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**Data Analyses: Assessing the Intersection between Health and Transportation**

**May 15, 2012**

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Funded by the Federal Transit Administration Cooperative Agreements Easter Seals Project ACTION & the National Center on Senior Transportation in partnership with the American Medical Association & LogistiCare

*Three photos on the front cover: (1) A doctor talking to an older patient. (2) People riding a bus, one woman has a service dog. (3) A driver securing a woman who is using a wheelchair onto a paratransit lift.*

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Abstract

This report summarizes activities the research team completed to analyze LogistiCare Data as part of Phase 2 of the project *Assessing the Intersection between Health and Transportation*. Progress and findings reported here are based on the conduct of analyses of the database provided by LogistiCare to address proposed objectives. This research was funded by the U.S. Department of Transportation Federal Transit Administration cooperative agreements Easter Seals Project ACTION (ESPA) and the National Center on Senior Transportation (NCST). Easter Seals’ ESPA program and Easter Seals and n4a’s NCST program are training and technical assistance centers that support the expansion of accessible transportation for people with disabilities of all ages and increasing transportation options for older adults. This document is disseminated in the interest of information exchange. Neither Easter Seals, n4a nor the U.S. DOT, FTA, assumes liability for its content or use thereof.

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# Introduction

A critical component to maintaining the health and well-being of older adults in the community is their ability to access health care. Lack of access to transportation is a critical barrier to the management of chronic illness and disabilities – chronic conditions account for 75% of healthcare costs in the US (needs the CDC citation for this) A study based on data from the National Health Interview Survey reported that approximately 3.6 million American adults living in the community fail to obtain health care due to a lack of transportation and that these individuals are more likely to be older, minority, and female (Wallace, Hughes-Cromwick, Mull and Khasnabis, 2005). These individuals are also more likely to report multiple medical conditions and related mobility disability. These impairments can include lower extremity, sensory, neurological, cognitive, and mental health impairments that make it difficult for older adults to perform activities involved in transporting themselves to medical appointments. Inability to obtain transportation for those with aging or disability related functional changes may lead to premature institutionalization and/or spend down to Medicaid eligibility.

Driving reduction and cessation is a critical factor contributing to the need for transportation. Not unexpectedly, older adults overwhelmingly prefer to transport themselves using their personal automobiles. As a result, few think about transportation until they no longer drive even though the transition from driving to being a non-driver is often gradual (AARP, 2001). Older adult non-drivers report that most alternative forms of transportation have limitations including availability, reliability, costs, and inconvenience. Medical-related transportation needs include non-emergency medical appointments as well as transportation to obtain medication (AARP 2001). The AARP report also notes that when safe driving is no longer possible for older adults, safe and practical alternative transportation must be available. Not all older adults have difficulty meeting their transportation needs and no single transportation solution will work for all people.

Driving cessation and lack of transportation have both direct and indirect effects on the health of older individuals. Adverse consequences of driving cessation among older adults include reduced activity outside the home and decreased life satisfaction (Harris & Ragland, 2003; Marottoli, Mendez de Leon, glass, Williams, Cooney & Berkman, 2000). A longitudinal study of older adults over a three-year period, found that compared to those who continued to drive, older adults who discontinued driving were more likely to develop depressive symptoms (Ragland, Satariano and MacLeod, 2005).

The literature review informed the selection of the Expanded Chronic Care Model (Barr, Robinson, Martin-Link, Underhill et al., 2003) as the overarching context for this study. This model is based on an ecological framework which integrates the influence of the individual, the family and community supportive environment and the health system. The Expanded Chronic Care Model uses a population-based approach to understand, predict and control appropriate healthcare use. This project examined the role of transportation on the health and well-being of older adults using an expansion of this model that incorporates the complexity and multilevel nature of community resources (transportation) while considering person level factors (health demographic characteristics of the older adult), interpersonal resources (family assistance) and health care system characteristics. Above all, research to date is clear that transportation options are not only critical for access to health care. It is essential to continued engagement in civic, social, and community life, and to human interactions necessary for health, well-being and quality of life.

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Yet, more research is needed to better understand the impact of transportation on the health and well-being of older adults, We proposed to examine the role of transportation access on health and health care use of community residing older adults.

The following two objectives/questions guided this study:

*1. What types of older clients/patients use what types and levels of transportation and services for NEMT?*

*2. What are the documented benefits of access (and consequences of non-access) to NEMT?*

The study is a result of extensive discussions among Easter Seals Project ACTION, the American Medical Association (AMA) and LogistiCare about the role of transportation in medical care, particularly among those with limited transportation access.

LogistiCare is the largest non-emergency medical transportation broker in the country. It is active in 40 states and brokers more than 26 million NEMT trips per year. It implements and manages complex NEMT programs and organizes and credentials thousands of local transportation providers to serve specialized groups of people. The value of LogistiCare resides in its extensive experience providing NEMT and the extensive database it has accumulated which can be used to develop a greater understanding of the relationship between transportation and healthcare access.

The study will make possible to compile some basic facts about the population that currently receives NEMT, for example:

* Who is using NEMT?
* What types of rides are users getting?
* How are they acquiring these rides?
* Who is paying for the rides?
* What is the cost of the rides?
* Who is providing the rides?
* What types of healthcare services are they gaining access to through alternative transportation?
* How efficiently are they able to get to and from the healthcare services of their choice when they have access to transportation resources?

There are several important questions or hypotheses that the study of LogistiCare data along with other data sources will address:

* Can people who are no longer able to drive, or who otherwise do not have access to transportation, maintain health by using NEMT to access medical care?
* What are the implications for no-show patients? Is lack of transportation a factor in cancelled visits? What are the costs of cancelled visits?
* Among patients with access to NEMT, what factors are associated with cancelled transportation trips? What are the implications of cancelled trips for medical outcomes?
* Does use of NEMT differ for elderly vs. non-elderly populations?

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# Methods

## LogistiCare Data File

*Membership File*: All users of transportation services brokered by LogistiCare must be enrolled in the program to obtain this service. LogistiCare collects comprehensive information for all enrolled riders after eligibility is verified and updates the information as needed. Basic identifying and demographic information is provided, including the address of the rider, region of service, date of birth, age, gender, and date of death if applicable. Medical information is also provided for each rider, including type of eligibility (e.g., ADA, Medicaid), level of service (e.g., ambulatory, wheelchair, stretcher), health conditions relevant to provision of service, and the rider's primary care provider. The information also includes whether the rider is able to use mass transit and whether he or she is permitted to be accompanied by a personal care attendant.

*Trip File*: Once riders are enrolled, LogistiCare collects data for each requested trip. Basic identifying information includes name of the rider, date of the trip, and date the trip was requested. The trip is classified as either a prescheduled trip (on a repeating basis, such as weekly dialysis) or a one-time trip; for one-time trips, the amount of notice is classified as urgent or non-urgent. Data also includes whether the rider requested the trip himself, and if not, the relationship of the requestor to the rider. Those accompanying the rider are identified, including the number of adults and children traveling with the rider and whether there is an accompanying personal care assistant. For the pickup and drop-off locations, the address and type of facility are provided, in addition to the reason for the trip and the treatment type. If the trip was denied, the reason for denial is noted.

Performance and efficiency data are available for both trips and riders. LogistiCare collects data on number of calls made by users to schedule trips and number of appointments for which users experience delays or express complaints. For each ride requested, extensive information is recorded on the related costs. LogistiCare has a cost structure based on use (trips) and membership, which is included along with details such as fees paid to service providers and travel distances and times. Ride cost is then linked to individual rider information.

## Eligibility File

For each state in which it operates, LogistiCare compiles data both on older adults who are enrolled in the program as well as the estimated 90% of Medicaid-eligible individuals who are not enrolled. The “eligibility” data set that LogistiCare receives from state Medicaid agencies contains identification information (e.g., date of birth, address) as well as basic demographic information (e.g., age and gender) on all persons eligible to receive transportation services. Due to privacy concerns and in order to comply with the requirements of multiple institutional review boards (IRB), LogistiCare provided de-identified data on the eligibility files (i.e., no name or address). In addition, the eligibility file does not indicate who uses NEMT. However, the eligibility file can be compared with the user file to determine eligibility versus use.

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## Census Data

ZIP codes for residence are collected from the LogistiCare trip file and then related to Census ZIP Code Tabulation Areas (ZCTAs). ZCTAs are approximations of USPS ZIP Code service areas and often represent the majority ZIP code for addresses within a Census block. The Census defines urban areas as core census block groups or blocks that have a population density of at least 1,000 people per square mile and surrounding blocks with an overall density of at least 500 people per square mile. Rural areas consist of all territory, population, and housing units located outside of urban areas and urban clusters.

## State Data Selection for Analyses

Our overall strategy was to select states that met the criteria of having at least 5 years of complete data on LogistiCare NEMT use, including overlapping years across states, data covering the entire state, and data on rural and urban areas. Five states met the criteria:

|  |  |  |
| --- | --- | --- |
| State | Start Date | End Date |
| Delaware | Jan 2004 | to date |
| Nevada | Jan 2004 | to date |
| Mississippi | Oct 2006 | to date |
| Oklahoma | Jan 2004 | to date |
| Virginia | Jan 2004 | to date |

We selected one state (Delaware) to construct measures and to determine the feasibility of conducting the proposed analyses. Our intention was to add one or more additional states in order to conduct cross-state comparisons. Given the extensiveness of the analyses conducted and difficulties obtaining and repeating all state data sets, the consensus between LogistiCare and the research team was to select one additional state (Oklahoma) to replicate the analyses conducted with the Delaware data. We have completed extensive analyses of the Delaware 2010 and Oklahoma LogistiCare databases. With the exception of longitudinal analyses, we have also replicated all analyses for the Oklahoma 2010 data.

## Analyses

Frequency distributions were conducted for all variables to determine the quality of the data including the level of missing data, out of range values and cell frequencies. New measures were constructed by combining logical category values for variables such as reason for trip, tripcancelation and age groups. Additional measures were constructed by adding variables to the data files such as percent rural generated from user ZIP code. Within-state bivariate analyses were conducted comparing older users to younger age groups, and among older users only. Cross state comparisons (Delaware vs. Oklahoma) are also presented to examine differences in NEMT use. Longitudinal analyses focused on patterns of program growth and attrition over a four-year period (2006-2010) for Delaware. Finally, multivariate analyses are conducted for Delaware to model the odds of NEMT cancellation and costs where trips were taken and paid.

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# C. Results

## Eligibility

A total of 158,117 Delaware individuals were eligible for LogistiCare brokerage transportation services in 2010. Of this pool 16,195 eligible individuals enrolled and became members in LogistiCare. Thus, 10.2% of eligible persons actually became NEMT users. The proportion of eligible persons age 65 and older who are users is considerably higher than those younger than age 65 (9.1% of eligible group under age 65 vs. 42.8% of eligible persons age 65 and older are users). Use of the services appears to increase dramatically with age. The proportion of users and eligible persons living in rural areas was similar (19.5% of users and 21.4% of eligible individuals lived in areas that were >50% rural) with 9.3% of rural eligible becoming users.

## User/Trip Analyses

#### a. User

Table 1 provides age, gender and urban/rural residence frequency distributions for all NEMT users (users are defined as those who scheduled at least one transportation service with or without trip completion) of LogistiCare brokered services for Delaware and Oklahoma in 2010. A total of 16,195 Delaware users and 39,353 Oklahoma users scheduled at least one NEMT trip in 2010. The mean age of rider user in Delaware and Oklahoma was 38 years. The majority of the users were female and non-rural in both states. However, Oklahoma had a greater proportion of rural riders (30.9% vs. 19.5%). Delaware and Oklahoma show similar gender and rural residence patterns for the older adult population (age 65+).

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| **Table 1. Gender, Age and Rural/Urban Status of LogistiCare NEMT Users Delaware and Oklahoma 2010** | | | | |
|  | **Total Population** | | **Population 65+** | |
|  | Total users DE  n (%) | Total users OK  n (%) | Total users DE  Age 65+  n (%) | Total users OK  Age 65+  n (%) |
| N | 16,195 (100) | 39,353 (100) | 2,467 (100) | 6804 (100) |
| **Gender**  Male  Female  Unknown | 6297 (38.9)  9883 (61.0)  15 (0.1) | 14,154 (35.8)  25,351 (64.1)  30 (0.1) | 741 (30.0)  1721 (69.8)  5 (0.2) | 1856 (27.3)  4941 (72.6)  7 (0.1) |
| **Age**  0-<18  18-<65  65-<75  75+ | 4583 (25.2)  9645 (59.6)  915 (5.7)  1552 (9.6) | 11,027 (27.9)  21,704 (54.9)  3601 (9.1)  3203 (8.1) | --- | --- |
| **Urban/rural**  <=50% rural  >50% rural  Unknown | 12,716 (78.5)  3159 (19.5)  320 (2.0) | 26,997 (68.3)  12,197 (30.9)  341 (0.9) | 2040 (82.7)  396 (16.1)  31 (1.3) | 4274 (62.8)  2457 (36.1)   1. 1) |

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Table 2 presents age frequency distributions stratified by gender and urban/rural status. The proportion of male NEMT service users decreases with increasing age. For example, in Delaware among those age 65 years and older, 29% (741 of 2462 users) were male compared with 35% (3387 of 9639 users) of those age 18 to 65. The majority of Delaware users (12,716, 78%) reside in settings that are less than 50% rural. Suburban or urban residence is more prevalent for older Delaware users (74% under age 18, 79% age 18-64, 85% age 65-74, and 81% age 75+), than older users residing in Oklahoma.

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| **Table 2. Age by Gender, Age by Rural/Urban Status of LogistiCare NEMT Users Delaware and Oklahoma 2010** | | | | |
|  | **<=50% Rural** | **>50% Rural** | **Male** | **Female** |
| **Delaware** (16,195) |  |  |  |  |
| **Age**  0-<18  18-<65  65-<75  75+ | 3,038 (23.9)  7,638 (60.1)  778 (6.1)  1,226 (9.9) | 1,002 (31.7)  1,761 (55.7)  129 (4.1)  3,159 (8.5) | 2,169 (34.4)  3,387 (53.8)  340 (5.4)  401 (6.4) | 1,910 (19.3)  6,252 (63.3)  574 (5.8)  1,147 (11.6) |
| **Oklahoma** (39,353) |  |  |  |  |
| **Age**  0-<18  18-<65  65-<75  75+ | 7,594 (28.1)  15,129 (56.0)  2,315 (8.6)  1,959 (7.3) | 3,346 (27.4)  6,394 (52.4)  1,263 (10.4)  1,194 (9.8) | 5,742 (40.6)  6,556 (46.3)  1,118 (7.9)  738 (5.2) | 5,272 (20.8)  15,138 (59.7)  2,480 (9.8)  2,461 (9.7) |

#### b. Trips Number

A “trip” is defined as a completed unit of transportation provided to an individual for NEMT. Trips are labeled by trip number and trip date. A trip is comprised of one or more legs (segments) and may include multiple destinations. The number of legs for each trip may range from 1, such as receiving a one-way ride to or from the hospital, to 8. However, the majority of trips consist of either 1 (6.3%) or 2 legs (91.7%). The analyses were limited to 2-leg trips to address concerns that 1-leg or 3+leg trips may be different or, in some cases, that they may represent duplicate scheduled legs.

Table 3 provides the number of 2-leg trips taken in 2010 for the total NEMT population and among users age 65+ for Delaware and Oklahoma. Key analyses focused on number of 2-leg trips, length or trip, cost per trip and age, gender, and urban/rural differences. In order to determine length of trips and cost, segments were combined.

The number of trips in 2010 range from 1 to 76+ trips for both states and age groups. These frequencies are not adjusted by length of time as a user of NEMT services. Over half of the 2-leg trips taken for both Delaware and Oklahoma users consisted of four or less trips per year. This was consistent for both the general population of NEMT users and users age 65+. State and age differences are evident among users with extreme numbers of trips (76+). Compared to Oklahoma, Delaware has considerable higher proportion of NEMT users with 76 or more trips. This pattern is consistent for total users and for users age 65 years and older.

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| --- | --- | --- | --- | --- |
| **Table 3. Number of 2-leg Trips by Total Population and Age 65+, Delaware and Oklahoma LogistiCare 2010** | | | | |
|  | **Total Population** | | **Population 65+** | |
|  | Total users DE  n (%) | Total users OK  n (%) | Total users DE  Age 65+  n (%) | Total users OK  Age 65+  n (%) |
| **Number of 2-leg Trips**  Total  1  2  3-4  5-12  13-75  76+ | 13,678 (100)  3,423 (25.0)  1,791 (13.1)  1,891 (13.8)  2,699 (19.7)  2,482 (18.1)  1,392 (10.2) | 37,176 (100)  10,709 (28.8)  5,398 (14.5)  5,882 (15.8)  8,300 (22.3)  5,679 (15.3)  1,199 (3.2) | 2064 (100)  418 (20.3)  255 (12.4)  301 (14.6)  493 (23.9)  324 (15.7)  273 (13.2) | 6462 (100)  1532 (23.7)  847 (13.1)  1010 (15.6)  1614 (25.0)  1136 (17.6)  323 (5.0) |

#### c. Trip Reason

Table 4 presents the reason for trip by the total population of users and by users age 65 and over. Of all trips, dialysis was a relatively common reason and slightly more notable for users in Oklahoma (nearly 40%). Nearly 11% (Delaware) and 8% (Oklahoma) of all trips were for mental health reasons. It is very rare for individuals age 65 years and older to use NEMT for mental health reasons (less than 1% for women and 2% for men). The majority of trips for Delaware older adults were for **dialysis**. Of the 33,306 trips taken in by older women in 2010, 22,368 (67%) were for dialysis, while among older men 14,962 of 19,533 trips (76%) were for dialysis. Oklahoma has a notably lower proportion of trips by older adults for dialysis.

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| --- | --- | --- | --- | --- |
| **Table 4. Reason for Trip by Total population and Age 65+, Delaware and Oklahoma 2010** | | | | |
|  | **Total Population** | | **Population 65+** | |
|  | Total users DE  n (%**)** | Total users OK  n (%) | Total users DE  Age 65+  n (%) | Total users OK  Age 65+  n (%) |
| **Reason for Trips**  Total  Dialysis  Mental Health  Other | 339,778 (100)  96,215 (28.3)  36,163 (10.6)  207,400 (61.0) | 420,047 (100)  167,299 (39.8)  32,763 (7.8)  219,685 (52.4) | 54,164 (100)  38,449 (71.0)  390 (0.7)  15,325 (28.3) | 93,826 (100)  46,924 (50.0)  1082 (1.2)  45,820 (48.8) |

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#### d. Trips Cancelled

Cancellation codes were re-coded (from 51 codes) to better identify actual cancellation (e.g., cancelled versus received alternative transportation/appointment rescheduled) and cancellations by source (e.g., cancelled by client versus other). Table 5 shows cancellation status for 2-leg trips for the total population and for the population age 65 and over. For both states, approximately 18% of trips involved cancellations. In Delaware, cancellations tended to be more common among younger members (30% under age 18, 17% age 18-64, 11% age 65-74, and 13% age 75+).

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| **Table 5. Cancellation status for 2-Leg trips for Total and Age 65+, Delaware and Oklahoma LogistiCare 2010** | | | | |
|  | **Total Population** | | **Population 65+** | |
|  | Total users DE  n (%) | Total users OK  n (%) | Total users DE  Age 65+  n (%) | Total users OK  Age 65+  n (%) |
| **Cancellation Status**  Total  0 legs cancelled  1 or both legs cancelled | 339,778 (100)  280,030 (82.4)  59,748 (17.6) | 420,047 (100)  342,431 (81.5)  77,616 (18.5) | 54,164 (100)  47,682 (88.0)  6482 (12.0) | 93,826 (100)  78,953 (84.1)  14,873 (15.9) |

#### e. Distance

Table 6 presents the planned frequency of NEMTs for 2010. Approximately 28% of Delaware and 19% of Oklahoma members planned to use this service on an average of more than once a month (i.e., had 13 or more round trips scheduled). More frequent users tended to be older. As expected, miles per trip differ considerably by state. Compared with Oklahoma, Delaware reported a substantially higher proportion of NEMT trips of less than 40 miles (90% vs. 40.5%). For each state, mileage for older NEMT users generally did not differ from that of the general population of riders. Mileage tended to be higher for those in rural areas.

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| **Table 6. Frequencies of Length of 2-Leg Trip Total Population and Age 65+ Delaware and Oklahoma** | | | | |
|  | **Total Population** | | **Population 65+** | |
|  | Total users DE N=16,195  n (%) | Total users OK  N=39,353  n (%) | Total users DE  Age 65+  n (%) | Total users OK  Age 65+  n (%) |
| **Miles of Trip**  Total  <=5  6-<15  15-<25  25-<40  40-<60  60+ | 339,778 (100)  85,281 (25.1)  124,011 (36.5)  57,648 (17.0)  38,045 (11.2)  16,145 (4.8)  18,648 (5.5) | 420,047 (100)  64,283 (15.3)  87,329 (20.8)  48,614 (11.6)  49,758 (11.8)  49,927 (11.9)  120,136 (28.6) | 54,164 (100)  16,465 (30.4)  18,181 (33.6)  9532 (17.6)  7522 (13.9)  1748 (3.2)  716 (1.3) | 93,826 (100)  17,931 (19.1)  19,291 (20.6)  9317 (9.9)  11421 (12.2)  12,422 (13.2)  23,424 (25.0) |

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#### f. Level of Service

Table 7 presents the level of service provided for each trip stratified by age and gender. If the level of service differed by leg, the trip is categorized by the higher level of service (e.g., stretcher represents the highest level of service vs. ambulatory in which a user can walk). The majority of trips for older NEMT users (age 65+) were ambulatory (58.3% for Delaware and 67.3% for Oklahoma) which as expected, decreased with age. The least ambulatory NEMT users were older (75+) women with just over half requiring wheelchair or stretcher transportation (Delaware data not shown). Among the NEMTs for this population, very few trips in Oklahoma required stretchers. For both states, almost a third of NEMT services for older adults involved the use of or accommodation of a wheelchair.

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| **Table 7. Level of Service 2-Leg Trips (age 65+) by Age Group and Gender, Delaware and Oklahoma LogistiCare 2010** | | | | |
|  | **Age Group** | | **Gender** | |
|  | 65-<75 years n (%) | 75+ years n (%) | Female n (%) | Male n (%) |
| **Delaware** |  |  |  |  |
| Level of Service  Total  Stretcher (8.8%)  Wheelchair (32.9%)  Ambulatory (58.3%) | 28,922 (100%)  2,248 (7.8%)  8,313 (28.7%)  18,361 (63.5%) | 25,242 (100%)  2,522 (10.0%)  9,526 (37.7%)  13,194 (52.3%) | 34,544 (100%)  2,361 (6.8%)  11,814 (34.2%)  20,369 (59%) | 19,495 (100%)  2,399 (12.3%)  6,023 (30.9%)  11,073 (56.8%) |
| **Oklahoma** |  |  |  |  |
| Level of Service  Total  Stretcher (.01%)  Wheelchair (32.6%)  Ambulatory(67.3%) | 60,658 (100%)  26 (.00%)  18,929 (31.2%)  41,703 (68.8%) | 33,168 (100%)  64 (.02%)  11,650 (35.1%)  21,454 (64%) | 64,380 (100%)  84 (.01%)  21,377 (32.2%)  42,919 (66.7%) | 29,271 (100%)  6 (.00%)  9,198 (31.4%)  20,067 (68.6%) |

#### g. Cost

Table 8 provides a summary of NEMT LogistiCare, cost per trip, per mile, and level of service for the total population served, Delaware and Oklahoma 2010. Findings include all trips completed regardless of the number of legs per trip. The overall cost of LogistiCare NEMT for Oklahoma is over four times greater than Delaware ($4,658,178 vs. $19,701,575). However, compared to Delaware, Oklahoma had 357,442 more trips in 2010 and a higher mean miles per trip (9.5 vs. 25.6 miles per trip). The overall cost per mile is comparable for Delaware and Oklahoma for 2010 ($1.23 vs. $1.02 respectively). There are differences in cost per mile for type of level of service. For example stretcher service per mile is greater in Oklahoma ($5.23 vs. $7.78) and less for wheelchair service ($1.71 vs. $2.54).

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| **Table 8. Average Cost Per Trip and Per Mile by Level of Service, Delaware and Oklahoma LogistiCare 2010** | | | | | |
| Level of Service | Completed # of Trips | Trip Cost | Total Miles | Cost Per Trip | Cost Per Mile |
| **Delaware** |  |  |  |  |  |
| Ambulatory | 339,396 | $3,172,476 | 3,320,758 | $9.35 | $0.96 |
| Stretcher | 12,019 | $555,905 | 104,552 | $46.25 | $5.23 |
| Wheelchair | 44,751 | $893,266 | 352,282 | $19.96 | $2.54 |
| **Special Rate\***  Ambulatory  Stretcher  Wheelchair | 2,897  18  114 | $32,195  $996  $3,368 | 14,936  127  335 | $11.11  $53.67  $29.55 | $2.16  $7.61  $10.06 |
| **Total** | 399,195 | $4,658,178 | 3,792,990 | $11.67 | $1.23 |
| **Oklahoma** |  |  |  |  |  |
| Ambulatory | 617,891 | $15,045,864 | 16,574,348 | $24.35 | $0.91 |
| Stretcher | 492 | $80,675 | 10,366 | $188.06 | $7.78 |
| Wheelchair | 132,143 | $4,514,996 | 2,644,548 | $34.17 | $1.71 |
| **Special Rate\***  Wheelchair Extra Passenger | 263 | $2,780 | 5,978 | $10.57 | $0.47 |
| **Total** | 756,637 | $19,701,575 | 19,376,537 | $26.04 | $1.02 |

## Longitudinal Analyses

A longitudinal analysis of LogistiCare membership growth and program attrition was conducted for Delaware. Based on membership data from 2006 to 2010, a single combined data set was constructed to determine the number and proportion of members who discontinue NEMT in subsequent years. The combined data was also used to determine the rate of growth in membership over the four-year period. Most of the same variables available for 2010 were also available for the previous years, allowing detailed longitudinal analyses. A total of 34,084 individuals received trips at some time over the period from 2006 to 2010.

Table 9 provides a summary of membership growth and rider attrition from 2006 to 2010 among older program participants in Delaware. The “Total in each year” is the number of members (those who took trips) in each year. “Dropped from 1st to 2nd year” is the number (and percentage) dropped in the first of each pair of years. For example, the number in the column 2007 refers to the number who dropped membership from 2006 to 2007. The drop off from year to year can be considered the “attrition” due to: a) death, b) not eligible, c) moved from the State, d) don’t need the service, etc. “New in second year” is the number (and percentage) in the 2nd of each pair of years who are new users. For example, that number in the column 2007 refers to the number in 2007 who were not users in 2006 (i.e., were added as members). Finally, “In both 1st and 2nd years” refers to the number of users who were users during each pair of years. 34,084 individuals received trips at some time over the period from 2006 to 2010. Turnover of membership over each pair of years is quite high—about 35 to 40% of current members each year were not members the following year during this period, and, about 40% of members in any one year were new during this period. Older rider membership (new members—attrition) from 2006 to 2010 showed an overall growth of 24%. However, the overall **rate** of growth in membership has declined. For example, from 2006 to 2007 there was a 12% growth in membership (11,738 to 13,156) and a reduction of 1.5% from 2009 to 2010.

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|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 9. Membership Turnover and Growth (2006-2010) Age 65+ Delaware** | | | | | |
|  | **2006** | **2007** | **2008** | **2009** | **2010** |
| Total in each year (1) | 11,738 | 13,156 | 14,311 | 14,841 | 14,610 |
| Dropped from 1st to 2nd year (2)  n  % |  | 4,100 34.9% | 4,281  32.5% | 5,064  35.4% | 6,029  40.6% |
| New in 2nd year(3)  n  % |  | 5,518  41.9% | 5,436  38.0% | 5,594  37.7% | 5,798  39.7% |
| In both 1st year and 2nd year (4) |  | 7,638 | 8,875 | 9,247 | 8,812 |

Our next step will be to contrast the stability in membership growth and participant attrition across states (e.g., Oklahoma) and to examine longitudinal patterns by key characteristics associated with growth and program attrition such as (age, gender, type of service (ambulatory, wheelchair stretcher) and reason for service (mental health, dialysis, diabetes).

## Inferential Analyses

The multivariate analyses provided below are examples of key outcomes associated with NEMT services—canceled appointments and cost of transportation services.

#### Multivariate Analyses Canceled Appointments

This analysis aims to explore the personal and travel characteristics associated with cancelled trips in a Medicaid, older adult (age 65+) population. Exploring influential factors will assist in further hypothesis generation and developing next steps for this project. This work will provide important insight for improving the effectiveness of Medicaid non-emergency medical transportation and can assist in developing programs and policies for improving health care utilization and compliance.

* + 1. *Methods for inferential analysis*

Data for Medicaid eligible Delaware members who scheduled a transportation appointment with LogistiCare during 2006-2010 were obtained. LogistiCare collects basic demographic, treatment type, and trip data. Demographic information includes age and gender. Zip Code for residence can also be determined from the trip data. Treatment type represents a basic category for medical trip purpose (e.g. dialysis). Trip characteristics include: trip date, scheduling, miles from origin to destination, level of service, and whether the user will be accompanied by an escort. Using scheduling information, trips can be classified as pre-schedule (i.e. repeated on a regular basis), urgent, or non-urgent. Percent Hispanic, percent rural, and percent in poverty Zip Code Tabulation Area data were obtained from the U.S. Census to provide a proxy for additional socio-demographic characteristics. Hispanic data are from Summary File 1 2010. Rural/urban and poverty data are from Summary File 3 2000. Urban is defined as core census block groups or blocks that have a pop density of at least 1000 people per square mile and surrounding blocks have an overall density of at least 500 people per square mile.

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Treatment type for all records were missing 100%, 66%, 10%, 3% and <1% for 2006, 2007, 2008, 2009, 2010 respectively. As treatment type represents some indication of health status, the analysis was limited to years 2008-2010.

The database was structured as one record per user per trip date per leg. Summarized at the trip-level (user date-level) there were 158,094 records for older adults (age 65+). Trips with more than 2 legs were excluded as there was concern that these trips may differ from one-way or round-way trips or that they may represent duplicate scheduled legs. Therefore, 4,966 trips were excluded. Of the remaining 153,128 trips, analyses were restricted to non-missing covariates of interest leaving 152,182 trips for 4,092 clients. Of these, 94% were scheduled as round trips.

* + 1. *Variable definition*

The dependent variable for all analyses indicated cancelled (1 or yes vs. 0 or no). Four different cancelled binary variables were derived from trip status (=’Cancelled’) and cancellation reason. Cancellation reasons were categorized as:

1. All cancellations – includes a wide range of reasons including those attributed to the client and those attributed to the system;
2. Client cancelled -includes the following reasons:
   * Client no show
   * Late cancellation
   * Client cancelled with sufficient notice
   * Client refused
3. Client obtained alternative transportation - includes the following reasons:
   * Transported by family or friend
   * Transported by other means
   * Transported by another provider
   * Client drove self
   * Client walked
4. Client cancelled due to health- includes the following reasons:
   * Client is sick
   * Client is in the hospital

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The dependent variables for #2-4 are mutually exclusive categories.

Sex, age, Zip Code percent rural, Zip Code percent in poverty, Zip code percent Hispanic, treatment reason, scheduling status, escort, and level of service were independent variables. Selected checks of continuous variables can be found in Appendix A. All continuous variables were right skewed. The maximum range for age in years was 129. The top 1% of values were considered outliers. Age was then categorized as 65-<75, 75-<85, 85+. Zip Code characteristics were categorized as >50% rural vs. <=50% rural and >=10% Hispanic vs. <10% Hispanic. However, other categories were explored. Numerous treatment reasons were provided. Indicator variables were derived for mental health and dialysis. These represent two health indications of interest. Of the mental health trips analyzed, 90% were pre-scheduled (i.e. on a regular, repeat basis). Of the dialysis-related trips, 96% were pre-scheduled. Dummy variables were created for all categorical variables.

* + 1. *Analyses for inferential data*

Frequency distributions were produced for categorical variables stratified by cancellation status. *P*-values were obtained from the Chi-square statistic. Bivariate and multivariate logistic regressions were conducted.

The final models were as follows:

All types: Logit(Y) = *B*0 + *B*1Female + *B*2Agecat2 + *B*3Agecat3 + *B*4Hisp + *B*5Dialysis + *B*6MentalHealth + *B*7Presched + *B*8Urgent + *B*9Wheelchair + *B*10Stretcher

Client initiated: Logit(Y) = *B*0 + *B*1Female + *B*2Agecat2 + *B*3Agecat3 + *B*4Dialysis + *B*5MentalHealth + *B*6Presched + *B*7Urgent + *B*8Escort+ *B*9Wheelchair + *B*10Stretcher

Obtained alternative transportation: Logit(Y) = *B*0 + *B*1Female + *B*2Agecat2 + *B*3Agecat3 + *B*4Dialysis + *B*5MentalHealth + *B*6Presched + *B*7Urgent + *B*8Escort

Health: Logit(Y) = *B*0 + *B*1Female + *B*2Agecat2 + *B*3Agecat3 + *B*4Dialysis + *B*5MentalHealth + *B*6Presched + *B*7Urgent + *B*8Escort+ *B*9Wheelchair + *B*10Stretcher

The inclusion/exclusion of the final covariates was determined using a series of Wald tests. The Huber White Sandwich estimator method was applied to produce robust standard errors adjusting for the clustering of trips by user. This differs from the typical standard errors produced based on maximum likelihood and gives more accurate estimates for clustered data of the sample-to-sample variability of the parameter estimates (Huber, 1967; StataCorp, 2005; White, 1980).

Statistical significance levels were evaluated at the 0.05 level. Logistic regression analyses were conducted using Stata 10 and Stata 11 (StataCorp, College Station, TX). Descriptive analyses were conducted using SAS 9.2 (SAS Institute, Cary, NC).

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* + 1. *Results of inferential analysis*

Descriptive statistics are presented in table 10. Bivariate analyses are presented in table 11. Multivariate analyses are presented in table 12.

Over a 3 year period, 152,182 trips were scheduled by 4,092 older adult clients. As this service is for non-emergency medical care, only a small percentage (3.2%), were considered urgent. Nearly two-thirds were scheduled for dialysis (63.6%). Approximately 11% of all trips were cancelled for a wide range of reasons.

Socio-demographic characteristics

In bivariate analyses, females were more likely to cancel for all outcomes (ORs ranged 1.16 to 1.44). An increased odds was observed in the adjusted analyses except for the overall cancellation model (ORs ranged 1.20-1.32). In bivariate analyses, the oldest old (age 85+) were more likely to cancel for all reasons examined except for health (ORs ranged 1.31 to 1.61). However, these findings did not hold in the adjusted analyses where some indicators of health and functional status were considered. Living in an area that was 10% or more Hispanic was slightly protective for overall cancellation in the bivariate and multivariate model.

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**Table 10.** Trip characteristics by cancellation reason, Medicaid LogistiCare one-way or round-trip users age 65+ residing in Delaware, 2008-2010 (N=152,182).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **All reasons**  **(n=16,057)** | | | | **Client cancelled**  **(n=5,685)** | | | | **Obtained alternative transportation**  **(n=633)** | | | | **Health reason**  **(n=1,212)** | | | |
|  | No | | Yes | | No | | Yes | | No | | Yes | | No | | Yes | |
|  | n | % | n | % | n | % | n | % | N | % | n | % | n | % | n | % |
| Female vs. Male | **88,791** | **65.23** | **10,996** | **68.48** | **95,684** | **65.31** | **4,103** | **72.17** | **99,323** | **65.54** | **464** | **73.30** | **98,899** | **65.51** | **888** | **73.27** |
| Age |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 65-<75 | **66,799** | **49.07** | **7,629** | **47.51** | **71,694** | **48.94** | **2,734** | **48.09** | **74,136** | **48.92** | **292** | **46.13** | **73,859** | **48.92** | **569** | **46.95** |
| 75-<85 | **54,238** | **39.84** | **6,168** | **38.41** | **58,335** | **39.82** | **2,071** | **36.43** | **60,174** | **39.71** | **232** | **36.65** | **59,932** | **39.70** | **474** | **39.11** |
| 85+ | **15,088** | **11.08** | **2,260** | **14.07** | **16,468** | **11.24** | **880** | **15.48** | **17,239** | **11.38** | **109** | **17.22** | **17,179** | **11.38** | **169** | **13.94** |
| Zip Code characteristic (1) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| %Poverty 10+ vs. not | **61,574** | **45.23** | **7,405** | **46.12** | **66,253** | **45.22** | **2,726** | **47.95** | 68,698 | 45.33 | 281 | 44.39 | 68,418 | 45.32 | 561 | 46.29 |
| %Rural >50 vs. not | **28,933** | **21.25** | **3,175** | **19.77** | **31,022** | **21.18** | **1,086** | **19.10** | **32,013** | **21.12** | **95** | **15.01** | 31,847 | 21.09 | 261 | 21.53 |
| %Hispanic 10+ vs <10 | **37,496** | **27.55** | **3,884** | **24.19** | **40,034** | **27.33** | **1,346** | **23.68** | 41,223 | 27.20 | 157 | 24.80 | **41,098** | **27.22** | **282** | **23.27** |
| Treatment reason |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Dialysis | **90,111** | **66.20** | **6,654** | **41.44** | **95,080** | **64.90** | **1,685** | **29.64** | **96,565** | **63.72** | **200** | **31.60** | **96,408** | **63.86** | **357** | **29.46** |
| Mental Health | **1,635** | **1.20** | **303** | **1.89** | **1,814** | **1.24** | **124** | **2.18** | 1,926 | 1.27 | 12 | 1.90 | 1,920 | 1.27 | 18 | 1.49 |
| Trip sched. status |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pre-scheduled (repeat basis) | **97,052** | **71.30** | **8,137** | **50.68** | **102,950** | **70.27** | **2,239** | **39.38** | **104,982** | **69.27** | **207** | **32.70** | **104,797** | **69.42** | **392** | **32.34** |
| Urgent | 4,361 | 3.20 | 499 | 3.11 | **4,638** | **3.17** | **222** | **3.91** | **4,780** | **3.15** | **80** | **12.64** | **4,843** | **3.21** | **17** | **1.40** |
| Trip characteristic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Escort | **4,947** | **3.63** | **1,212** | **7.55** | **5,717** | **3.90** | **442** | **7.77** | **6,103** | **4.03** | **56** | **8.85** | **6,063** | **4.02** | **96** | **7.92** |
| Level of service |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Wheel chair | **43,683** | **32.09** | **6,194** | **38.58** | **47,496** | **32.42** | **2,381** | **41.88** | 49,688 | 32.79 | 189 | 29.86 | **49,321** | **32.67** | **556** | **45.87** |
| Stretcher | **13,485** | **9.91** | **1,733** | **10.79** | 14,661 | 10.01 | 557 | 9.80 | 15,150 | 10.00 | 68 | 10.74 | **15,010** | **9.94** | **208** | **17.16** |

Bold indicates *p*<0.05

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**Table 11.** Bivariate logistic regression modeling the odds of one-way or round trip cancellation by cancellation reason, Medicaid LogistiCare one-way or round-trip users age 65+ residing in Delaware, 2008-2010 (N=152,182).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **All reasons** | | | | **Client cancelled** | | | | **Obtained alternative trans.** | | | | **Health reason** | | | |
|  | **OR** | **95% CI** | | ***p*** | **OR** | **95% CI** | | ***p*** | **OR** | **95% CI** | | ***p*** | **OR** | **95% CI** | | ***p*** |
| Female vs. Male | 1.16 | 1.01 | 1.33 | <0.05 | 1.38 | 1.13 | 1.67 | <0.01 | 1.44 | 0.98 | 2.13 | 0.06 | 1.44 | 1.10 | 1.89 | <0.01 |
| Age |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 65-<75 | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  |
| 75-<85 | 1.00 | 0.87 | 1.14 | 0.95 | 0.93 | 0.77 | 1.13 | 0.47 | 0.98 | 0.62 | 1.54 | 0.93 | 1.03 | 0.78 | 1.35 | 0.85 |
| 85+ | 1.31 | 1.12 | 1.54 | <0.01 | 1.40 | 1.12 | 1.75 | <0.01 | 1.61 | 1.12 | 2.30 | <0.05 | 1.28 | 0.88 | 1.85 | 0.20 |
| Zip Code characteristic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent poverty |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <8 | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  |
| 8-9 | 1.04 | 0.88 | 1.21 | 0.66 | 1.03 | 0.82 | 1.30 | 0.78 | 1.26 | 0.79 | 2.01 | 0.34 | 0.89 | 0.64 | 1.22 | 0.47 |
| 10-16 | 0.94 | 0.80 | 1.12 | 0.54 | 0.98 | 0.78 | 1.24 | 0.87 | 0.80 | 0.50 | 1.27 | 0.35 | 0.84 | 0.58 | 1.21 | 0.34 |
| 17+ | 1.10 | 0.92 | 1.31 | 0.28 | 1.18 | 0.91 | 1.52 | 0.21 | 1.28 | 0.71 | 2.32 | 0.41 | 0.99 | 0.70 | 1.40 | 0.97 |
| %Rural >50 vs. not | 0.91 | 0.78 | 1.06 | 0.24 | 0.88 | 0.71 | 1.08 | 0.28 | 0.66 | 0.40 | 1.08 | 0.10 | 1.03 | 0.75 | 1.41 | 0.87 |
| %Hispanic 10+ vs <10 | 0.84 | 0.73 | 0.97 | <0.05 | 0.82 | 0.68 | 1.00 | 0.05 | 0.88 | 0.63 | 1.24 | 0.48 | 0.81 | 0.60 | 1.10 | 0.18 |
| Treatment reason |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Other | ref |  |  |  | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  |
| Dialysis | 0.36 | 0.33 | 0.40 | <0.0001 | 0.23 | 0.19 | 0.27 | <0.0001 | 0.26 | 0.16 | 0.43 | <0.0001 | 0.23 | 0.18 | 0.30 | <0.0001 |
| Mental Health | 0.90 | 0.44 | 1.84 | 0.78 | 0.87 | 0.27 | 2.80 | 0.82 | 0.79 | 0.32 | 1.92 | 060 | 0.59 | 0.12 | 3.01 | 0.53 |
| Trip scheduling status |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Non-urgent (Same day to 3+ days) | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  |
| Pre-scheduled (repeat) | 0.39 | 0.35 | 0.44 | <0.0001 | 0.26 | 0.22 | 0.32 | <0.0001 | 0.24 | 0.14 | 0.40 | <0.0001 | 0.19 | 0.15 | 0.25 | <0.0001 |
| Urgent | 0.54 | 0.48 | 0.60 | <0.0001 | 0.58 | 0.50 | 0.67 | <0.0001 | 2.02 | 1.56 | 2.62 | <0.0001 | 0.18 | 0.11 | 0.30 | <0.0001 |
| Trip characteristic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Escort vs. no escort | 2.16 | 1.80 | 2.61 | <0.0001 | 2.08 | 1.78 | 2.42 | <0.0001 | 2.31 | 1.59 | 3.36 | <0.0001 | 2.06 | 1.57 | 2.69 | <0.0001 |
| Level of service |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ambulatory | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  |
| Wheel chair | 1.38 | 1.21 | 1.56 | <0.0001 | 1.54 | 1.28 | 1.85 | <0.0001 | 0.88 | 0.62 | 1.25 | 0.47 | 2.17 | 1.62 | 2.92 | <0.0001 |
| Stretcher | 1.25 | 1.05 | 1.48 | <0.05 | 1.16 | 0.92 | 1.48 | 0.21 | 1.04 | 0.69 | 1.55 | 0.87 | 2.67 | 1.85 | 3.84 | <0.0001 |
| Total trip distance |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0-4 miles | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  |
| 5-10 miles | 1.01 | 0.87 | 1.18 | 0.91 | 1.01 | 0.79 | 1.28 | 0.95 | 0.99 | 0.61 | 1.61 | 0.96 | 0.85 | 0.60 | 1.20 | 0.36 |
| 11-18 miles | 1.04 | 0.87 | 1.23 | 0.69 | 1.11 | 0.88 | 1.40 | 0.37 | 0.87 | 0.49 | 1.53 | 0.63 | 0.85 | 0.61 | 1.19 | 0.35 |
| 19+ | 1.29 | 1.10 | 1.52 | <0.01 | 1.33 | 1.05 | 1.68 | <0.05 | 1.02 | 0.61 | 1.71 | 0.93 | 1.19 | 0.86 | 1.64 | 0.29 |

NOTES: (1) the standard errors were produced using the Huber White Sandwich estimator adjusting for the clustering by user (n=4,092); and (2) Zip Code characteristics were obtained from the US Census.

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**Table 12.** Multivariate logistic regression modeling the odds of one-way or round trip cancellation by cancellation reason, Medicaid LogistiCare one-way or round-trip users age 65+ residing in Delaware, 2008-2010 (N=152,182).

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **All reasons** | | | | **Client cancelled** | | | | **Obtained alternative transportation** | | | | **Health reason** | | | |
|  | **OR** | **95% CI** | | ***p*** | **OR** | **95% CI** | | ***p*** | **OR** | **95% CI** | | ***p*** | **OR** | **95% CI** | | ***p*** |
| Female vs. Male | 1.04 | 0.93 | 1.17 | 0.45 | 1.20 | 1.00 | 1.43 | 0.05 | 1.20 | 1.00 | 1.44 | <0.05 | 1.32 | 1.05 | 1.66 | <0.05 |
| Age |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 65-<75 | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  |
| 75-<85 | 0.97 | 0.87 | 1.09 | 0.63 | 0.91 | 0.77 | 1.06 | 0.23 | 0.91 | 0.78 | 1.08 | 0.28 | 0.94 | 0.73 | 1.20 | 0.60 |
| 85+ | 1.00 | 0.88 | 1.14 | 0.98 | 0.95 | 0.80 | 1.14 | 0.60 | 0.98 | 0.82 | 1.17 | 0.80 | 0.73 | 0.51 | 1.04 | 0.08 |
| Zip Code characteristic 3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Percent Hispanic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 0-<10 | Ref |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 10+ | 0.88 | 0.78 | 0.99 | <0.05 |  |  |  |  |  |  |  |  |  |  |  |  |
| Treatment reason |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Other | ref |  |  |  | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  |
| Dialysis | 0.43 | 0.34 | 0.55 | <0.001 | 0.32 | 0.22 | 0.47 | <0.0001 | 0.31 | 0.21 | 0.46 | <0.0001 | 0.58 | 0.39 | 0.87 | <0.01 |
| Mental Health | 1.14 | 0.57 | 2.27 | 0.71 | 1.18 | 0.37 | 3.75 | 0.77 | 1.12 | 0.36 | 3.52 | 0.85 | 1.62 | 0.33 | 7.96 | 0.55 |
| Trip scheduling |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Non-urgent (Same day to 3+ days) | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  | Ref |  |  |  |
| Pre-scheduled (repeat basis) | 0.78 | 0.62 | 0.98 | <0.05 | 0.62 | 0.43 | 0.90 | <0.05 | 0.63 | 0.44 | 0.92 | <0.05 | 0.32 | 0.22 | 0.49 | <0.0001 |
| Urgent | 0.52 | 0.46 | 0.59 | <0.0001 | 0.66 | 0.56 | 0.79 | <0.0001 | 0.55 | 0.47 | 0.64 | <0.0001 | 0.12 | 0.07 | 0.21 | <0.0001 |
| Trip characteristic |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Escort vs. no escort |  |  |  |  | 0.87 | 0.76 | 0.99 | <0.05 | 0.89 | 0.78 | 1.01 | 0.08 | 0.79 | 0.62 | 1.02 | 0.08 |
| Level of service |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ambulatory | Ref |  |  |  | Ref |  |  |  |  |  |  |  | Ref |  |  |  |
| Wheel chair | 1.14 | 1.02 | 1.27 | <0.05 | 1.18 | 1.00 | 1.38 | <0.05 |  |  |  |  | 1.73 | 1.29 | 2.31 | <0.0001 |
| Stretcher | 1.04 | 0.90 | 1.20 | 0.60 | 0.80 | 0.67 | 0.95 | <0.05 |  |  |  |  | 2.36 | 1.64 | 3.39 | <0.0001 |
| **Pseudo R-sq** | 0.0392 | | | | 0.0641 | | | | 0.0627 | | | | 0.0671 | | | |
| ***p* for goodness of fit** | <0.0001 | | | | <0.0001 | | | | <0.0001 | | | | <0.0001 | | | |

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NOTES:

1. the standard errors were produced using the Huber White Sandwich estimator adjusting for the clustering by user (n=4,092);
2. shading indicates that the independent variable was not included in the model; inclusion of zip code, treatment, and trip variables in model were evaluated using the Wald test;

Zip Code characteristics were obtained from the US Census.

Treatment type

Dialysis trips were less likely to be cancelled for all outcomes and these results held in the multivariate models (ORs = 0.31 to 0.58). Mental health trip cancellations were not statistically different from other treatment types.

Trip characteristics

Pre-scheduled and urgent trips were less likely to be cancelled in all models (adjusted ORs = 0.32 to 0.78 and 0.12 to 0.66 respectively). Use of wheel chair or stretcher was associated with cancellation in bivariate and multivariate analyses except for in the obtained alternative transportation model where other transportation might not be able to accommodate that level of service. Clients who needed a stretcher were slightly less likely to cancel (OR=0.80) while they were nearly 2.4 times more likely in the health reasons model than those whose level of service was ambulatory. In bivariate analyses, those clients who were able to bring an escort were more likely to cancel (ORs= 1.8 to 2.3); however, after considering some indication of health and functional status, were slightly less likely to cancel.

1. *Discussion of inferential analysis*

This study explored factors associated with an increased odds of canceling subsidized transportation for health care among Delaware Medicaid older adults. This database allows for a look at how an important service is used and could potentially be better utilized. This system provides access to preventive and potentially end of life care. However, nearly 11% of scheduled trips were not taken.

It is important to note that the analyses are somewhat limited as complete socio-demographic information is not available (e.g. poverty level, race/ethnicity, education, household composition or marital status, residence type, etc.). It is likely that one’s ability to manage health care and transportation varies by socio-demographic characteristics. Further, the data are not linked to claims or medical records so a complete assessment of health and functional status cannot be determined. Also, actual health care utilization and expenditures cannot be evaluated. And while this database is longitudinal, it is not a comprehensive source for mortality follow-up. Relatively few cancellations were due to death over this 3 year period. The pseudo R-squares in these models are relatively small.

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However, within these limitations a few patterns emerged. There is some indication that health status is associated with reduced odds of cancellation while controlling for age and other factors. This suggests that those who are most in need of transportation (they made an appointment) and who are most in need of medical services do not miss these trips. Scheduling and dialysis were among the leading factors associated with reduced odds of cancellation. Scheduling status may be a broad indicator of treatment or health status. For example, nearly all dialysis trips are pre-scheduled. Future analyses will work on further categorizing the treatment type variable to finer categories and examining how this relates to scheduling. It would be important to try to understand if, for example, preventive care trips are more likely to be cancelled. Further, only 24% of stretcher level of service and less than 2% of wheel chair level of service was considered an urgent schedule. Perhaps a health/functional measure can be derived using the treatment type, scheduling, and level of service.

Females were slightly more likely to cancel and would be important to better understand why. In a national study, females were more likely to be transportation disadvantaged and delaying or missing health care (Hughes-Cromwich & Wallace, 2006). It was expected that clients who lived in rural areas may be less likely to cancel as alternative public transportation systems may not be available. In this study population, a small proportion of clients lived in highly rural areas. Perhaps Zip Codes can be related to other indicators of urbanity, for example, density of bus stops or road network. Future work might involve looking at infrastructure characteristics to better understand access issues.

This exploratory study identified a few patterns related to the canceling of subsidized transportation. Next steps include conducting a similar analysis for other states and age groups. A basic description of these cancellations will assist in developing research questions for future study with this data and potentially with other data and/or with linked data. The results of this study may also provide some insight into how to improve the use of subsidized transportation. For example, in adjusted analyses having an escort was slightly protective of cancellation and presumably treatment compliance. Perhaps encouraging the use of escorts or providing escorts will assist in better health care access for low income, older adults.

#### b. Multivariate Analyses Cost of Completed Trips

A report by the Transit Cooperative Research Program (2006) noted that non-emergency medical transportation can reduce cost of emergency room and hospital expenditures. Costs accrue as a result of delay for preventive services and timely chronic disease management. Older adults are particularly disadvantaged in this regard as they are most likely to have multiple chronic conditions and disability requiring timely and frequent medical care—the majority of which is NEMT. The report provides findings documenting NEMT costs per NEMT one way trip and compares this to costs associated with lack of access. Using LogistiCare NEMT use data, Delaware 2010, this study examines trip cost associated demographic characteristics, type of service, level of service, and reason for trip (proxy for major chronic condition) to determine the relative contribution of these NEMT service characteristics and demographic and health of the user.

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* + 1. *Methods of multivariate analysis*

This analysis was limited to those Delaware users in 2010 with 2-leg trips where both legs were verified and paid and were not subject to special rates. Total cost was the dependent variable for the analysis. Total costs were defined as transportation costs for completed trips involving 2-leg segments (round trip) and were summed for both legs. . Independent variables include include both socio-demographic characteristics and trip characteristics. Socio-demographic characteristics include gender, age categories (0 - <18 (referent), 18 - <65 years, 65 - <74 years, and, 75+ years) and residential characteristics as a proxy for socioeconomic status and access. Level of rural versus urban populations of NEMT user residence was determined by census data and was entered as percent rural. Percent of population on residence in poverty was constructed using a similar procedure. Trip schedule was organized into three non-overlapping categories; non-urgent, pre-scheduled and urgent. It should be noted that urgent care does not necessarily reflect the seriousness of the users health, but rather that the trip was scheduled within 24 hours of trip. Level of service was reported for three levels, ambulatory, wheel chair and stretcher. Each of these three levels of service has increasing cost reimbursements associated with the NEMT service. Total miles was also included as a continuous variable and represents the summed distance in miles from pick up and drop off for each leg. Cost reimbursement also increases with milage. For the purpose of this analysis, reason for trip or treatment reason was organized into three categories; dialysis, mental health and other as the referent. Linear regression was conducted using all trips and then adjusting the SEs for the correlations between observations on the same person.

* + 1. *Results of Multivariate analysis*

Table 13 provides the findings from a multivariate regression of trip costs. Costs associated with females were not statistically different from males. In general, trips for adults were $4 less compared to youths. Zip code, percent rural residence, and poverty were not significantly associated with cost. As expected, total miles increased the cost of a trip. Holding level of service and other factors constant, with every mile cost increased by approximately 60 cents and this varies slightly by Zip Code poverty. The interaction between Zip Code rural status and total miles was explored (not shown). Scheduling status was significantly associated with decreased costs. Pre-scheduled and urgent trips were, on average, $4 and $11 less expensive than non-urgent trips. As expected, increased level of service was associated with increased costs. In general, dialysis trips are less expensive.

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**Table 13.** Multivariate Regression of 2-leg trip costs, LogistiCare Delaware 2010.­­

| Effect | Regression coefficient | SE | P |
| --- | --- | --- | --- |
| Intercept | 17.39 | 1.37 | <0.0001 |
| Female vs. Male | -0.58 | 0.66 | 0.38 |
| Age |  |  |  |
| 0-<18 | ref |  |  |
| 18-<65 | -4.11 | 1.06 | <0.001 |
| 65-<75 | 1.13 | 1.48 | 0.45 |
| 75+ | -2.91 | 2.02 | 0.15 |
| Residence Zip Code % rural | 0.01 | 0.01 | 0.37 |
| Residence Zip code % poverty | -0.03 | 0.04 | 0.41 |
| Total miles | 0.62 | 0.03 | <0.0001 |
| % Poverty\*Total miles | 0.01 | 0.00 | <0.05 |
| Trip scheduling |  |  |  |
| Not urgent | ref |  |  |
| Pre-scheduled | -3.79 | 0.73 | <0.0001 |
| Urgent | -10.92 | 2.11 | <0.0001 |
| Level of service |  |  |  |
| Ambulatory | ref |  |  |
| Wheel chair | 37.96 | 2.13 | <0.0001 |
| Stretcher | 170.90 | 3.63 | <0.0001 |
| Urgent\*stretcher | 24.61 | 11.80 | <0.05 |
| Treatment reason |  |  |  |
| Other | ref |  |  |
| Dialysis | -10.99 | 1.08 | <0.0001 |
| Mental health | -0.76 | 1.05 | 0.47 |

Note: Includes trips where both legs were paid; excludes special rate trips; SEs are adjusted for the correlations b/t observations (n=211,398) on the same person (n=11,356); and r-square = .746.

* + 1. *Discussion of Multivariate Analysis*

These are exploratory analyses but the preliminary findings suggest that NEMT costs and cost saving are more complex than just the reasons for trip. After adjusting for other factors, age is associated with costs. It is expected that NEMT trip cost is associated with mileage and level of service as rates of reimbursement are based on these factors. While cost for NEMT users is considerably lower that the referent “other” category, additional exploration of other reasons for trip should be explored. Other major categories include diabetes, day care, and preventive services. Finally, these analyses can be conducted within the older adult user population and modeled across states for examining consistency in findings.

## Summary

The high portion of eligible older adults who actually use LogistiCare services is a strong indicator of need by this group. The high proportion of older adults who use NEMT for dialysis is also an indicator of the need for and importance of NEMT for older adults users and underscores the significance of this service to the health and well-being of this vulnerable population. This observation is reinforced by the lower cancellation rate, especially by older adults.

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# Continued Work

There is a need to further explore whether a link exists between multiple chronic conditions and transportation access. We need to determine whether transportation usage for more than one service can be identified. Data pertaining to co-morbidity exist but are not included in the primary transportation use data set. While this is beyond the scope of this project, if requested co-morbidity could be addressed through other data sources but would require additional resources. Similarly, disability data and findings, if available, should be interwoven with age-specific findings. Minimal information on mobility disability exists in terms of type of transportation required (e.g., need for wheelchair, ambulance), and will be explored.

A major focus for the remainder of the project is to complete a report of the findings, which will include a summary of procedures and key results along with discussions of these findings. This will also include input from the Scientific Advisory Committee.

We will present the findings from this project on January 24 at the national Transportation Research Board conference in Washington. This pre-release presentation with invited attendees will include a presentation of the findings by research team members, comments from the AMA perspective and LogistiCare and open discussion on implications moderated by Easter Seals.

Finally, one possible next step the research team would like to pursue is to seek additional two years of funding through the Retirement Research Foundation or Atlantic Philanthropies.

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# Recommendations for LogistiCare Data File

While the LogistiCare data files are designed for documentation of eligibility, NEMT service delivery and fiscal management, they have considerable potential for health research and policy. The quality and depth of the data, especially more recent data files, are a rich data source for determining patterns of NEMT use and characteristics of users. The *Scope of Work* data file provides limited information on state level services allowed and provide some utility for determining state-to-state difference in NEMT. In addition, with the unique participant identifiers, the data can be used to determine multiyear patterns in NEMT use, program growth, and participant attrition. However, the LogistiCare data files have limitations that restrict their potential for determining the impact of NEMT on the health and well-being of older adults and the cost effectiveness of services provided. The following recommendations are offered as opportunities to significantly improve LogistiCare data files in determining policy and the public health impact of NEMT.

* The eligibility file includes a listing of all eligible participants for NEMT but is limited to a few demographic characteristics (e.g., age, gender). While we have found that a small proportion of eligible person actually use NEMT and, compared with younger eligible individuals, a greater proportion of the older eligible population use NEMT, we have insufficient information to compare health status and demographic differences between eligible persons who do and do not use NEMT.
* Similarly, very limited information is available on the health status, chronic conditions and co-morbidities of NEMT users. Chronic illness has been inferred and limited to the primary reason for the NEMT service use (i.e., purpose of trip). Similarly, (mobility) disability has been inferred by the type of NEMT provided (i.e., ambulatory, wheelchair, stretcher). A minimal set of standard health status and disability measures linked to the user file would considerably improve analyses of health status and service use.
* Type of transportation service (e.g. bus, mass-transit, taxi) was not included in the LogistiCare data files. However, the data file pertaining to type of service is available. Merging type of transportation data to the user file would greatly enhance our analyses, especially interpretations of cost, canceled appointments and availability of services.
* Linking participants in the LogistiCare data file to Medicare use files and the National Death Index would significantly improve the value of the data for policy decisions and research investigation.
* Additional state level data beyond what is provided in the Scope of work file is needed to better understand differences between states in NEMT use.

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# External Feedback and Recommendations for Future Research

This project received specific feedback from two external sources, invited attendees of the pre-release conference by the U.S. Access Board in Washington DC, January 24, 2012 and comments from members of the Scientific Advisory Board. These comments are provided in Appendix A. The overall response, without exception, was extremely positive and stresses the desire to expand on this work. Sample comments include:

* This is great research, I am glad to see it....I applaud the work you have done, it’s interesting.
* This presentation has just been absolutely wonderful. Dale captured the excitement that many of us feel about the level of detail. It’s a very provoking presentation.
* I think this is a great endeavor. Too often academics don’t think about the type of data that particularly managers of benefits have in healthcare, so I think it’s just terrific that you are breaking that ground. I hope there will be a more structured collaboration or more collaborations between academics and government contractors, particularly benefit managers in public health care programs. The data that contractors collect would be more research friendly.
* Thank you so much for doing the work that you guys have done. What you presented today is incredible. This information is timely for the American Cancer Society and our advocacy arm, the Cancer Action Network. We are going to convene a large group with people in Atlanta and the CAN group based in DC to talk about transportation as the organization and the society is reevaluating the transportation program that we offer to cancer patients.
* I am excited in terms of what the potential for the other research questions is.
* You all have done a fabulous amount of work.
* I appreciated the study and, as one of the financiers [FTA], thank you very much.
* This is great work and I’m impressed and I look forward to seeing the final report and thank you.

More specific comments and recommendations for additional research were provided. These comments are organized into 12 areas and are summarized below. Specific recommendations for follow-up research are also provided in each of the 12 areas.

*1. Reasons for trip*

Reviewer Comment: The need for additional information as to the (medical) reason for the trip was expressed. There was a request to have information as to how to better predict growth in paratransit ridership based on causes rather than trends is ridership. Key older participant characteristics such as mobility disability, activities of daily living, significant cognitive impairment, available family care and availability of alternative transportation are required to determine *reason for trip* beyond the measure of the primary medical reason for medical visit. A related comment is the request to examine in more detail, how different reasons for trip differ in terms of use of NEMT services. Specific purposes for NEMT present different profiles and knowing the patterns in reason for trip may help to predict future growth.

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Preliminary findings: There are several preliminary findings pertaining to reasons for trip

* Older adults do differ from younger in the primary medical reasons for NEMT and as expected, chronic diseases such as diabetes are more common among older riders
* Although preliminary, there are clear differences by state (Oklahoma vs. Delaware) in the patterns of reason for trip.
* Reason for trip is associated with important NEMT outcomes including canceled trips and need for special transportation.

There are also characteristics in the LogistiCare data that limit interpretation of the findings on reason for trip.

* The primary reason for the trip is the reason recorded. Given this, reasons for trip such as use of preventive services, may be underestimated do to having multiple purposes for a medical visit having a higher priority.
* In general, older adults are more likely than younger individuals to have multiple health issues which may not be recorded on reason for trip.
* Reason for trip may be associated with *Scope of Work* agreements which vary from state to state.

Even with these limitations, several questions can be addressed with additional analyses of reason for trip.

1. What characteristics of the older community residing population lead to the use of paratransit and does differ by type of illness profile?

2. Does the reason for trip change among older adults over time, if so, what are the implication to patterns of NEMT use?

The LogistiCare data can address these unanswered questions on reason for trip. There are models to identify the characteristics of individuals who do and do not uses NEMT services. One way to examine NEMT use within an existing infrastructure that’s already serving that population at risk. For example, in Illinois, a community care program provides services to 80,000 community residing older adults who would otherwise be in nursing homes. In-depth information on these clients contains valuable functional and cognitive status, medical problems and available informal care assistance. States which have these waiver programs and which also provide NEMT could be identified and examined for client demographic and health characteristics associated with transportation use. This same strategy could be used to understand NEMT used in the older V.A. population.

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Other analyses of the LogistiCare data could focus on the stability of reason for trip over time. Our preliminary findings of participants in the NEMT client file indicate that approximately 30 to 40 percent user attrition from year to year. An examination of reason for trip over time would provide important information on not only the stability of purpose for medical visit, but also those who are short versus long-term NEMT riders. Do clients with a specific reason for medical visit, such as mental health, than those who report dialysis as the primary reason for trip? These studies would provide insight on projected growth as well as sustainability.

If the distribution of primary reason for medical visit does not reflect patterns of medical care utilization and the distribution of chronic illness and disability of older adults in a given state, it is critical to understand the source of the discrepancy. Analyses could be conducted that examine reason for trip across states to determine level of consistency (The findings between Oklahoma and Delaware on reason for trip identified inconsistencies). An examination of reason for trip across states based on Scope of Work would be a reasonable first step. If items in the scope of work are associated with variations in reason for trip, this can be useful in modeling growth in paratransit services within each state.

*2. NEMT-Eligible Riders Not Using the Service*

The relatively low proportion of eligible individuals who were actually enrolled is of interest. Is there a way to determine potential contributing factors (e.g. drive on own, other sources of transportation)?

Comment: Some people are eligible for NEMT but are not being served because they either choose not to or do not know about it. Eldercare Locator receives a high percentage of calls for an immediate need for transportation, and sometimes people believe the NEMT service for which they are Medicaid-eligible is not available to them. What is the incentive for increasing the usage of this valuable service by those who don’t use it?

Response: Typically, when you begin an NEMT program there’s an outreach effort made. It’s usually part of the contractual effort between the state agency and, in our case, the brokerage service. Another thing is that, particularly with Medicaid, people are often discouraged from using NEMT because it has to be the last source of transportation. A rider must exhaust all other sources before she can be billed for a Medicaid trip. Regarding stretcher services, people are probably unnecessarily in emergency type ambulances. Riding in a different type of vehicle with a stretcher would cost riders about a third as much to do, but people are not aware that they do not always need NEMT but just need to be transported in a reclining position. In many cases, riders aren’t comfortable that the people providing the [Non-NEMT] services are properly credentialed, trained or monitored.

Response: There are creative ways in which you can come up with good estimates of how little or how much we are serving a community. There are models to identify the individuals who haven’t been reached and the true denominator. One of the ways you can approach finding the real numbers is to piggyback on an existing infrastructure that’s already serving that population at risk. For example, in Illinois, a community care program that provides services to 60,000 older adults who would otherwise would be in nursing homes has in-depth information on their customers’ IDL’s and ADL’s needed for assistance.

Comment: There’s an issue of statewide coordination in lowering cost and increasing use of NEMT.

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*3. How Age Affects the Use of NEMT*

Comment: There are relational databases looking at density by ZIP code, and it would be neat to look at these findings against Medicare claims data in terms of longitude. [Regarding slide 39] Isn’t it possible that the younger people were still using other modes of transportation and didn’t need NEMT? Let’s start to look at the 80-85 year old range and see how the modes of transportation change. In addition to death, factors that can affect drop-outs include: the rider moved to other settings; he became institutionalized; someone else is driving him; he’s using a volunteer driver program; the type of vehicle he’s using has changed; or, though you don’t have this from the data, the rider didn’t like how he was treated by the driver and other issues.

*4. Coordinating Dialysis Trips*

Comment: Is there a movement or is there the ability to coordinate dialysis trips of multiple people that could save costs?

Response: We need to get the medical community involved in the coordination efforts. It could and should be done because every dollar we save in transportation is fed back in providing more transportation. There are some efforts in cases where we do that with individual dialysis clinics. In some cases, we have been successful in working with groups.

*5. Cancellations*

Comment: What is the difference between a cancellation and a no-show? Aren’t there differential costs?

Response: Cancellations in this study include all the no-shows—if we arrived at the door and the passenger doesn’t come out. There are differential costs, and it’s a loss of opportunity. If two thirds of the people don’t show up, then you have more cost to the operator, to the programmer and all around.

Response: This is why looking at the cancellations, what’s causing it and why it’s happening is important.

Comment: Cancellation seems quite high in general and this is a central issue. We need to get a better sense of who cancels. Being hospitalized or ill is a reasonable reason for cancelling. In the dialysis-mental health comparison, the data on dialysis patients makes sense as people who signed up for dialysis must receive it. I was surprised that the mental health group cancellation rates weren’t worse.

Response: Numbers in the data were working the way we expected them to. We then ran into some quirks, for example with the urgent care point. When I understood the operational definition was not based on seriousness but on the timing of it, I felt a little better there was a real finding. It took us a year to feel somewhat comfortable with this data.

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*6. How Policy Could Have Affected Findings*

Comment: Regarding the role of public programs, be aware of the extent to which your findings are driven by policy. You may have a low take-up rate for an NEMT benefit simply because there’s guidance from the Center on Medicaid Services that says this is a benefit of last resort. It is a mandatory benefit, but there’s no entitlement to it unless a person lacks transportation to a covered benefit. You may just be seeing an artifact of the policy. The turnover you are seeing in your population from year to year may be nothing more than the turnover of the Medicaid population.

Also, it’s important to keep in mind that you are looking at data from managed NEMT, not NEMT Medicaid benefit in general, although there’s been a big growth in managing an NEMT under brokers like LogistiCare due to a change in policy in 2006 when barriers for states to use those managers were eliminated. Only about half of the Medicaid population is in a managed program. In terms of all the variables you are looking at, you may see significant differences if you were to look at the same benefit in a non-managed environment.

Response: We are being cautious about how [these findings are] interpreted and we leave that for others and for other sources of information to either supplement or confirm that it’s the interpretation that’s appropriate. I like the idea or concept that what we are seeing may be the result in policy and certainly it is toward an extent. I think it would be interesting to model potential changes to see what the outcomes would be. We do have a natural experiment in the concept of scope of work by state. We can kind of look at how variations in that seem to play a role in the pattern of use.

*7. Managed Transportation Benefits*

Comment: I was interested in your comments about residents of Delaware and Oklahoma who have other types of chronic diseases and rely on the NEMT benefit. It will be interesting to watch the managed transportation benefits as more and more states are starting to shift their aid to people with disabilities and visual impairments into managed care. It will be interesting to see how people with disabilities access the benefit as they are in a more coordinated delivery system.

*8. Use of Companions*

Comment: You spoke about how we might save money by encouraging companions to accompany patients and take them further to the door, thus keeping transportation non-urgent. In addition to using a less expensive transportation method, by using NEMT, two caregivers do not have to miss a day of work/lose income in the effort to help get their older adult family member to a doctor’s appointment (one would park the car and the other would assisting the family member). When you do surveys, consider the companion and ask a complexity of questions. You could show a savings in terms of society, not just transportation. I hope to contribute some of those ideas as I look at it much in depth. We should encourage caregivers to use NEMT through being a companion to their family member.

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Response: If we were to do the survey, we would want to use that context. Shared care, or the transition to becoming a caregiver, is associated with transportation. Part of the scope of service with the contract may or may not include companion assistance.

Response: You must remember this is NEMT not paratransit services. We don’t necessarily have a really good handle on that service and what’s being required because drivers often go above and beyond. Notably, a companion passenger is typically allowed to ride at no extra charge.

*9. One-Way Versus Roundtrips*

Comment: I was struck by was the high percentage of round trips. Sometimes, people call NCST and are able to take NEMT to their medical facility but must use a different method of transportation after receiving dialysis or chemotherapy. Perhaps people use NEMT roundtrip if it’s their only alternative. In your further research, it might be interesting to tease this out.

*10. Urgent Trips*

Comment: Regarding urgent trips booked less than 24 hours in advance, it seems odd that people that make their appointments at the last minute would have less expensive trips than those planning in advance.

*11. Future Plans for the Study*

Comment: Are you planning to extend this study to groups and states other than Delaware and Oklahoma? It would be interesting to look at less homogenous states, such as in Virginia and Ohio (size and diversity) and Mississippi (African American minority and low-economic status groups).

Response: We needed to understand the data set and Delaware was appropriate for that. Oklahoma seemed like the best fit for the next level, and indeed we found another level of complexity in that data, so each state has a level of complexity unto itself. We had a suspicion that Virginia would be complex in a number of ways, and we decided that, while that would be a nice state to add, it was premature to do at this point in our work.

Response: You bring up a good point, however, as we do need to go further. This was a pilot kind of project. We only had a complete five years set of data on five states. For what the research team has done and what time and effort they put in on this initial study, they went far beyond in terms of what we hoped in terms of scope. It would be great to provide the researchers with information from states that do not use managed care to look at the difference in the direction these services take and the cost.

Comment: These findings are just a part of the picture. Maybe we should call NEMT *nonemergency medical transportation* with small letters rather than capital letters as that may distort the role of policies. In River City, we attempted to blend our paratransit together with a very small amount of money from the Older Americans Act. Also, we don’t want to lose site in the United We Ride effort in terms of what can we do in a given locality to maximize the efficiency, effectiveness and service to people. Getting a ride to where a person needs to go is more important than who provides it.

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Response: There’s good coordination in the Peduca area. It might be worthwhile to get data through that system to do some comparison here in terms of how it works. They are doing a completely coordinated model in terms of their services. The Medicaid model is the model that we have because we haven’t been allowed to get in most of the human service transportation yet.

Comment: At the federal level, we have a federal interagency group looking at health. We are going to be grappling with federal policy issues associated with that (though this is not a legislative group). We want to help to make our programs more responsive. The other database you might be interested in is the Veterans Administration, one of the members of our group. They are trying to upgrade the transportation of their own system and have created, for the first time within the VA, a veterans transportation service group. They have discreet grants they are making to the medical centers around the country, and they want to measure the impacts of these investments on the cost of health care they are delivering.

Below is a summary of comments and recommendations as well as response to each comment.

*Overall Comments*

1. Site selection:

Why pick Delaware and Oklahoma? The choice of Delaware as a starting point makes sense given its size and presumed homogeneity, as does the comparison with Oklahoma given the geographic differences between the two. However, comparisons with other states would also be of interest (eg Virginia for its size and diversity, both of client and geographic features, and Mississippi, for its large African American population). Are comparisons with other sites planned?

2. Eligibility v. enrollment:

The relatively low proportion of eligible individuals who were actually enrolled is of interest. Is there a way to determine potential contributing factors (eg drive on own, other sources of transportation)?

3. Cancellation rates:

The high cancellation rates are of interest for a variety of reasons. In the clinical arena, 'no shows' are an area of increasing concern because of the time and revenue implications. Having a better understanding of why people cancel would be very helpful. If they have other sources of transportation or are hospitalized, that would be understandable, and it may be helpful to focus efforts on others. It was not clear if Table 5 excluded those with other transportation sources or who rescheduled.

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4. Role of dialysis/mental health in cancellation rates:

One would expect a low cancellation rate among dialysis patients for several reasons: a) they are motivated (they agreed to dialysis); b)they are sicker by definition and feel worse if they miss dialysis. On the surface, one might expect a higher cancellation rate among mental health patients. However, it may be low in this segment because you have a subset that is more motivated to get treatment, as evidenced by their signing up for transportation services in the first place. To get at the reasons for everyone else, it may be worthwhile considering dropping dialysis patients (and mental health patients) from the analysis and looking at the remaining individuals. Alternatively, one could consider looking at dialysis patients who cancel to see why as this group really runs counter to expectations.

5. 'Urgent' trips least expensive:

Even accounting for the definition of urgent provided, these findings run counter to expectations. One would anticipate pre-scheduled trips to be the least expensive, followed non-urgent and then urgent, given that one would assume that the greater the lead time in scheduling, the less expensive the trip. Are these findings comparable to other studies and are there potential explanations for the findings?

6. Literature review:

A point of interest that perhaps should be emphasized is the comment that statewide coordination of NEMT services has been associated with lower cost and increased use of services.

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*Three photos on the back cover: (1) A doctor talking to an older patient. (2) A woman in a wheelchair boarding a bus. (3) A doctor and a patient who is writing on a clipboard and using crutches.*

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