. The company performed a pre-market usability study to gauge user experiences with a novel infusion system for intravenous and subcutaneous use. User feedback on infusion effectiveness, efficiency, controllability, customizability, and consistency provides invaluable data, which is used to assess the ease of use, safety, and identify additional user needs.

Retrospective Study of Safety and Efficacy of Milrinone in Home-Infusion Setting

Nayeon Kim, PharmD
KabaFusion

Background: Milrinone is a phosphodiesterase III inhibitor that is used in patients with acute or chronic heart failures and pulmonary hypertension. It is often used in cardiac surgeries requiring cardiac support such as CABG surgery and cardiac transplantation. Its approved indications include acute decompensated heart failure with reduced ejection fraction in need of inotropic support. The use of milrinone in the outpatient setting is generally limited to patients with severe symptoms of congestive heart failure refractory to optimal medical therapy. In the myocardium, PDE III inhibition leads to increased contractility and improved relaxation which improves systolic and diastolic function, optimizing cardiac output. In the vasculature, PDE III inhibition prevents cGMP metabolism in the smooth musculature and results in vasodilation in both arteries and veins.

Retrospective Analysis of Adherence and Compliance with Registered Dietitian Oversight in Enterally Fed, Home Infusion Patients Receiving Pea-Protein Plant-Based Formula Versus Milk-Based Formulas

Lauren Murphy, RD, CNSC, LDN, *KabaFusion*
Kara Kelly, M.Ed, RD, CNSC, *KabaFusion*
Jamie Nounna, MSML
John Vlahopoulos, PharmD, MBA
KabaFusion
Erika Ryan, DCN, RD, CDN, *Kate Farms*
Vanessa Millovich, DCN, MS, RD, CNSC, *Kate Farms*

Background: There are several factors that impact adherence to home enteral nutrition (HEN), including formula tolerance. Registered Dietitian (RD) guidance has helped identify and address feeding intolerances and offer interventions to improve patient adherence and delivery of nutrition. Barriers include clinician-to patient communication via telephone and other limitations, such as voluntary, subjective reporting.

Rapid Implementation of Outpatient Treatment of Coronavirus Disease 2019 (COVID-19)

Lead Author(s) Julia K. Nguyen, PharmD
Kaiser Permanente
Rulin C. Hechter, MD, PhD, *Kaiser Permanente*
Deborah S. Ling Grant, PhD, *Kaiser Permanente*
Cecilia Portugal, MPH, *Kaiser Permanente*
Jia-xiao Shi, PhD, *Kaiser Permanente*
William Towner, MD, *Kaiser Permanente*

Background: Highly effective vaccines have reduced mortality related to SARSCoV-2, however treatment remains important for high-risk populations. The Federal Drug Administration (FDA) approved remdesivir for treatment of COVID-19 in adult and pediatric patients who require hospitalization or non-hospitalized patients with mild to moderate COVID-19 at high risk for progression to severe COVID-19, including hospitalization or death. Shortages of hospital resources due to repeated surges of COVID-19 cases led a large health system in Southern California to implement outpatient "pop-up" tents and home infusion of remdesivir via the traditional home health model or advanced medical care at home model. Limited research has been conducted on facilitators and barriers to rapid initiatives for delivery of outpatient care.

Determining Safety for Rituximab Infusions in the Home and Pharmacy Infusion Suite

Stacie Acquistapace, CPhT
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Kristie Griggs, MSN, RN, CNSC
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Background: The ability to receive care in the outpatient setting has long been established as more convenient and cost effective for the patient. Home infusion therapy is no exception and never more imperative than during the COVID-19 pandemic. In addition to convenience and cost savings, limiting the patient's exposure to COVID-19 was crucial. Administering therapy in the outpatient setting during the pandemic also helped to alleviate strain on hospital systems by freeing up valuable bed space and preserving personal protective equipment (PPE). During the COVID-19 pandemic this organization received an increased number of referrals for rituximab therapy, including first doses, to be administered in the home or pharmacy ambulatory infusion suite (AIS). Concerns regarding the severity of acute drug reactions (ADRs) associated with the initial doses of rituximab have historically limited its administration to a more controlled site of care until patient tolerance was established. This project seeks to establish that patients can safely receive rituximab, including first doses, in the home or pharmacy AIS by demonstrating a low incidence of ADRs in these environments during a two-year period following the emergence of Covid -19.

A Home Infusion Therapy Company's Implementation of a Collaborative Practice Agreement to Expedite Home Parenteral Nutrition Recommendations

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Background: Initiating HPN therapy recommendations under current Arizona pharmacy board regulations is time consuming for the HIT pharmacist; often resulting in delay of care for the patient, abnormal lab values, unmet nutrient requirements, need for intravenous (IV) electrolyte or fluid replacement and hospitalization. A CPA can bridge the communication gap between physician and HIT pharmacist to expedite HPN order changes. The CPA contract outlines terms for pharmacist management of a patient's HPN on behalf of the physician with the goal to provide timely, collaborative, and optimal patient care.

Enhanced HPN RN Training Improves Interdisciplinary Team Communication

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Background: Nursing has played a critical role in nutrition support care since the first patients went home on PN in the early 1970s. Today it is estimated that more than 350,000 hospital stays include parenteral nutrition (PN) with tens of thousands of patients receiving HPN annually. Many nursing related errors associated with PN have been reported over the years with sentinel events being worst-case scenario. Over the last 50 years there have been advances in equipment, sterile technique, compounding practices, PN products, PN education and ongoing emphasis regarding the importance of interdisciplinary teams to manage PN patients. Registered Dietitians (RDs) in home infusion are essential to improved care and outcomes and they often lead education, cross training and mentoring of other disciplines. The objective of this pilot is to evaluate improvement in communication between nursing and nutrition after implementation of a monthly HPN in-service series for nursing.

Home Parenteral Nutrition and the Eating Disorder Patient: Challenges, Expectations and Realities of Therapy

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Background: Patients diagnosed with eating disorders (EDs) have been referred for home parenteral nutrition (HPN) therapy, which can cause a dilemma for the home infusion team particularly when there is no intestinal failure or contraindication to oral diet/enteral nutrition (EN). The experienced infusion RD has a high skill level in HPN management but typically does not have advanced training in EDs. An ED patient with normal gastrointestinal (GI) function was referred to a national home infusion company to provide PN to help gain weight. This abstract evaluates the complexity of ED in this case presentation when providing HPN.

Quality of Life at the End of Life for the Patient on Parenteral Nutrition Transitioning to Hospice: A Focus on Ethical Principles

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Background: Clinical ethics is grounded in a patient centered approach, focused on patient preferences and balancing benefits of continuation of therapies to inherent burdens or risks. This abstract targets a unique subgroup of patients receiving preexisting parenteral nutrition (PN) due to a nonfunctioning gastrointestinal (GI) tract who desire continuation of PN with transfer to hospice. Diagnoses includes obstructing, metastatic tumors of the GI tract requiring gastric and/or intestinal decompression. PN is an established therapy favorably impacting quality of life (QOL) and functional status. Transfer of care to hospice on PN may lead to unforeseen challenges related to cost considerations and complexity. Patients and/or surrogate decision makers (SDM) may decline hospice and its associated benefits if unable to continue PN fearing expedited death from starvation and dehydration as opposed to disease progression.

Hospital and Home Infusion Nutrition Support Teams: Allies in Safe Transition of Care for Parenteral Nutrition Patients During Times of Shortages

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Background: Parenteral nutrition (PN) is a complex therapy requiring an experienced team for patient safety. ASPEN's Safe Care Transitions for Patients Receiving Parenteral Nutrition consensus statement 2022 reports that gaps and safety concerns in care coordination can occur during transition affecting outcomes. This is especially true during transition from hospital to home. Numerous PN component shortages in 2021-2022 have complicated this process. Shortages impact inpatient and outpatient settings differently adding another layer of challenge, thus communication between hospital and home PN teams is vital. This abstract demonstrates a collaborative approach resulting in safe transition and PN meeting patient needs despite shortages.

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