

# Improvement of Activities of Daily Living (ADL) for Patients Treated in Skilled Nursing Facilities (SNFs)

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## Abstract

**Background:** Self-care tasks or activities of daily living (ADL)'s performance are often disrupted after an older adult sustains an injury or illness, which can be a determining factor for discharge placement after hospitalization, or it can determine the level of assistance required after discharge from a skilled nursing facility (SNF). We believe that comprehensive rehabilitation can improve a patient's overall functioning during their short term stay in SNFs. The purpose of this study is to determine if an individual's level of independence improved after admission to a skilled nursing facility and procurement of rehabilitation services. **Methods:** This study retrospectively reviewed 4612 nursing home patients in California who underwent rehabilitative services at skilled nursing facilities to determine how the patients responded to their environments, therapy interventions, and any other additional supportive measures. The records of patients who were admitted for short-term rehabilitation were reviewed in a blinded fashion, looking specifically at Section GG of the Minimum Data Set (MDS). Self-Care Section GG scores recorded by rehabilitative staff provide objective data and measure patients' levels of assistance that were required. Each activity is scored from 1, being completely dependent, to 6, being entirely independent, with varying levels of assistance with scores in between. The admission scores versus the discharge scores can be compared to determine if a patient improved their level of functioning upon discharge. **Results:** Utilizing the Pearson's correlation coefficient, a strong correlation of improvement in ADL performance on Section GG between the admission and discharge scores was identified, implying significant improvement in functional independence upon discharge. The average percent improvement for Managed Care patients was ~35.4% and ~39.4% for Medicare patients. **Conclusions:** The results support the benefits of rehabilitation

services in skilled nursing facilities, and the data suggests that admission scores can be used as a predictive tool for functional outcomes.

## Keywords

Activities of Daily Living, Skilled Nursing Facilities, Rehabilitation, Independent Living

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## 1. Introduction

Skilled nursing facilities provide rehabilitative services for millions of people [1] following acute hospitalization with the goal of returning them back to their communities. Relatively few studies have examined whether these patients show improvement in their functional ability as a result of their stay. One important care requirement is the level of assistance that an individual needs during their activities of daily living (ADLs) [2] [3]. This may include self-feeding, oral-hygiene, toileting, showering or bathing, upper or lower body dressing, and footwear management. The ability to perform various ADLs is recorded on Section GG of the minimal data set (MDS), which is completed upon admission and discharge from the facility on every patient. The purpose of Section GG is to examine a patient's functional abilities and set goals for their discharge. The Section GG rubric can be used to assess a patient's progress and examine the degree of improvement at the time of discharge. The status is based on the necessary assistance in daily self-care actions, in this case for ADL [4]. Section GG can also be used for other forms of scoring, such as mobility. The functional status during the first and last 72 hours of a patient's stay is measured and recorded as well. The admission score is the baseline where no interventions are made with the patient in order to check what said person's current condition is. The discharge score is based on progress after all interventions have been completed. An interim GG score is also recorded to identify the change in a patient's condition during their short-term rehabilitation stay. The data is recorded and summarized in Net Health, a software program utilized in most skilled nursing facilities, so all factors can be monitored and averaged between facilities as time progresses. It is imperative to identify if rehabilitation services in skilled nursing facilities improve the ADL function of patients, which will impact the independence of a patient [5] [6] [7]. When the Self-Care Section GG data from facilities across California are analyzed, correlations can be found between different aspects. These include the discharge and the admission Section GG scores of thousands of patients to determine the effectiveness of these care programs.

Earlier studies suggested that therapy in SNFs contributed to community discharge and reduced mortality [8] [9] and improved function following hip fracture [10]. However, a study published last year suggested that previous studies had focused too much on orthopedic conditions and the physical and occupational therapy in SNFs did not lead to a significant improvement in physical

function [11]. A comprehensive review to determine if an active rehabilitation program impacts ADLs, not just physical and occupational therapy will help to ascertain the potential benefit of short-term SNF stays.

## 2. Methods

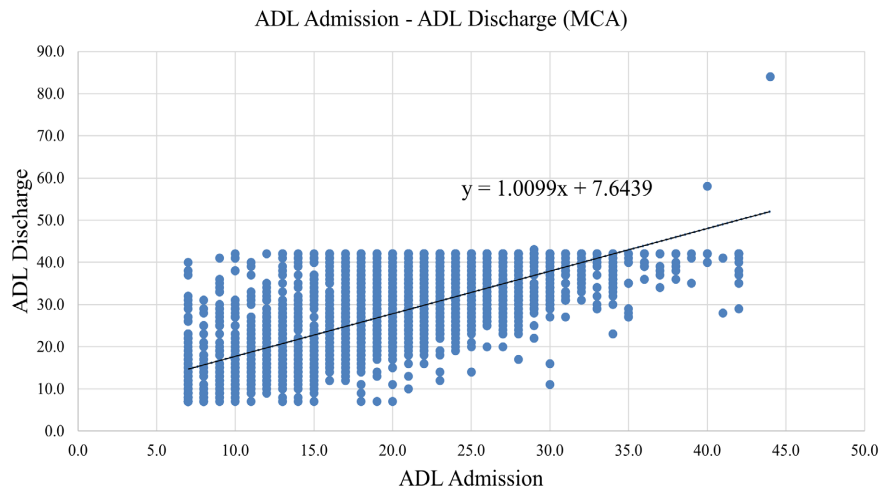
In our study, we collected data from Net Health from 75 skilled nursing facilities throughout California. All patients who were admitted for short term stays during 2021 were included for potential analysis. No personal identifiable information was included in the data transmitted. We were able to review 4612 admissions (patients) with completed data that included information regarding their Section GG scores, insurance coverage, and average minutes of therapy per week. The data values came from patients across skilled nursing home facilities in California (refer to **Table 1** for patient demographics). We used 2021 data from 3404 Medicare A (MCA) and 1208 Managed Care A (MGA) patients. We reviewed the MDS GG section and were able to filter through to find complete data values utilizing different categories involving ADL scoring. Each activity is scored from 1, being completely dependent, to 6, being entirely independent, with varying levels of assistance with scores in between. We looked for a correlation between ADL admission and ADL discharge scores, as well as a correlation between ADL average change and ADL discharge scores. We used Pearson's correlation to determine if the changes were statistically significant and between the admission and discharge scores as well as the discharge and average degree of change scores. The scores are made up of the points tallied from multiple categories defined by the GG scoring system of ADL, such as eating and hygiene. If there is a strong or moderate correlation in the change from admission to discharge, then that would suggest there is an effect via rehabilitation and other interventions on ADL that these skilled nursing home facilities have had on their patients [12]. Furthermore, we attempted to determine if ADL scores on admission could predict outcome upon discharge from the facility. This would clearly be useful as (since admission ADL scores correlated with outcomes) facilities could better utilize resources for patients who are likely to benefit from the services. This idea could be used as an overall predictive tool for outcomes based on admissions. The patients and families of patients could also have an understanding of what the expected outcome from the rehabilitation in skilled nursing facilities should be and make an informed decision on steps to take for the patient's recovery. As mentioned, it would help facilities and therapists know the future trajectory of a patient's conditions and know how to use resources most efficiently. We calculated equations by trend lines formulated from dot plots of the values of admission and discharge scores. These equations allow the input of specific admission values to gain approximations of discharge scores. Additionally, the average percent change can be found from the average discharge minus the average admission all divided by the average admission, further than just the correlations and the predictable outcome based on the graphs of data points and their trend lines.

**Table 1.** Patient statistics.

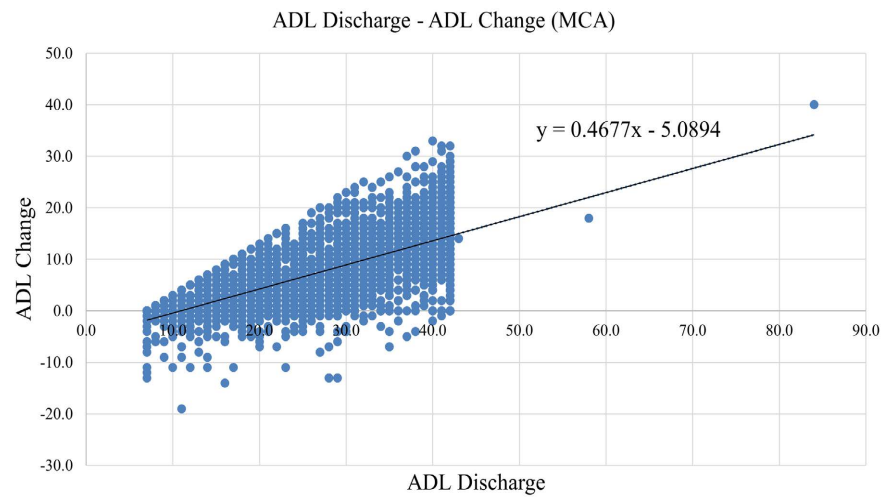
<b>Gender</b>	
Male	51.80%
Female	48.20%
Average Age	74.3
<b>Diagnostic Category</b>	
Medically Complex	40.70%
Orthopedic	22.30%
Neurological	14.80%
Respiratory	9.10%
Cardiac	8.50%
Cognitive	4.70%

### 3. Results

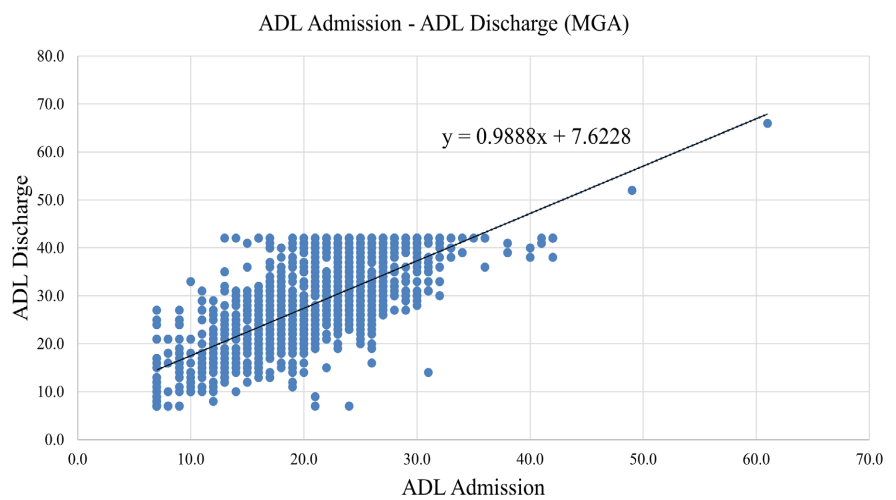
The data shows significant improvement overall in ADL scores when comparing admission to discharge, which held a strong correlation. The discharge and average change scores have a moderate correlation. The Pearson’s correlations showed statistically significant correlations between admission and discharge scores in ADL. A strong correlation of 0.733205 was demonstrated for the Medicare insured patient data when examining 3404 patients’ ADL admission and ADL discharge scores (Figure 1). Furthermore, looking at the same group of Medicare insured patients, the ADL discharge to ADL average change appeared with a moderate correlation of 0.687716 (Figure 2). The Managed Care insured patients showed results almost identical to the Medicare patients when looking at 1208 patients, with a strong Pearson’s correlation of 0.726734 for comparing ADL admission and ADL discharge scores (Figure 3). Additionally, the Managed Care insured patients showed that ADL discharge to the ADL average change held a moderate correlation of 0.678192 (Figure 4). The trend lines on both sets of data and correlations held important positive slopes, indicating statistically significant improvement of ADL. From the Medicare population data, the ADL admission scores and ADL discharge scores correlation has a trend line with the equation of  $y = 1.0099x + 7.6439$  (Figure 1). The discharge and average change for the Medicare population’s trend line was  $y = 0.4677x - 5.0894$  (Figure 2). For the Managed Care data, the ADL admission and ADL discharge trend line was again almost identical with the equation  $y = 0.9888x + 7.6228$  (Figure 3). The trend line for discharge and average change for Managed Care was  $y = 0.4659x - 5.774$  (Figure 4). For the admission and discharge comparisons, the x stands for a specific admission score while y refers to a discharge score (for examples, refer to Table 2). The admission and discharge scores are related and dependent in the equation. Additionally, for the average change and discharge graphs, the x is the discharge score while the y is the overall average



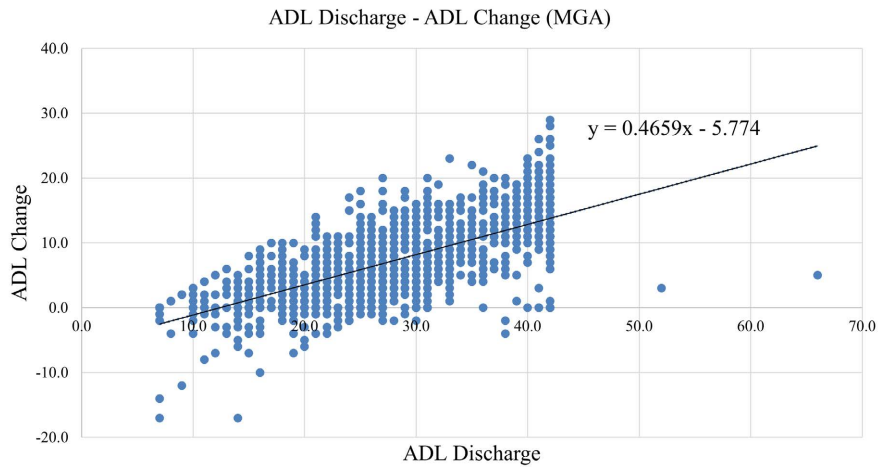
**Figure 1.** Compares admission to discharge ADL scores for Medicare (MCA) patients.



**Figure 2.** Compares ADL discharge to average change scores for Medicare (MCA) patients.



**Figure 3.** Compares admission to discharge ADL scores for Managed Care (MGA) patients.



**Figure 4.** Compares ADL discharge to average change scores for Managed Care (MGA) patients.

**Table 2.** Examples of predictive admission to discharge scores.

Medicare		Managed Care	
$y = 1.0099x + 7.6439$		$y = 0.9888x + 7.6228$	
Admission Score	Discharge Score	Admission Score	Discharge Score
10	17.7429	10	17.5108
20	27.8419	20	27.3988
25	32.8914	25	32.3428
30	37.9409	30	37.2868
40	48.0399	40	47.1748

change score. The average percent improvement for the Managed Care data patients was 35.4067% and 39.3939% for the Medicare patients, representing a seven to eight-point change. A one to two-point change is considered clinically meaningful.

#### 4. Discussion

Skilled nursing facilities admit a multitude of patients with various medical complexities and care requirements. We looked at thousands of nursing home patients, retrospectively, with a wide variety of conditions to determine if the rehabilitative services provided improved their ability to remain independent [7]. The study demonstrated statistically significant improvements in ADLs, regardless of insurance status. The correlation between ADL admission and ADL discharge scores confirms that these patients, on average, improved on standardized measurements of ADLs. The data demonstrates that patients admitted to long-term care facilities showed a significant improvement in their ADL scores, and most importantly, implied that they have a greater ability to return to inde-

pendent living upon discharge (or at least not be as dependent as without such care). The data looked at thousands of patients throughout 75 facilities, reducing/eliminating the chances of there being selection bias. The overall change and discharge scores for ADL also appeared to have a moderate correlation, which is another valuable piece of evidence to demonstrate that there is a connection between the average changes of ADL by the time of discharge. The positive slopes in each correlation (**Figures 1-4**) indicate that, generally speaking, patients improve in the skilled nursing facilities; however, there may be exclusions to this case (e.g., severe medical complexities, disruptions to care, rehospitalization, etc.). Additionally, the interventions may even assist those patients with the worst prognosis [13] [14]. The correlation shows, in most cases, that patients have a discharge score that improves their abilities to do average activities of daily living on their own. The trend lines gave positive slopes that suggest the improvement of a patient by the point of discharge after admission (**Figure 1** and **Figure 2**). In fact, the equations of the trend lines might be able to be used as approximate predictors of a patient's potential discharge based on the score in which they were admitted. If a "x" value is plugged into one of the equations, that being an admission score, it would result in the estimate for a "y," the discharge score. The condition of discharge is almost always positive. Furthermore, for the discharge and overall change graphs' trend lines, the discharge (x value) can dictate the approximate overall change (y value), which is also usually positive (**Figure 3** and **Figure 4**). Also, the average percent change in the data ranged from approximately 35% to 39%, which demonstrates an improvement in patients with regards to their skills and capabilities. The information is also significant because it shows how ADL performance, with certain scores, correlates with independence and a lower level of dependent care needed. It may also result in an economic benefit if the patient needs less assistance and can live independently or at an assisted-living level. The process can result in patients living more independently or with less reliance on caregiver assistance. Signs of improvement include a decreased need for helpers or aids for eating, help with hygiene and dressing, reduced reliance on verbal and physical cues, and diminished need for use of equipment such as wheelchairs or walkers. Therapy (with its 421 overall average minutes per week) is the most likely factor leading to the improvement due to the redevelopment of skills; although, other factors cannot be ruled out as possible reasons for the improvement, such as better nutrition and increased socialization [15]. The study was not designed to examine these individual factors and further research may help to determine the impact these factors may have on overall improvement. The review was not performed as a prospective trial of a specific application, but rather to see if the overall methods used by these facilities are producing the outcome that they hope and expect. Finally, the data was collected from a single nursing home chain and may not be applicable across all skilled nursing facilities. Either way, this study helps facilities, therapists, patients, and families of patients to make better informed deci-



sions on what the best course of action is for a patient and their rehabilitation. Although more research is needed, this study supports the use of short-term admission to skilled nursing facilities following hospitalization, illness, and/or surgery to aid in recovery [16].

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### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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