

STROKE RECOVERY CENTER

Update to

Organizational Health Initiative Project

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Executive Summary

Organizational Health Initiative Project

The Organization Health Initiative Project (OHIP) is now in its third year of data gathering and analysis. The OHIP methodology is to gather data regarding outcomes of treatment for chronic stroke and TBI suffers from the existing patient base and compare such data to stroke and TBI victims and survivors along with national data regarding seniors and disabled populations. The Project objective has been to develop a client data tracking system that will be used to prove the economic and social value of long-term stroke rehabilitation. The hypothesis tested is that stroke and TBI victims who use Stroke Recovery Center are less a financial burden on the health and social service budgets than those who do not have access Stroke Recovery Center services. Stroke Recovery Center, as the best practice model for continuing care for stroke survivors,

requires eligibility for predictable and sustainable funding from government, private insurance and/or medical group providers to become sustainable, to develop more comprehensive programming and to be replicated in other locations. The project is designed to provide the value proposition to potential funders within the healthcare system and position the Center as a value added partner in care.

Research Design and Parameters

We have collected and tabulated data for 89 clients who as of January 1st, 2009 were Stroke Recovery Center users having been there 3+ months and attended at least 3 times per month or more. We were able to compare the data points with the cohorts we collected in years 1 and 2.

The initial baseline data was analyzed using the criteria of length of attendance (LOS) at the Stroke Recovery Center. Looking at the year 3 data, we found that the length of attendance remained a median of 2 years with the heaviest concentration continuing to be in the 2 and 3 year time frame consistent with the year 1 and 2 data.

Having three years of data we were able to track the drop-out rate and analyze the characteristics of those who do not continue and reasons for non-compliance with the program along with the utilization criteria we determined in the year 1 and 2 study.

With the median LOS at 2 years, data points were again compared to determine if there were differences in the early users as compared to those who have been at the center for 2+ years. With that data in hand, analysis went deeper to look at the changes from year 1 and 2 as well.

Results

The data findings were addressed and compared to data from year 1 and 2 in the following categories:

Client Drop-out in year 2: This category was identified as clients who had attended at least 3 months in 2009, however, had dropped out by December of 2009. There was an 11.2% drop out as a percentage of the whole, however, of that number, 44.6% were from death and/or deteriorating health issues that no longer allowed the client to participate. The other reasons reported were moving out of the area, return to work and no reason.

Age and Sex of Clients: The average age of clients was 68.8 similar to the first year of the study. The median age is 69, slightly lower than year 2. As expected the group that has a longer LOS has a slightly higher average age of 71.8. The client base continues to reflect national norms with the highest propensity for stroke being in the 60-79 age group and men and women being at equal risk. As the group ages, men become higher risk but prior to 60 years of age women have an almost 2 time risk over men. This is supported by our sex differentials a higher propensity of women in the first 2 years but the men catching up as the LOS extends.

Prescription Drug Usage: Prescription drug usage per Patient increased in year 3 to 7 per patient. This is in line with the Kaiser study of seniors which identifies 7 as the norm. Examining the drugs indicate a wide variety of drug used including dietary supplement and vitamin usage. Co-morbidities appear to be the major determining factor and suggest that drug usage needs to be examined on a case by case basis.

Transportation: the shift to public and/or commercial forms of transportation and a return to self transportation continue to support the rehabilitation efforts to increase confidence and independence and decrease reliance on family. Professional caregivers as transporters remain constant. Bus usage moved from 5.3% in the first 2 years to 20% in the over 2 years group.

Ambulation: Year 3 data indicates that there is a continued aggressive move to utilize mobility aids among the patients. Initial data seemed to indicate that there would be less use of support

aids as the years went on, however, the data suggests the opposite is true. Stability and balance are critical to successful mobility and independence and the use of aids does aid that process

Orthotics: Initially it was contended that orthotic use would decline as the years progress but, as with ambulation aid, the use of orthotics has increased as the years progress. This suggests that orthotics use is being prescribed to increase balance and mobility in an aggressive manner and should be correlated to reduction in falls.

Emergency Room Visits: In 2009 17.3% of the patients made at least one visit to an Emergency room (ER) even less than the prior years. All of these visits came from the group who have been at the center less than 2 years. As the patients remain at the Center the propensity to use the ER declines which offers significant saving to the healthcare system.

Falls: The percentage of patient who fall has declined each year of the study to 13.5% in year 3. This number is well below the national average for seniors of 30%. The increased use of ambulation aids and orthotics can be correlated to this as the concentration on balance and strengthening use individually in the exercise therapy program can be cited as supporting these numbers.

Conclusions

The data has strongly supported the efforts of the Stroke Recovery Center but suggests that the Center is only taking the first steps to assist their patients on their recovery. The data supports the creation of environment in which healing can take place and where patients can gain some control over their lives regaining some of the skills and independence they enjoyed prior to the stroke or TBI. The data further supports the value of exercise in increasing secure mobility which in turn adds to confidence and independence. However, on the other hand, the data also suggests that patient focused care should be instituted to maximize value for each individual patient. Cost savings to the system should be allocated to support this case management and program development and need to be garnered from the sources that benefit. There are clear and undeniable data to support this notion and it is the clear direction that the studies have revealed.

ORGANIZATION HEALTH INITIATIVE PROJECT

Introduction

The Organization Health Initiative Project (OHIP) is now in its third year of data gathering and analysis. The OHIP methodology is to gather data regarding outcomes of treatment for chronic stroke sufferers from the existing patient base and compare such data to stroke victims who may or may not have access to assistance and to norms provided for other chronic disease sufferers, elderly and frail populations. The Project has developed a client data tracking system that is being used to prove the economic and social value of long-term stroke rehabilitation. The hypothesis to be tested is that stroke victims who use Stroke Recovery Center are less a financial burden on the health and social service budgets than those who do not access Stroke Recovery Center services. Quantification of the cost/benefit lends precision to the reasoning for long term

rehabilitation to be a functional part of the continuum of care. Stroke Recovery Center, as the best practice model for continuing care for stroke survivors, is currently ineligible for sustainable funding and as such is at high risk for failure. Cost-benefit analysis is being used to present the case for eligibility for predictable and sustainable funding from government, private insurance and/or medical group providers to be replicated in other locations.

Design

We have collected and tabulated data for 89 clients who as of January 1st, 2009 were Stroke Recovery Center users having been there 3+ months and attended at least 3 times per month or more and participate in at least two of the rehabilitation modalities offered at the Center. Those who just participate in speech therapy or just in exercise therapy are not included in this comprehensive study. In year 3 we collected data on 89 clients that met this on-going criteria and were able to compare their data to each other, as in the first study as well as to the data collected in years 1 and 2.

The initial baseline data was analyzed using the criteria of length of attendance (LOS) at the Stroke Recovery Center. Looking at the year 3 data, we found that the length of attendance remained a median of 2 years with the heaviest concentration continuing to be in the 2 and 3 year time frame consistent with the year 1 and 2 data. The average LOS was 3.4 years but the spread was from 15 years to the minimum of 3 months required for inclusion in the study.

Having three years of data we were able to track the drop-out rate and analyze the characteristics of those who do not continue and reasons for non-compliance with the program along with the utilization criteria we determined in the year 1 and 2 study.

With the median LOS at 2 years, data points were again compared to determine if there were differences in the early users as compared to those who have been at the center for 2+ years. With that data in hand, analysis went deeper to look at the changes from year 1 and 2 as well.

Parameters

The baseline data is analyzed using the criteria of length of attendance (LOS) to the Center to keep the results and outcomes consistent for analysis. This parameter was chosen to determine if clients show improvement over time spent at the Center and partaking in the programs. To support this as the major contributing factor to recovery, the data was also analyzed and adjusted for age variations, co-morbidities, type of stroke and length of time since the last stroke. The year 3 data was also rigorously examined to ensure the results were consistent.

The 89 clients in the year 3 group have an average (mean) length of attendance at the Center of 3.4 years with a median of 2 years. This is a significantly higher average than last year primarily due to the longevity of a number of our patients who have over 10 years attendance. The spread is between 15 years and 3 months so the use of the median has greater validity. The median is the middle of the data set and has an equal number of data points above and below the median value. Therefore, going forward with our analysis as we did with the year 1 and 2 data, we will use the median number of 2 years attendance and compare the greater than (>) 2 year attendees to the less than (<) 2 year attendees. IN our 2nd year we added to some of the outcomes that we measured a further analysis looking at the first year compared to the 1+ years. As appropriate, we did the same in year 3.

Further we had the ability to look at the drop-out clients and analyze that cohort and its effect both on the data and on the treatment modalities. The drop-out percentage was 11.2% for year 3, a total of 10 patients. This is compared to 17% (26 patients) of the total for 2008. Of that 11.2%, 30% (3 patients) died compared to 26% (7 patients) the year prior patients that were transferred to other facility's care or unable to attend due to deteriorating health totaled 40% in year 3, a bit higher than the 34% (9 patients) from the year prior. We also had one patient who moved out of the area, one client who was able to go back to his volunteer job and one patient who left but has a history of taking a few years off and then returning. In terms of trends, we are seeing a core group of survivors who take part in all the services but extensive growth in specialty services of speech and exercise.

We looked at the following data based on the client's length of attendance to compare it to the prior year's results:

- Age and Sex
- Transportation
- Co-morbidities and Drug Usage
- Ambulation
- Orthotic usage
- ER Visits
- Number of Falls

AGE AND SEX OF CLIENTS

The average age of clients attending in year 1 was 68 years of age with a median of 70 years of age. Year 2 showed an increase in the average and the median ages, 71.2 and 72 respectively. However, the age range in the second year expanded to 25 to 92. In year 3 the average age was 68.8 years of age with a median age of 69 with only one client in her 90's remaining with us.

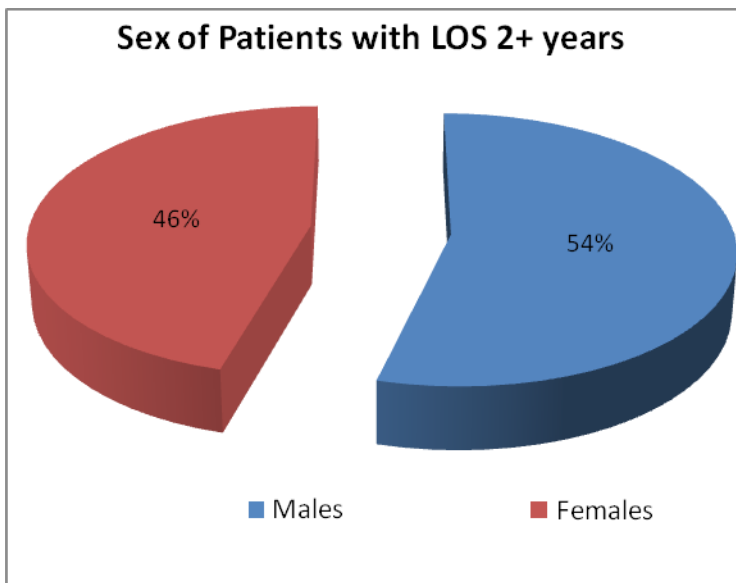
The year 1 group that had attended less than 2 years had a mean age of 67 with the median 68 years of age. The year 2 data aged this group to 69.3 average and 71 median with a standard deviation of 12.2. Year 3 has an average of 65.3 years of age but with a standard deviation of 16.2 indicating the wide spread of ages. In the first year, the group that had attended longer than 2 years was older with an average (mean) age of 70.6 years of age and a median age of 71

years. In year 2 data the average grew to 73.6 and the median to 75. The standard deviation was 10.9. In year 3 the average was 71.8 with a standard deviation of 10.9.

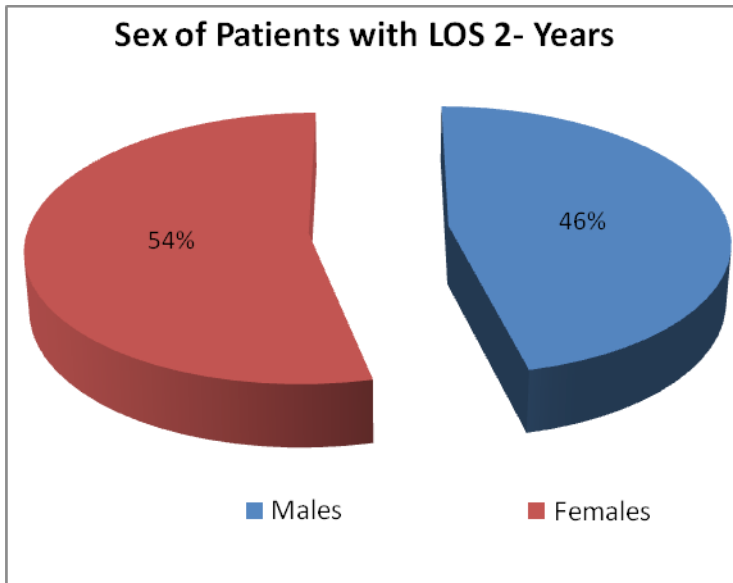
The consistency to the ages of the groups even with the high level of age deviation resulting from the few TBI patients who tend to be under 40 years of age, suggests that tolerance for rehabilitation is highest among the 60-79 years of age cohort. This group has a prevalence of stroke of 7.4 to 7.5 percent of the population much less than the 80+ group.

Deaths range from 47 as the youngest to 88 as the eldest in our year 2 results while in year 3 we had one death at 89 years of age with the other two in their early 70's. There was little in age correlation to suggest age related co-morbidity problems or moving away from the center.

The gender of the client base that stays at the Center over 2 years in year 3 lowered from a high level of males 62%, to 54.2% males. Incidence of stroke in males prior to age 60 is higher than for females but tends to even out in the 60-69 age group and increasing again in the 80+ group. Since the group that stays with us tend to be older, the trends all follow the national norms.



Among the clients who have attended less than 2 years in year 1, the numbers were almost equal: 49% women and 51% men. In year 2 data there were fewer females, 47% and more males, 53% which is slightly ahead of the national norms. For those who have been here longer than 2 years, the percentage changed in the first year to 35% women and 65% men while in year 2 of the study there were 38% females and 62% males. Year 3 shows a reverse with only 46.3% being males and 53.7% being females. Women in the 40-59 years of age group tend to have strokes at a much higher percentage of the population that do men – 2.7% compared to 1.0% for men.



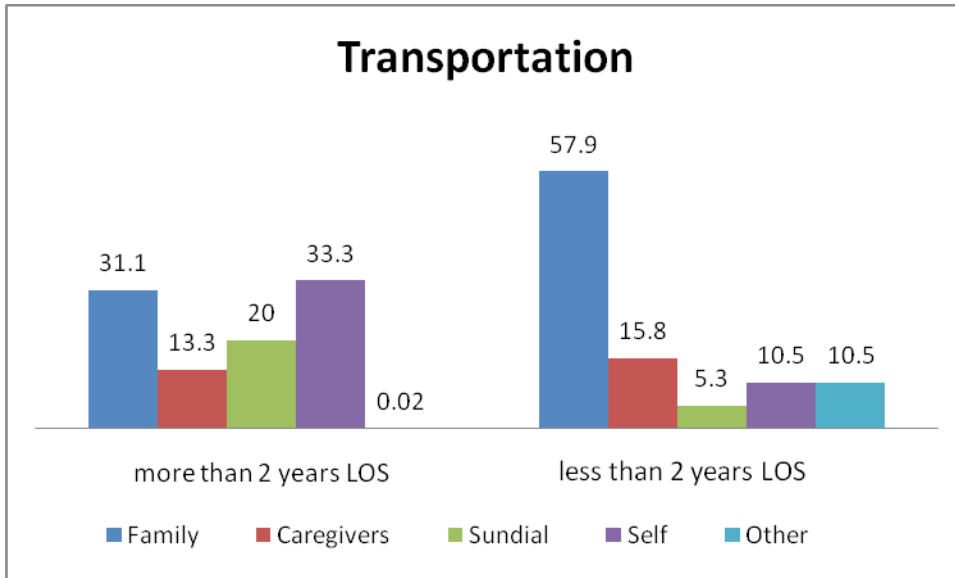
Females account for 61% of the deaths from stroke each year. In the drop-out group, deaths were all females one of who had just started with us but was 89 years of age. There is no correlation to age with those who suffer co-morbidities or moved to other areas.

PRESCRIPTION DRUG USEAGE

The average (mean) number of drugs taken by the client population in the year 1 study was 4.5 per day with a median of 5 and standard deviation of 3 which indicated a number of significant outliers that are attributable to co-morbidities. In the second year the average increased to 5.5 in those with less than two years at the Center and 2.3 for those who have been at the Center longer. The median numbers are both 5 which is the same as it was in year 1 of the study. With the range being high the initial presumption that the number of drugs and usage appears to be more highly related to the co-morbidities than to the years spent at the Center. The consistency of the data supports this contention.

Year 3 data confirms earlier data. The Average number of drugs taken is 7.1 consistent with the Kaiser study of senior drug usage. Drug usage does not vary with the time spent at the Center, but does vary significantly with co-morbidities.

TRANSPORTATION

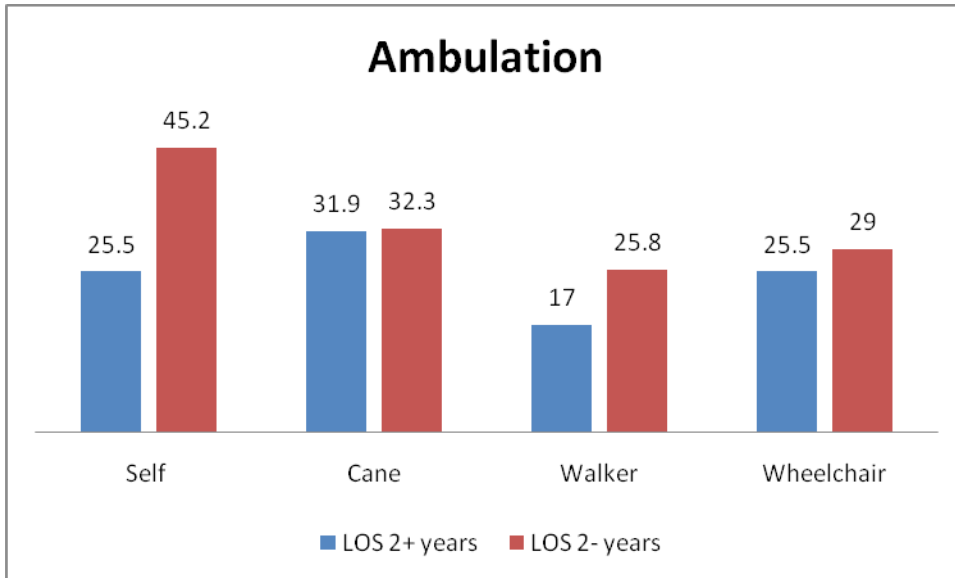


As was true with the year 1 and year 2 data, the shift to public and/or commercial forms of transportation away from reliance on the family is noticeable after the clients have been at the center for 2+ years. In the early years, 73.7% of patients rely on their families or caregivers for transportation needs while that percentage shrinks to 44.4% after being with us for 2+years. Those taking public transportation grows from 5.3% to 20.0%. The constancy of caregiver decreases very little over time probably due to need for assistance both for transportation but also for participation at the Center.

Clients able to bring themselves to the Center increase after the first 2 years of attendance from 10.5% to 33.5%.

We did not see the significant increase we saw in year 2 after the first year suggesting that the first year's results are more replicable over the long term and therefore have a higher degree of validity.

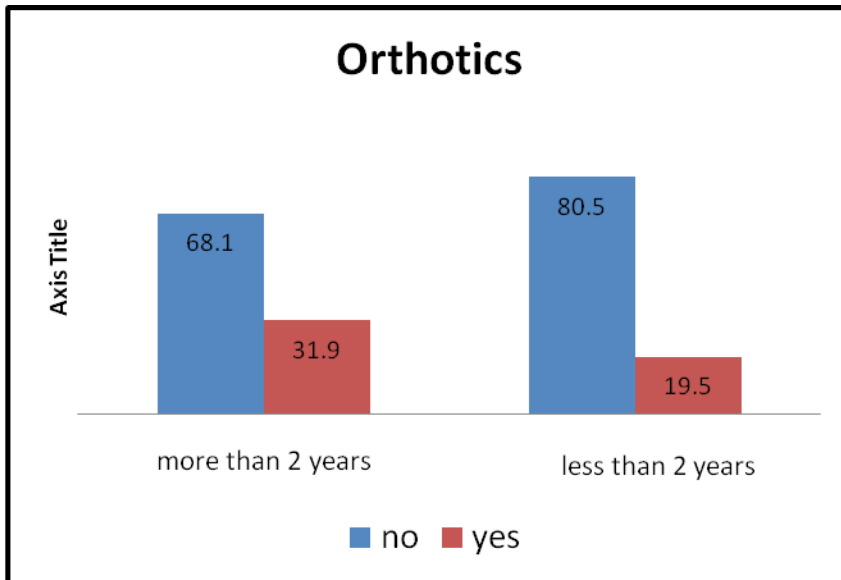
AMBULATION



While the year 1 data indicated a difference in ambulation and ambulation aids showing a movement from walkers to canes among those who spend a longer time at the Center from those that are in the first 2 years, year 2 data is less clear. The decline in walker use may be shifted to cane but also may be shifting to wheelchairs as there is a significant increase in wheelchair usage suggesting that more clients may be requiring greater assistance as time goes on. The year 2 data suggests that overall more clients are being moved to ambulation assistance than was the case in the first year of the study. Looking at the movement that is occurring after the first year of attendance, the data suggests that therapists are moving clients to more ambulation assistance at an early stage in their program. This may be related to the increased age of the group reported and/or more clinical analysis of client need related to the results of the first year study.

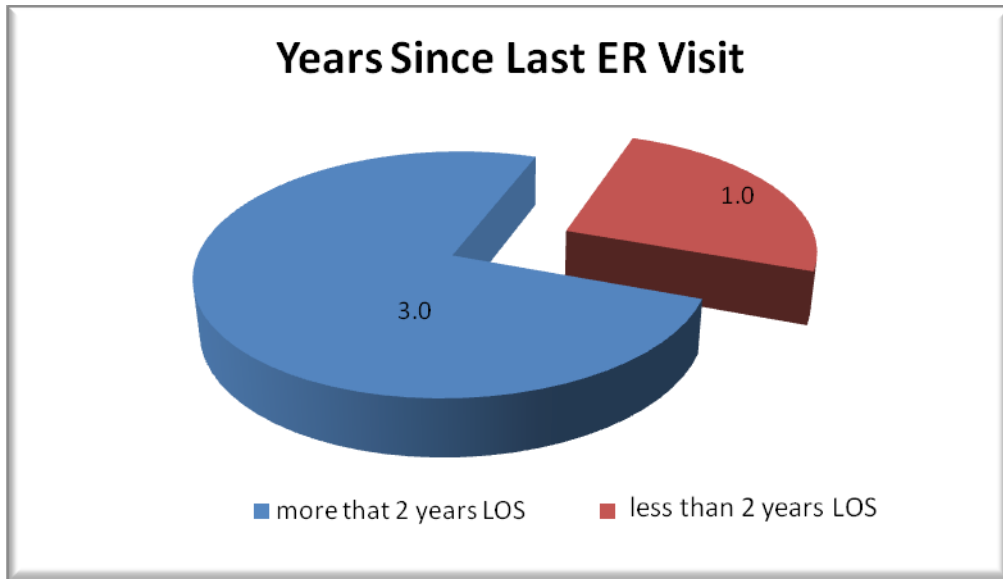
The results from year 2 are upheld as we move into year 3. We see a big move from self ambulation to uses of canes and walkers. Wheelchair usage remains somewhat constant. This suggests the correlation is to the age and co-morbidities of the population along with therapists moving patients to assisted mobility to support balance and stability in their homes and in the Center.

ORTHOTICS



Use of orthotics for ambulation assistance by clients increased from the data from year 1 of the study in those who have attended the Center for more than two years to 29.2% from 21%. Additionally, the number of clients who use orthotic support initially, increased to 49% from 32%. Last year the data indicated that patient's increased use of orthotics may be attributed in part to the increase in age; however attention to appropriate supports in conjunction with the changed results in ambulation assistance seem to support that more attention is being given to the benefits of extra support. Fully 80.5% of new patients are not using orthotic support when they start with the Center. By year 2+ 68.1% of patients are not using support while 31.9% of patients are using orthotics for support and help in ambulation suggesting that more patients are being assisted by orthotic supports as they are given more rehabilitation.

EMERGENCY ROOM VISITS

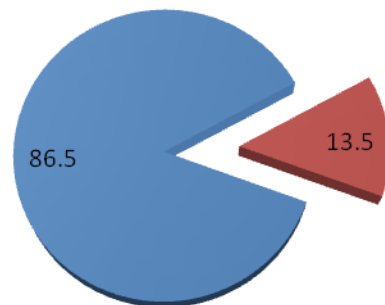


In 2009, 17.3% of the patients made at least one visit to an Emergency Room down from 25% and 32% of the patient populations in the years prior. All of the visits in 2009 were recorded by the group who had been at the Center in their first 2 years. This being the case, looking at the years since the last visit to the ER by the different cohorts gives us a better picture of predictive behavior correlated to the time spend at the Center. Patients that have more than 2 years LOS have not visited an ER for 3 years (median) while those with less than 2 years LOS have only 1 year since their last visit to the ER. While the early joining group come to the Center an average of 2.1 years after their stroke and therefore possibly would have a more current ER experience, as they remain at the Center they are less likely to seek emergency care.

Cost for ER visits continues to be a major drain on the healthcare system as a whole. The ability to successfully have an influence on reducing this cost supports the inclusion of the therapies designed and provided at the Stroke Recovery Center to long term care programs for stroke survivors throughout the country.

FALLS

Percentage of Patients who Fell in 2009



The overall numbers continue to decline to 13.5% of patients suffering falls in 2009 as compared to 20.4% and 30% the prior years. This current number is well below the national norm for seniors which is 30%. Considering the client base is elderly and handicapped, the numbers show significant progress in treatment.

The data shows a higher propensity to fall in the first two years of attendance at the Center. Taken with the data points in the calculating ambulation variation and orthotic use, falls are correlated to the increase use of ambulation assistance and training. The benefit of continuing care is quantifiable in cost reduction due to secure mobility of the patient.

The cost reductions to the healthcare system as a whole from reduction of falls in the frail and elderly are significant not only in the medical cost, the hospital cost and medication cost but in elements like first responder cost and lost productivity of caregivers need for recovery. This statistic by itself supports the inclusion of the therapies of the Center in a long term care plan for stroke survivors throughout the country.

CONCLUSIONS

We have seen some significant shifts in data sets over the three years of this study that begin to point in directions that correlate some of the therapies to outcomes both expected and unexpected. Additionally, the study allows us to identify shortcomings of the Center and determine what changes should be made going forward to better ensure the success of the patients in attaining and maintaining maximum feasible functionality.

The age of the patient base shows that we concentrate in the high propensity age bracket of 60-79 years of age. It is in this age bracket that men and women are equal in the prevalence of stroke. Prior to that age women are twice as likely to have strokes than men. That said, one might expect that the Center has a higher level of participation from women which holds true only in the first 2 years of attendance and then switches to a preponderance of men. Additionally, there is a limited group of 80+ attendees while the stroke risk is much higher. This suggests that there may need to be a different level of services available to the frail, older patient as well as the female patients to bring the numbers more in line with the national stroke statistics.

The drug usage study indicates the wide variety of prescription drugs that are used. A number of patients are very heavy drug users due to co-morbidities such as HIV-AIDS. Additionally, there are a number of patients who are heavy users of dietary supplements. The average numbers are equal to the Kaiser study of senior prescription drug usage, however, individual drug usage and interactions may be putting the patients at risk.

Transportation is an area that continues the trend first noted in year 1 of the study. As the patients continue to participate at the Center, they become less reliant on family to provide transportation and begin to rely on publicly available services or return to being able to transport themselves. Non-family caregiver dependency stays constant. Of the long term cost of stroke, a significant portion is due to lack of family productivity caused by the necessity for family caregivers. Long term cost of stroke is estimated at \$140,048 per survivor only \$13,019-\$20,346 of which are expended in the first 30 days following the episode.

The major decreases in falls from the patient base need to be correlated with the increased use of orthotics and ambulatory aids that are evident as the patients stay in treatment with the exercise therapists. The concentration is on balance and strength building both of which do require time to be effective. With a fall rate of only 13.5% in an elderly, handicapped population, the effectiveness of treatment is supported. Initial studies indicated that there was less use of orthotics and ambulatory aids as the years off attendance increase however, over time the data indicates a more aggressive use of aid to help in mobility in conjunction with exercise. The results clearly support the cost effectiveness of using the aids to reduce falls and increase confident mobility. Falls are a major cost factor in elderly and frail populations, not only due to ER fees but also resultant hospitalizations, nursing home days, home visits and loss of productivity.

Emergency Room (ER) visits are a major segment of cost to the healthcare system as a whole. While the patients who are in the first 2 years of attendance tend to be closer to their initial episodes and therefore have a higher likelihood of having been in the ER, as they remain at the Center the propensity to use the ER declines sharply until end-of-life issues intervene. The usage follows a bell shaped curve with heavy use in the early and last years of attendance. The ability to influence the early use is limited as, in most cases, the patient is unknown. However, it might be possible to have a greater influence on the end of life choices that are made by the patients. Currently, this is not included in the educational program except on a 1-2 time per year educational session on advance directives.

The data has strongly supported the efforts of the Stroke Recovery Center but suggests that the Center is only taking the first steps to assist their patients on their recovery. The data supports the creation of environment in which healing can take place and where patients can gain some control over their lives regaining some of the skills and independence they enjoyed prior to the stroke or TBI. The data further supports the value of exercise in increasing secure mobility which

in turn adds to confidence and independence. However, on the other hand, the data also suggests that patient focused care should be instituted to maximize value for each individual patient. Cost savings to the system should be allocated to support this case management and program development and need to be garnered from the sources that benefit. There are clear and undeniable data to support this notion and it is the clear direction that the studies have revealed.

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