

---

# Medicare Beneficiary Satisfaction with Durable Medical Equipment Suppliers

Thomas J. Hoerger, Ph.D., Eric A. Finkelstein, Ph.D., and Shulamit L. Bernard, Ph.D.

---

*CMS has recently launched a series of initiatives to control Medicare spending on durable medical equipment (DME) and prosthetics, orthotics, and supplies (DMEPOS). An important question is how these initiatives will affect beneficiary satisfaction. Using survey data, we analyze Medicare beneficiary satisfaction with DMEPOS suppliers in two Florida counties. Our results show that beneficiaries are currently highly satisfied with their DMEPOS suppliers. Beneficiary satisfaction is positively related to rapid delivery, training, dependability, and frequency of service. Results of our analysis can be used as baseline estimates in evaluating CMS initiatives to reduce Medicare payments for DMEPOS.*

## INTRODUCTION

Medicare's Part B benefit provides coverage for DME and prosthetics, orthotics, and supplies (POS). Part B covers a wide range of DME for use in the home, including oxygen equipment and supplies, hospital beds, wheelchairs, walkers, and renal dialysis machines. The coverage for POS, in both home and nursing home settings, includes enteral nutrition therapy, urological supplies, surgical dressings, and devices such as hand braces and artificial limbs. DME-

POS benefits are especially important to sick and disabled Medicare beneficiaries, allowing them to avoid institutionalization, live more mobile and independent lives, and maintain their quality of life.

While DMEPOS items are of indisputable importance to beneficiaries, concern over fraudulent billing and the high cost of these benefits has attracted scrutiny from policymakers during recent years. Beginning in the late 1980s and continuing through today, Medicare has relied on fee schedules to reimburse DME suppliers. Despite attempts to limit rising costs within this framework, expenditures have grown by over 10 percent per year, twice the rate of the national economy. As of 1996, expenditures on DMEPOS accounted for over \$6 billion—about 3 percent—of Medicare's \$193.9 billion total outlays. Although expenditures actually fell in 1998 because of reductions in the fee schedule, expenditures are projected to rise by more than 5 percent annually during the next decade (Board of Trustees, Federal Hospital Insurance Trust Fund, 1999). In addition, several studies suggest that Medicare pays more for DMEPOS than other purchasers pay (U.S. Department of Health and Human Services 1996a, 1996b, 1996c, 1996d; U. S. General Accounting Office, 1997).

As a result of this scrutiny, Congress and CMS have adopted initiatives to reduce DMEPOS expenditures. DMEPOS services are one of four industries that the Federal Government has targeted in Operation Restore Trust, a program

---

The authors are with the Research Triangle Institute (RTI). Research for this article was supported by the Centers for Medicare & Medicaid Services (CMS) under HCFA Contract Number 500-95-0061 (TO#3) through a subcontract from the University of Wisconsin-Madison's Center for Health Systems Research and Analysis. The views expressed in this article are those of the authors and do not necessarily reflect the views of the RTI, CMS, or, the University of Wisconsin-Madison.

designed to prevent Medicare and Medicaid waste, fraud, and abuse. As part of the Balanced Budget Act of 1997, Congress mandated substantial cuts in the Medicare fee schedule for oxygen equipment and supplies, the largest single component of DMEPOS spending. Also as part of the Balanced Budget Act of 1997, Congress approved up to three CMS demonstration projects to use competitive bidding to set the price of Medicare Part B services. In the demonstration projects, suppliers were no longer reimbursed through a fee schedule but received payments based on rates that they bid during the selection process. Suppliers were able to receive payments for items and services covered by the demonstration only if their bids were competitive in terms of quality and value. CMS implemented the first DMEPOS Competitive Bidding Demonstration in Polk County, Florida, with bids for five types of DMEPOS collected in March 1999 and new, lower fees taking effect in October 1999.

These initiatives raised important questions: What impact, if any, will policy initiatives such as reductions in fees and the DMEPOS Competitive Bidding Demonstration have on beneficiaries' access to and quality of the DMEPOS services they receive? In particular, after the initiatives, will beneficiaries still be able to obtain the same access to DMEPOS services they need, when they need them? Will beneficiaries still receive the same quality of equipment or services? One method of assessing access to and quality of services is to ask users about their satisfaction with the equipment and services they receive from suppliers. This type of rating is often called consumer satisfaction, but it can also be viewed as a summary measure of access and quality from the unique perspective of users of services. Measuring and reporting consumer satisfaction has

become an integral part of efforts to promote active participation by consumers in the health care services received (Sangl and Wolf, 1996), and CMS is currently surveying Medicare beneficiaries' satisfaction with health plans and the fee-for-service system using satisfaction questions developed by the Consumer Assessment of Health Plans Study (CAHPS®).

In order to evaluate the effect of the demonstration on beneficiary satisfaction with DMEPOS suppliers, it is necessary to have a baseline measure of beneficiary satisfaction prior to implementing the intervention. This information can then be compared with beneficiary perceptions, or satisfaction, after implementation. Unfortunately, published information about beneficiary satisfaction with DMEPOS suppliers is extremely limited.

In this article, we analyze Medicare beneficiary satisfaction with DMEPOS suppliers using data from a random survey of beneficiaries who use five types of DMEPOS in two Florida counties. Ultimately, this baseline information will be used to evaluate whether Medicare's DMEPOS Competitive Bidding Demonstration project affects beneficiary satisfaction, access to care, quality of equipment, and product selection. More generally, however, we believe that these estimates represent current levels of beneficiary satisfaction with DMEPOS suppliers.

## **METHODS**

As part of a comprehensive evaluation of Medicare's DMEPOS Competitive Bidding Demonstration, baseline surveys of DMEPOS users in Polk and Brevard Counties in Florida were conducted in spring 1999. Polk County is the first site for the competitive demonstration; Brevard County, which is not included in the demonstration, was selected as a comparison site for the evaluation

because it matches Polk County along several key characteristics. Both counties are located in Florida, have similar numbers of Medicare beneficiaries, have few beneficiaries enrolled in managed care, and comprise a single-county metropolitan statistical area. For the broader purposes of the evaluation, inclusion of a comparison site will allow us to distinguish between effects of the demonstration that only affect the demonstration site and contemporaneous changes in the DMEPOS market that affect both the demonstration and the comparison sites. However, for the purpose of this article on baseline variables, we expect similar results in the two counties. The baseline surveys entered the field 7 months prior to implementing the new demonstration fee schedule in Polk County on October 1, 1999; thus, the baseline results reported here are unlikely to have been affected by the demonstration. Followup surveys in the two counties were conducted 12 months after implementing the demonstration fee schedule; these results will be compared with the baseline surveys to evaluate the impact of the demonstration in Polk County.

Although many of the questions are identical, separate survey questionnaires were developed for beneficiaries using home oxygen equipment and beneficiaries using the four other types of DMEPOS covered in the demonstration (hospital beds, urological supplies, surgical dressings, and enteral nutrition). An oxygen-specific questionnaire was developed because home oxygen accounts for the majority of DMEPOS use and expenditures. The oxygen survey includes 75 questions, and the other DMEPOS questionnaire includes 58 questions. Many of the additional questions on the oxygen survey result from duplicate questions being asked for both portable and stationary oxygen equipment. Each survey was expected to take between 15 and 20

minutes to complete. Beneficiaries using both home oxygen and other equipment included in the demonstration received the oxygen survey only.

The surveys include questions about the following:

- Medical equipment use.
- Quality of service.
- Satisfaction with service/equipment.
- Access to service.
- Health status.
- Respondent characteristics.

More specifically, each survey asks respondents what types of DME they currently use. For the equipment used most often, the survey also asks respondents a series of questions about usage and supplier conduct/performance. Specific questions on usage include how long and how often the respondent has been using the equipment, and the respondent's general comfort level operating the equipment; for oxygen users this includes controlling the rate of oxygen flow, using a humidifier, attaching regulators, and cleaning filters. Nearly all questions allow users to check boxes corresponding to the appropriate answers, which ranged from 2 to 10 categories depending on the level of detail required.

Questions on supplier conduct/performance address overall satisfaction (on a scale from 0 to 10, with 10 being the best), equipment reliability, and whether or not users would recommend the supplier to a friend. Each survey also includes questions related to customer service, including the quality and type of training, promptness and courtesy in filling orders and addressing problems, customer support during and after hours, complaint resolution, and the number of contacts between the user and the supplier.

Finally, each survey concludes with a series of questions on demographic characteristics, including health status, living

arrangements, race, education, income, and whether or not the survey was completed by proxy. Proxy respondents are asked to indicate their relationship to the user, why the user was unable to complete the survey himself, and what level of support the proxy provided in responding to the survey.

Many of the survey questions, including those related to satisfaction, were taken from the CAHPS® survey instrument. As part of the CAHPS® development process, these questions received extensive cognitive and psychometric testing. Additional questions specific to DMEPOS were developed expressly for this survey. These questions were reviewed by survey methodologists and pretested with a small sample of DMEPOS users.

The data collection design was adapted from the approach used in the Medicare Beneficiary Health Status Registry pilot study that achieved a response rate of 83 percent from Medicare beneficiaries (Turner et al., 1994). The protocol included mailing of prenotification letters and questionnaires to all members of the sampling frame, a second mailing to non-respondents, and telephone followup and interviews with remaining non-respondents. The prenotification letter and an informational booklet assured sample members that participation in the survey was voluntary and that their decision whether or not to participate would not affect their Medicare benefits. As is typical for mail and telephone surveys, a respondent's willingness to participate in the survey by completing and returning the questionnaire was taken as his or her informed consent to participate in the survey.

The sampling frame for the baseline survey was composed of a list of Medicare recipients (aged or persons with disabilities) with permanent addresses in Polk and Brevard Counties who submitted Part B claims for home oxygen, hospital beds,

urological supplies, surgical dressings, and enteral nutrition from July-November 1998. The initial list was merged with death dates from the Medicare Enrollment Database, and individuals who were known to have died were deleted from the sampling frame prior to sample selection. Initial plans called for random samples of 800 oxygen users in Polk County, 800 non-oxygen users in Polk County, 800 oxygen users in Brevard County, and 800 non-oxygen users in Brevard County to be selected for surveying. However, there were fewer than 800 non-oxygen users in both Polk and Brevard counties, so all non-oxygen users were included in the sample. For oxygen users, a random sample of 800 beneficiaries from Polk County was drawn; the sample for the comparison county was then drawn with the objective of matching the sample drawn from Polk County.

Surveys were mailed to 1,600 oxygen users and 1,295 users of other medical equipment and supplies. Forty-eight individuals were ineligible for the survey because they lived outside the study counties, and 195 individuals in the sample were deceased. A total of 1,953 individuals responded, for an overall response rate of 74 percent, excluding ineligible or deceased persons. The response rate for the oxygen survey was 82 percent, while the response rate for the other DMEPOS survey was 63 percent. The higher response rate for the oxygen survey may be because beneficiaries spend more money and receive more service on oxygen equipment than on other supplies; thus, they may be more interested in the oxygen survey.

## DESCRIPTIVE STATISTICS

To provide baseline information on satisfaction, we calculated the percentage of beneficiaries responding with each satisfaction rating between 0 (worst possible

supplier) and 10 (best possible supplier). We also calculated beneficiary ratings of delivery time, training, frequency of home visits, reliability of equipment, complaints and requests for help, and supplier responses to complaints and requests.

### **Multivariate Analysis of Satisfaction**

To determine which variables have the largest impact on satisfaction, we performed multivariate regression analyses. Because of the differing nature of oxygen and other DMEPOS services, we performed separate analyses for oxygen users and other DMEPOS users, and then tested whether it would be appropriate to run a pooled regression on the combined data set. The regression for other DMEPOS users allows for additional service-specific effects by including dichotomous variables for hospital beds, urological supplies, surgical dressings, and enteral nutrition.

The dependent variable in each specification is an ordinal ranking of beneficiary satisfaction with his supplier on a scale from 0 to 10. A ranking of 10 is better than a ranking of 5 but not necessarily twice as good. Given the ordinal nature of the dependent variable, we estimate an ordered logit model to determine which beneficiary and supplier characteristics are associated with higher rankings. This model takes into account the ordinal nature of the satisfaction variable and estimates the probability that a consumer will choose each satisfaction rating based on personal and supplier characteristics, which in our model are a series of dichotomous (dummy) variables. We report odds ratios and 95 percent confidence intervals for these ratios for each variable. Each odds ratio may be interpreted as the ratio of the odds of choosing a higher, rather than lower, satisfaction ratio when the variable is equal to 1 rather than 0.

In addition to dichotomous variables representing the DMEPOS product categories, each ordered logit model includes supplier-related and user-demographic characteristics as explanatory variables. These variables are described in the following paragraphs.

Supplier characteristics include a variable identifying those respondents who reported having major problems with their equipment in the last 6 months. Another variable indicates whether the equipment was delivered on the same day that it was ordered. Three dichotomous variables indicate the level of face-to-face contact the respondent has had with his or her supplier during the last 6 months. They signify, respectively, no face-to-face contact, a few contacts (between one and five contacts over the prior 6 months), or many contacts (greater than five contacts over this time period; that is, at least monthly visits). We distinguish between few and many contacts because of concern that multiple contacts might be the result of problems with the supplier and/or the equipment and thus would have a negative impact on satisfaction. The regressions include three dichotomous variables identifying whether the respondent rated his or her training on the equipment as excellent; very good; or good, fair, or poor (the omitted category). The regressions also include a dichotomous variable signifying that the respondent did not receive training.

Seven user demographic variables are included. An education variable was assigned a value of 0 for those who had not graduated from high school; 1 for high school graduates, general equivalency diplomas, and those who completed some college or technical school; and 2 for college graduates and those who had more than a 4-year college degree. A race/ethnicity variable identifies the respondents'

**Table 1**  
**Demographics of Survey Respondents**

Demographic	Oxygen Users (N = 1,129)	Other DMEPOS Users (N = 630)
Average Age	73 (10.29)	74 (15.14)
<b>Sex</b>	Percent	
Male	48.9	48.7
Female	51.1	51.3
<b>Composition of Other Durable Medical Equipment Users</b>		
Surgical Dressings	—	21.3
Hospital Bed Equipment	—	73.7
Urinary Devices	—	35.7
Enteral Nutrition Supplies	—	14.3
<b>Health Status</b>		
Excellent	0.8	2.3
Very Good	4.0	5.7
Good	16.0	18.0
Fair	46.8	39.8
Poor	32.4	34.2
<b>Living Arrangements</b>		
Lives Alone	23.5	10.4
Lives with Others	73.0	71.2
Nursing Home or Assisted Living	3.5	18.4
Duration of Use Greater than 1 Year		
Proxy Respondent	80.2	76.6
	26.8	60.9
<b>Race/Ethnicity</b>		
White, Non-Hispanic	83.2	69.1
Non-White	16.8	30.9

NOTES: Medicare beneficiaries using oxygen or other durable medical equipment and supplies in Polk and Brevard counties, Florida, were surveyed. Numbers in parentheses represent standard deviation.

SOURCES: Oxygen Consumer Survey, 1999; Medical Equipment and Supplies Consumer Survey, 1999.

race and ethnicity, though only to the extent that it distinguishes between non-Hispanic white persons and all other race/ethnicity combinations. Other variables include whether the beneficiary lives alone, reported his or her health status as at least “good” as opposed to “fair” or “poor,” and whether he or she has been using DMEPOS equipment for at least 1 year. To test whether the use of a proxy respondent implies differential levels of satisfaction, we include a proxy variable. Although we do not expect differences in baseline responses between the demonstration and comparison sites, we include a dummy variable for the demonstration site (Polk County) to test this hypothesis. Because a fixed fee schedule was used at the time of the survey to reimburse

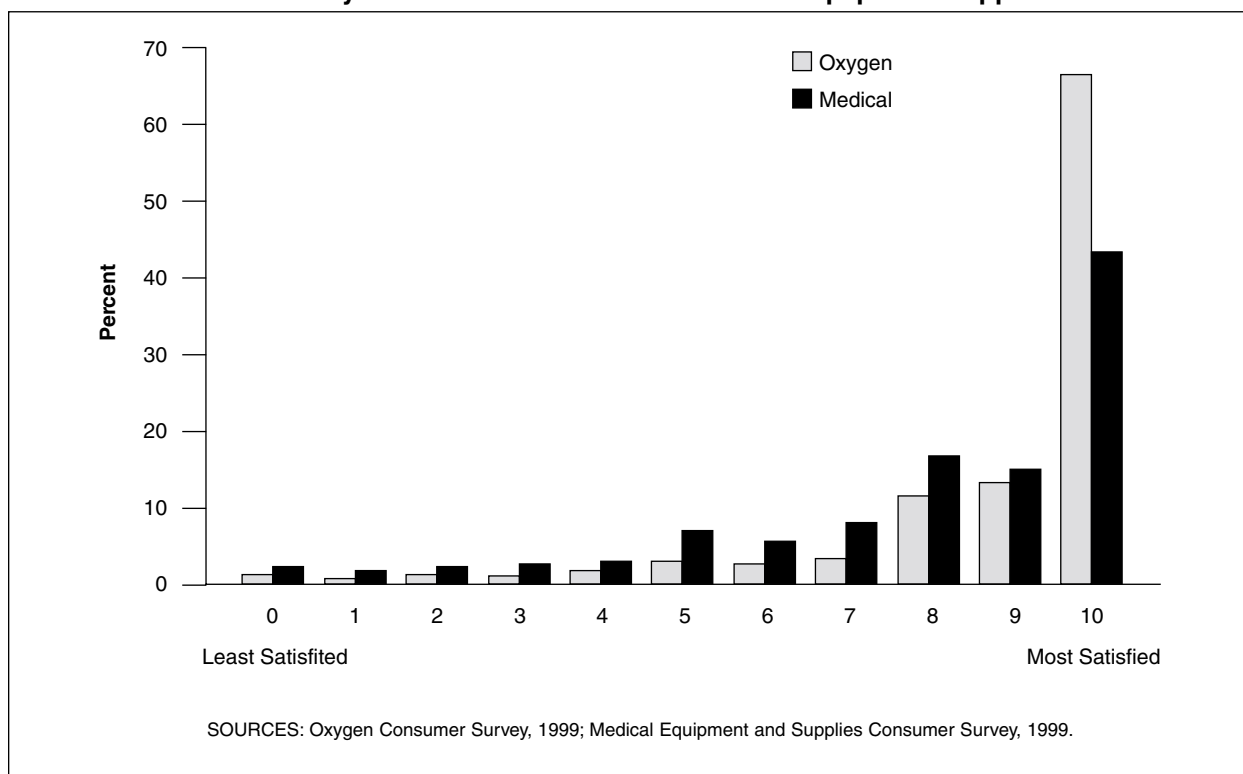
Medicare DMEPOS services and beneficiaries faced standard Medicare coinsurance rates, we did not include a cost variable in the equation.

## RESULTS

### User Demographics

Table 1 shows the demographics for respondents to the two surveys. The average age of respondents was more than 70 years old, and consistent with this age, more respondents were female than male. Not surprisingly, the surveys reveal a high degree of morbidity. Respondents were asked to rate their overall health on a scale from 1 to 5, with 1 signifying excellent and 5 signifying poor. Approximately one-third of respondents to

**Figure 1**  
**Beneficiary Satisfaction with Durable Medical Equipment Supplier**



each survey rated their overall health as poor, and 75 percent rated their health as either fair or poor. The majority of respondents reported living with a spouse or other relative; however, 23 percent of oxygen users and 10 percent of other DMEPOS users reported living alone. Additionally, 4 percent of oxygen users and 18 percent of other DMEPOS users reported living in a nursing home or assisted living facility. Seventeen percent of oxygen users were non-white individuals, as were 31 percent of other equipment users. Among other equipment users, 74 percent used hospital beds, 35 percent used urinary equipment, 21 percent used wound coverings, and 14 percent used enteral nutrition equipment (respondents could use more than one type of equipment).

Survey results also revealed that over three-quarters of oxygen users responded to the survey themselves; in contrast, proxy responses were very common (61

percent) for other DMEPOS users. On both surveys, spouses/partners and sons or daughters were the most common proxy respondents, accounting for 75 percent of proxies on the oxygen survey and 67 percent of proxies on the other DMEPOS survey. Other relatives accounted for an additional 15 percent and 19 percent of proxies on the oxygen and other DMEPOS surveys, respectively.

Sixty-seven percent of oxygen users and 43 percent of other DMEPOS users rated their supplier as highly as possible for overall satisfaction (Figure 1). These numbers increased to 92 percent and 74 percent, respectively, when including rankings of 8 or higher. Over 90 percent in each group responded that they would recommend their supplier to a friend. Only a handful of respondents—less than 2 percent—report having switched suppliers because they were dissatisfied with the service.

**Table 2**  
**Respondent Ratings of Supplier Characteristics and Performance**

Category	Oxygen Users (N = 1,129)	Other DMEPOS Users (N = 630)
<b>Delivery of Equipment After Ordering</b>		Percent
Same Day	75.0	44.9
1-2 Days	21.9	36.9
3-4 Days	2.0	10.1
Longer	1.1	8.1
<b>Training</b>		
Excellent	53.5	28.7
Very Good	30.3	26.3
Good	10.5	13.3
Fair	2.4	4.5
Poor	0.2	0.9
None Received	2.2	26.4
<b>Frequency of Home Visits</b>		
Once a Week	3.2	5.0
Once Every 2 Weeks	5.1	1.6
Once a Month	48.9	5.3
Once Every 2 Months	19.2	1.8
Once Every 3-6 Months	17.4	10.7
Never	6.3	75.6
<b>Reliability</b>		
Very Reliable	94.4	79.0
Somewhat Reliable	4.5	16.6
Somewhat Unreliable	0.4	1.0
Very Unreliable	0.7	3.3
<b>Customer Service</b>		
Equipment Replaced Because it was not Working Right	23.4	13.8
Initiated a Complaint During Last 6 Months	25.7	23.7
Complaint Resolved Satisfactorily	92.0	79.1
Needed After-Hours Help	18.2	7.6
Received Needed Help	81.5	61.1

NOTE: DMEPOS is durable medical equipment and prosthetics, orthotics, and supplies.

SOURCES: Oxygen Consumer Survey, 1999; Medical Equipment and Supplies Consumer Survey, 1999.

### Factors Affecting Satisfaction

Table 2 shows how users rank suppliers' performance based on time between order and delivery, training effectiveness, frequency of supplier visits, equipment reliability, and responses to equipment or service problems. As shown in the table, users rank their suppliers highly on most of these factors. However, differences between oxygen users and users of other DMEPOS are apparent. For example, 75 percent of users report that their oxygen equipment was delivered on the same day it was ordered, and another 22 percent received their equipment between 1 and 2 days after ordering. A much smaller percentage of other DME-

POS users (45 percent) report that their equipment was delivered on the same day it was ordered, although another 37 percent received their equipment between 1 and 2 days after ordering. Unlike oxygen therapy where nearly everyone received training, only 74 percent of other DMEPOS users report being trained to use the equipment. However, of the other DMEPOS users who received training, 75 percent rated their training as either excellent or very good, about the same percentage reported for oxygen users. Oxygen users and other DMEPOS users also differ on the frequency of supplier visits. Among oxygen users, 57 percent report having had an employee come to the house at least once per month



**Table 3**  
**Means of Regression Variables Stratified, by Survey**

Variable	Range	Means	
		Oxygen Users (N = 847)	Other DMEPOS Users (N = 412)
Satisfaction Rating	0-10 <sup>1</sup>	9.22	8.31
Surgical Dressings	0,1	—	0.12
Hospital Bed Equipment	0,1	—	0.65
Urinary Devices	0,1	—	0.31
Enteral Nutrition Supplies	0,1	—	0.09
Training was Good, Fair, or Poor	0,1	0.13	0.20
Training was Very Good	0,1	0.31	0.25
Training was Excellent	0,1	0.55	0.29
Received No Training for DME	0,1	0.02	0.25
Received DME Same Day it was Ordered	0,1	0.74	0.44
Experienced Equipment Problems	0,1	0.19	0.23
No Contacts with Supplier in Past 6 Months	0,1	0.05	0.76
Few Contacts with Supplier in Past 6 Months	0,1	0.37	0.14
Many Contacts with Supplier in Past 6 Months	0,1	0.58	0.10
White, Non-Hispanic	0,1	0.83	0.71
Education	0,1	0.78	0.81
DME User for at Least 1 Year	0,1	0.80	0.77
Lives Alone	0,1	0.22	0.11
In Good Health	0,1	0.20	0.27
Proxy Respondent	0,1	0.28	0.58
Polk County (Florida) Resident	0,1	0.48	0.46

<sup>1</sup> With 0 being the lowest and 10 being the highest.

NOTES: DMEPOS is durable medical equipment and prosthetics, orthotics, and supplies. DME is durable medical equipment.

SOURCES: Oxygen Consumer Survey (oxygen users), 1999; Medical Equipment and Supplies Consumer Survey (other DMEPOS users), 1999.

to either deliver or check equipment. In contrast, over 75 percent of other DMEPOS users did not have a supplier visit even once during the preceding 6 months.

The vast majority of oxygen respondents report that they are either very or somewhat comfortable controlling the rate of oxygen flow (nearly 80 percent), using a humidifier (nearly 80 percent), attaching regulators (86 percent), and cleaning filters (73 percent). Most of the other DMEPOS users (71 percent) also report being either very or somewhat comfortable using and maintaining their equipment.

### Multivariate Analysis of Satisfaction

Means of the variables included in the multivariate ordered logit are presented in Table 3, and results for the oxygen and other DMEPOS specifications are presented in Table 4. We also estimated the model using ordinary least squares; the results

(not shown) were qualitatively similar. Because an *F*-test (not reported) strongly rejected the appropriateness of pooling the data across specifications, we do not include the results of the pooled model. The other DMEPOS regression reveals that, after adjusting for the levels of the other independent variables, urinary devices is the only type of DMEPOS equipment significantly associated with differential levels of satisfaction.

Both regressions reveal a strong relationship between training and beneficiary satisfaction. The omitted reference category is good, fair, or poor training. Individuals responding that they received excellent or very good training rated their suppliers higher. Oxygen users who received no training were just as satisfied as those who received good, fair, or poor training. Other DMEPOS users who received no training were significantly more satisfied than those who received

**Table 4**  
**Ordered Logistic Regression Results Concerning Overall Satisfaction<sup>1</sup>**

Variable	Oxygen Users Odds Ratio	Other DMEPOS Users Odds Ratio
Number of Observations	847	412
Surgical Dressings	—	0.85 (0.47, 1.52)
Hospital Bed Equipment	—	1.26 (0.76, 2.09)
Urinary Devices	—	1.76 (1.04, 2.96)
Enteral Nutrition Supplies	—	1.36 (0.68, 2.70)
Training was Very Good	3.92 (2.52, 6.08)	3.3 (1.94, 5.63)
Training was Excellent	13.04 (8.26, 20.57)	13.77 (7.64, 24.81)
Received no Training for DME	0.59 (0.19, 1.85)	2.59 (1.44, 4.65)
Received DME Same Day it was Ordered	1.95 (1.41, 2.71)	1.99 (1.35, 2.93)
Experienced Equipment Problems	0.76 (0.53, 1.10)	0.64 (0.40, 1.04)
Few Contacts with Supplier in Past 6 Months	2.24 (1.19, 4.22)	1.2 (0.67, 2.14)
Many Contacts with Supplier in Past 6 Months	3.9 (2.06, 7.40)	1.0 (0.49, 2.05)
White, Non-Hispanic	1.17 (0.78, 1.77)	1.52 (0.99, 2.33)
Education	0.71 (0.56, 0.91)	0.86 (0.65, 1.14)
DME User for at Least 1 Year	0.86 (0.59, 1.27)	1.08 (0.68, 1.71)
Lives Alone	0.94 (0.65, 1.37)	0.92 (0.48, 1.77)
In Good Health	0.97 (0.66, 1.43)	1.76 (1.11, 2.79)
Proxy Respondent	0.76 (0.54, 1.07)	0.9 (0.58, 1.39)
Polk County (Florida) Resident	1.21 (0.88, 1.66)	0.83 (0.59, 1.21)
Pseudo <i>R</i> -squared	0.1282	0.0925

<sup>1</sup> Numbers in parentheses represent range of 95 percent confidence interval. Confidence intervals that do not include 1 indicate statistically significant differences at the 95 percent level.

NOTES: DMEPOS is durable medical equipment and prosthetics, orthotics, and supplies. Confidence intervals are shown in parentheses. DME is durable medical equipment.

SOURCES: Oxygen Consumer Survey, 1999; Medical Equipment and Supplies Consumer Survey, 1999.

good, fair, or poor training. The odds ratio for same-day delivery is significantly greater than 1 in both specifications, revealing that customers are likely to rate their suppliers higher if they receive the equipment promptly. The odds ratio associated with an increase in equipment problems is not significantly different from 1 in either specification.

The two included contact variables measure the marginal influence that these variables have on satisfaction. Compared with the omitted reference category that repre-

sents no contacts during the prior 6 months, those oxygen users who have a few or many contacts rate their suppliers higher. The odds ratios for the contact variables are not significantly different from 1 in the other DMEPOS regression.

The variable signifying greater education has an odds ratio less than 1 in both regressions, and the odds ratio is significantly different from 1 in the oxygen specification. The length of time that an individual has been using the equipment and whether they live alone appear to have no

effect on satisfaction ratings. The odds ratio on the variable representing white non-Hispanics is greater than 1 in both regressions and almost significantly different from 1 in the other DMEPOS specification. The other DMEPOS specification shows a positive and significant effect associated with the health status of the beneficiary. We find no evidence that the use of a proxy respondent is correlated with perceived satisfaction. We also do not find any systematic differences in satisfaction between the demonstration and comparison counties, suggesting that Brevard County was an appropriate choice for comparison.

## DISCUSSION

Oxygen users are extremely satisfied with their suppliers, and other DMEPOS users are also quite satisfied, although slightly less so. The surveys reveal that users rank their suppliers highly on nearly every category of service, including delivery, training, frequency of supplier visits, reliability of equipment, and responses to equipment or service problems. However, regression results reveal that the marginal effect of these variables is different for oxygen than for other DMEPOS users. Indeed, the differences are strong enough that we reject the hypothesis that the data from the two groups can be pooled.

These differences are most likely due to the nature of the products. Generally, suppliers deliver oxygen equipment directly to the home and deliver additional supplies, particularly portable oxygen tanks, on a routine basis. Because oxygen is potentially dangerous, careful training is required, and suppliers generally check the equipment while making deliveries. Delivery, training, and onsite servicing requirements vary for other DMEPOS equipment. Hospital beds and enteral

nutrition equipment are generally delivered by the supplier, while surgical dressings, urological supplies, and some enteral nutrition supplies, such as nutritional formula, can be purchased at suppliers' outlets or received by mail. Some DMEPOS equipment (e.g., surgical dressings or urological supplies) does not require training, and other equipment (e.g., enteral nutrition) is primarily used in nursing home settings, where it is operated by trained staff. Onsite servicing is also relatively uncommon for surgical dressings and urological supplies.

As noted, most oxygen users and users of other DMEPOS who received training report that the training was excellent or very good. With a mail and telephone survey, it is not possible to directly test whether this training is effective. As an indirect measure of training effectiveness, the survey asked whether users are comfortable operating their equipment. The vast majority of respondents report being either very or somewhat comfortable operating the equipment. Surprisingly, oxygen users report higher mean values of comfort than users of other DMEPOS, even though oxygen equipment is considered to be more complicated than the other DMEPOS products.

To determine which of the variables discussed earlier have the largest impact on satisfaction, we performed multivariate regression analyses for oxygen and the other DMEPOS products that are included in the competitive bidding demonstration. Both regressions reveal a strong relationship between the perceived quality of training and beneficiary satisfaction. More contact with the supplier is also associated with greater satisfaction for oxygen users, while frequency of contact with the supplier has no significant effect for other DMEPOS users. This again may reflect the differing nature of oxygen and other DMEPOS

products. Oxygen equipment is more complicated and requires more maintenance than the other DMEPOS equipment. Moreover, many oxygen users receive regular deliveries of portable oxygen tanks. Therefore, we expect that ongoing contact with the oxygen supplier is likely to be related to training, maintenance, and/or delivery and should be positively correlated with satisfaction. The correlation between contact and supplier satisfaction for the other DMEPOS products is less clear; this equipment generally requires minimal training and maintenance. The regression results are consistent with these expectations.

Because the other DMEPOS products also vary greatly in terms of the level of training required and other variables of interest, we ran an additional regression (not shown) that allowed both the intercepts and slopes to vary by product type. Although the small sample size associated with any one product resulted in relatively large standard errors, the signs of the coefficients were consistent across products. In summary, the regression results for oxygen and the other DMEPOS products suggest that consumers are acutely aware of the service they receive from their suppliers, and they reward higher quality service with higher satisfaction ratings.

The coefficients on the demographic variables yield some varying results. The white non-Hispanic odds ratio is greater than 1 in both regressions and nearly significant in the other DMEPOS specification. The odds ratio for the variable signifying greater education is negative in both regressions and significantly greater than 1 in the oxygen specification. The other DMEPOS specification shows a positive and significant effect associated with the health status of the beneficiary. It has been suggested that an individual who is positive about his own health is more likely to be positive about his supplier's performance (Piette, 1999).

Medicare beneficiaries who use DMEPOS clearly are highly satisfied with their DMEPOS suppliers. These results raise an interesting question: Are beneficiaries more satisfied with DMEPOS suppliers than with other health care suppliers or do Medicare beneficiaries always rate suppliers highly, regardless of whether the supplier is a physician, health maintenance organization, or DMEPOS supplier? To provide perspective on this issue, it is worth comparing the DMEPOS results with satisfaction ratings for other health care services. Our questions on satisfaction were derived from similar questions on the CAHPS® survey. The CAHPS® survey focuses on patients' experiences with several dimensions of medical care and contains four questions asking consumers to rate the following on a scale from 0 to 10:

- Their personal physician.
- The specialist seen most often in the last 6 months.
- The health care received in the previous 6 months.
- The performance of the health plan itself.

Early CAHPS® results show mean ratings ranging from a low of 7.6 regarding the health plan to a high of 8.1 for both the personal doctor and the specialist (Fowler, Gallagher, and Nederend, 1999). Nationwide, the average ranking for Medicare managed care plans in 1998 was 8.7 out of 10 (Beeuwkes, 1999), and the percentage of enrollees in Florida who rated their health plan as a 10 was 47 percent (Centers for Medicare & Medicaid Services, 2000). In comparison, our results reveal the average rating for oxygen suppliers is 9.2, and the average rating for other DMEPOS suppliers is 8.3. Sixty-seven percent of oxygen users and 43 percent of other DME users give their supplier the highest possible rating. Obviously, managed care is a very different service from DME and the usual

cautions about comparing apples with oranges apply; nevertheless, these results add perspective to the overall high satisfaction ratings for DME suppliers. The ratings for oxygen suppliers appear higher than satisfaction ratings for other health care services. The ratings for suppliers of other DMEPOS services are also high but closer to those for other health care services.

Our study has several limitations. First, because the study was limited to two Florida counties, the high satisfaction levels recorded for oxygen and other DMEPOS suppliers may not generalize to suppliers in other locations. Note, however, that Medicare reimbursement policies in the counties at the time of the surveys were similar to those in the rest of the Nation.

Second, proxy respondents were common, particularly on the other DMEPOS survey. Proxies often give lower ratings on health status questions than do intended respondents, and the same result may hold for satisfaction. However, most of the proxies who responded were close relatives of the sampled beneficiary. Although proxy satisfaction ratings were slightly lower than non-proxy ratings, the differences were not significant.

Finally, as a set of baseline surveys, our results cannot yet show the results of DMEPOS policy changes, such as fee reductions or the implementation of competitive bidding. Nevertheless, they provide important baseline information that—combined with later data—can be used to evaluate whether policy changes, such as reductions in reimbursement or the DMEPOS Competitive Bidding Demonstration, will affect beneficiary satisfaction. Because the baseline satisfaction levels are already so high, it is almost statistically impossible for the initiatives to cause satisfaction ratings to increase. Thus, if any changes in

satisfaction are to be observed, they are likely to be negative. Our analysis provides a useful baseline for evaluation purposes, with data on both satisfaction as well as quality and service variables that are clearly associated with satisfaction.

## ACKNOWLEDGMENTS

We thank Claire Gibbons, Amy Wofford, Kay Jewell, and Sarita Karon for their assistance in developing the survey instruments, Kristine Broglio for providing data analysis, and Ann Meadow who provided assistance throughout the study.

## REFERENCES

- Beeuwkes, B.: Risk Selection and Product Differentiation in Medicare HMOs. Unpublished manuscript. Harvard University. Cambridge, MA. 1999.
- Board of Trustees, Federal Hospital Insurance Trust Fund: 1999 Annual Report of the Board of Trustees of the Federal Hospital Insurance Trust Fund. Washington, DC. 1999.
- Centers for Medicare & Medicaid Services: Medicare and You. Internet address: [www.medicare.gov/comparison/plansearch/QualityResults.asp](http://www.medicare.gov/comparison/plansearch/QualityResults.asp). 2000.
- Fowler, F.J., Gallagher, P.M., and Nederend, S.: Comparing Telephone and Mail Responses to the CAHPS® Survey Instrument. *Medical Care* 37(3,Supplement):MS41-49, 1999.
- Piette, J.D.: Satisfaction with Care Among Patients with Diabetes in Two Public Health Care Systems. *Medical Care* 37(6):538-546, 1999.
- Sangl, J. A., and Wolf, L.F.: Role of Consumer Information in Today's Health Care System. *Health Care Financing Review* 18(1):1-8, 1996.
- Turner, C.F., Forsyth, B.H., Weeless, S.C., et al.: Field Test of Medicare Beneficiary Health Status Registry: Major Findings and Recommendations. Research Triangle Institute. Research Triangle Park, NC. 1994.
- U. S. Department of Health and Human Services, Office of Inspector General: *Enteral Nutrient Payments in Nursing Homes*. Report Number OEI-06-92-00861. U.S. Government Printing Office. Washington, DC. March 1996a.

U. S. Department of Health and Human Services, Office of Inspector General: *Durable Medical Equipment Payments in Nursing Homes*. Report Number OEI-06-92-00862. U.S. Government Printing Office. Washington, DC. March 1996b.

U.S. Department of Health and Human Services, Office of Inspector General: *Payments for Enteral Nutrition: Medicare and Other Payers*. Report Number OEI-03-96-00021. U.S. Government Printing Office. Washington, DC. May 1996c.

U.S. Department of Health and Human Services, Office of Inspector General: *A Comparison of Albuterol Sulfate Prices*. Report Number OEI-03-94-00392. U.S. Government Printing Office. Washington, DC. June 1996d.

U.S. General Accounting Office: *Medicare: Home Oxygen Program Warrants Continued HCFA Attention*. Report to the Chairman, Committee on Finance, U.S. Senate. Report Number GAO/HEHS-98-17. U.S. Government Printing Office. Washington, DC. November 1997.

---

Reprint Requests: Thomas J. Hoerger, Ph.D., Research Triangle Institute, Health, Social, and Economics Research, 3040 Cornwallis Road, P.O. Box 12194, Research Triangle Park, NC 27709. E-mail: [tjh@rti.org](mailto:tjh@rti.org)