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Assessment of Activity of Daily Living among Older Adult Patients in Home Health Care and Skilled Nursing Facilities: An Integrative Review

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Abstract

Older adult's ability to self-manage illness is dependent on their ability to perform activities of daily living (ADL). Forty-five percent of those older than 65 years will have ongoing clinical needs after hospital discharge and require post-acute care (PAC) services in settings such as home health care (HHC) and skilled nursing facilities (SNF). The Improving Medicare Post-Acute Care Transformation Act (IMPACT) of 2014 requires PAC providers to begin collecting and reporting ADL data to build a coordinated approach to payment and standardize patient assessments and quality measurement. The aim of this integrative review was to compare the methods of assessing ADLs in HHC to SNF. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement was used to ensure results were reported systematically. A scientific literature search without date restriction within the PubMed and Cumulative Index of Nursing and Allied Health Literature (CINAHL) databases was conducted. Two independent investigators assessed study quality using the quality appraisal instrument developed by Kmet and colleagues. Study quality ranged from 94.5% to 100%. Of the 18749 articles identified by the search, eight met inclusion criteria and four tools were identified that are used to assess ADLs in SNF and HHC. Although SNF and HHC collect similar ADL information, the range of content covered, item definitions, scoring, and psychometrics are not comparable across settings.

Over the past two decades, there has been a substantial increase in the use of post-acute care (PAC) services in the United States (Ackerly & Grabowski, 2014; Mechanic, 2014). Recent studies associate this growth with a corresponding decrease in hospital length of stay (Burke

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et al., 2015). PAC services represent a range of rehabilitative or skilled nursing services that patients may receive after inpatient hospitalization (Boutwell et al. 2014). Such services are covered by Medicare, and are provided in skilled nursing facilities (SNF), inpatient rehabilitation facilities (IRF), and home healthcare (HHC). Nearly 50 per cent of hospitalized Medicare patients use PAC after discharge, accounting for more than \$62 billion in 2012 expenditures (Medicare Payment Advisory Commission [MedPAC], 2013). Currently, HHC and SNF are the two most common PAC settings to which patients are discharged following their hospital stay (Tian, 2016). Within these settings, the Centers for Medicare and Medicaid Services (CMS) requires patients to be evaluated using setting-specific patient assessment instruments for clinical assessment, payment, and quality assurance – The Minimum Data Set (MDS) (Mor, 2004) in SNFs, and the Outcome and Assessment Information Set (OASIS) in HHC (Health Care Financing Administration [HCFA], 1999).

OASIS was implemented as a standardized assessment instrument for HHC in 1999. Several versions of the OASIS have been developed, refined and implemented since it was introduced in 1999. The first major update since its inception was the OASIS-C in 2010. This update included revision to OASIS items to improve clarity and to align OASIS items with evidence based process measures (CMS, 2012). In 2010, OASIS-C1, which is the current version of the OASIS data set was developed from the OASIS-C to accommodate the transition to the ICD-10 diagnosis coding system (CMS, 2015). Similarly, the MDS 2.0 has been actively used to create quality measures since its inception in 1990 (Mor, 2004; Morris et al., 1990), and in 2010, CMS implemented version 3.0 of the MDS (MDS 3.0) (Wysocki et al., 2015). The update from the 2.0 version was primarily because of concerns about the reliability, validity, and clinical relevance of its assessment items (Rahman & Applebaum, 2009).

One important data element collected in PAC settings is the activities of daily living (ADLs). ADLs include daily self-care activities such as eating, dressing, bathing and toileting (Elsawy & Higgins, 2011) and mobility activities such as, transferring between the bed and a chair (Middleton et al., 2016). Difficulty in performing these activities is associated with reduced independence and health related quality of life (Giebel et al., 2014; Han et al., 2013), increased acute care hospitalizations (Greysen et al., 2015; Meddings et al., 2017) and increased mortality (Millan-Callenti et al., 2010). The prevalence of ADL limitations increases with advancing age (Wiener, Hanley & Van Nostrand, 1990). Approximately 25% of people 65 years and older have difficulty with at least one ADL (Hennessey et al., 2015).

In PAC settings such as SNF and HHC, ADL measures constitute one of the domains used to calculate each patient's reimbursement rate (Schlenker, Powell, & Goodrich, 2005) and evaluate quality of care (Middleton et al., 2016). However, researchers have commented on the limitations of current ADL data captured using the current assessment instruments in SNF and HHC (Fortinsky & Madigan, 2004; Lum, Lin, & Kane, 2005). One such limitation is the variation in the methods of assessing ADLs in both settings (Medicare Payment Advisory Commission [MedPAC], 2014). Comparative information on the assessment methods and psychometric properties of ADL instruments used in SNF and HHC would be useful to develop standardized ADL measures across both settings. Furthermore, objective,

consistent and reliable assessments of ADL are requisite to plan and evaluate the effectiveness of interventions in all PAC settings. Therefore, the purpose of this integrative review is to describe and compare methods used to assess ADLs among older adult patients in SNF and HHC.

Methods

This integrative review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement to ensure that the results were reported systematically (Moher, Liberti, Tetlaff, Altman, & The Prism Group, 2009).

Search Strategy

Appropriate search terminology and keywords are listed in Table 1. With guidance from an information specialist, the first author conducted scientific literature searches without date restriction using PubMed and Cumulative Index of Nursing and Allied Health Literature (CINAHL). Criteria for inclusion of articles were quantitative and qualitative primary research studies published in English through April 21, 2016.

The following inclusion criteria were used to identify relevant studies: a.) original research published in English, b.) included patients age 65 years or older, and c.) used a standardized ADL instrument in either HHC or SNF. We only included studies of nursing homes with individuals who had a length of stay of 100 days or less and who had a hospitalization prior to their nursing home stay (Linehan & Coberly, 2012; Mor et al., 2010). Editorials, commentaries and unpublished dissertations were excluded. Additional articles were obtained by hand searching reference lists of relevant articles identified while reviewing the abstracts.

Results

The original search returned 18,749 articles (18,307 from PubMed database and 442 from the CINAHL database). After title review, 18,416 were removed because of duplicates and non-eligible titles, leaving 333 articles for abstract review. Two additional studies identified from the hand search of reference lists of the 333 articles were included, yielding 335 studies. As summarized in Figure 1, 253 abstracts were subsequently excluded for the following reasons: studies conducted in non PAC settings (n=103), had no ADL measure described (n=45), other long term care population (n=37), PAC settings were not HHC or SNF (n=34), focused on chronic disease self-management programs (n=15), studies that combined ADLs and instrumental ADLs measures (n=5), hospice (n=2), literature reviews (n=6), case studies (n=3), quality improvement projects (n=2), only measured ADL of feeding (n=1). After excluding the non-eligible abstracts, the remaining 82 articles underwent full-text review. Another 74 articles were excluded for reasons summarized in the Figure, leaving 8 articles for the integrative review.

Characteristics of Included Studies (Table 2)

Among the eight reviewed articles, five were cross sectional studies (Lee, 2006; Leland et al. 2015; Madigan et al., 2012; Scharpf & Madigan, 2010; Wysocki, Thomas & Mor, 2015),

one quasi experimental study (Tinetti, Charpentier, Gottschalk & Baker., 2012), one prospective cohort study (Thygesen, Saevereid, Linstrom, Nygaard & Engedal, 2009) and one retrospective cohort study (Jung, Trivedi, Grabowski et al., 2016). Four of the studies were conducted in HHC settings (Thygesen et al., 2009; Scharpf et al., 2010; Madigan et al., 2012 & Tinetti et al., 2012) and four in SNF (Lee, 2006; Wysocki et al., 2015; Leland et al., 2015 & Jung et al., 2016). Of the 4 HHC studies, one was conducted in a single site (Tinetti et al. 2012), one in a multi city HHC in Norway (Thygesen et al., 2009), and 2 used large representative samples from the United States (Madigan et al. 2012; Scharpf, et al. 2010). Of the 4 studies conducted in SNF, 3 used large national data sets (Jung et al. 2016; Leland et al., 2015 & Wysocki et al., 2015), and one was a single site study (Lee, 2006). Two studies used the Andersen Model of Health Services Utilization (Madigan et al., 2012; Thygesen et al., 2009) to guide the analyses. Study sample sizes ranged from 131 to 1,023,036. The average ages of patients were between 77.1 and 84.9 years and most were white and female when reported.

All SNF studies (Lee. 2006; Madigan et al., 2012; Tinetti et al., 2012; Tao et al., 2012 & Wysocki et al., 2015) and one HHC study (Tinetti et al., 2012) focused on Medicare patients only. Two HHC studies (Scharpf et al., 2010; Madigan et al., 2012) included Medicaid and Medicare patients.

While the OASIS was used to assess ADLs in all three HHC studies in the United States, the Barthel Index was used in the Norwegian study. Different tools were used to assess ADLs in SNF: the MDS 2.0 was used in two studies (Jung et al., 2016; Leland et al., 2015), MDS 3.0 in one study (Wysoki et al., 2015), and Functional Independence Measure-Function Related Group (FIM-FRG) was used in one study (Lee, 2006). Only two studies reported on the reliability and validity of ADL items, both conducted in the HHC setting (Madigan et al., 2012; Scharpf et al., 2010). One HHC study discussed the reliability of the Barthel Index specific to the stroke population (Thygesen et al., 2009) and one SNF study addressed the validity of the ADL Self Performance items in the MDS (Wysocki et al., 2015).

Although the OASIS is not designed for scoring (Fortinsky et al., 2003), Madigan and colleagues (2012) used the corrected Likert approach where each response is divided by the highest value possible for that ADL. Individually adjusted items were then summed for a total functional capacity score ranging from 0 to 8. This study found that the strongest influence on the change score for improvement in functional capacity was better admission functional status. Using the same approach, Scharpf and colleagues (2010) found that 70% of HHC patients with heart failure improved while receiving HHC services.

Five studies examined the associations between ADLs and patient outcomes and found that poor ADL ability is associated with poor health outcomes (Lee et al., 2006; Leland et al., 2015; Madigan et al., 2011; Thygesen et al., 2009 & Tinetti et al., 2012). More specifically, Tinetti and colleagues (2012) reported that the restorative model of HHC focused on improving ADL ability was associated with approximately one-third fewer admissions than usual care. Using national MDS data, Leland and colleagues (2015) examined the outcomes of SNF patients who experienced a fall and subsequent hip fracture during their first SNF

stay and found that patients who experienced a hip fracture and still achieved successful community discharge were higher functioning, indicated by a lower ADL score.

Quality Assessment

Two independent investigators (Z.A and M.A) assessed study quality using the quality appraisal instrument developed by Kmet and colleagues (Kmet, Lee & Cook, 2004). This is a validated tool which is comprised of separate checklists for qualitative and quantitative studies. Using this tool, a summary score was calculated for each study by summing the total score and dividing it by the total possible score. Consistent with the guidelines, studies with a quality score ranging from 55% (liberal) to 75% (conservative) and above were included (Kmet et al., 2004). Disagreements between the two reviewers were discussed and resolved by consensus after referring to eligibility criteria and guidelines of the appraisal instrument.

Comparison of ADL Measures in SNF and HHC

This review identified five instruments that assessed ADLs in SNF (Table 3) and HHC (Table 4). The Barthel Index and OASIS were used in HHC studies, while the MDS 2.0, MDS 3.0, and The Functional Independent Measure Functional Related Group (FIM-FRG) were used for studies in SNF settings. Each tool varies in terms of whether the assessment is judging ADL ability levels on the day of assessment or for some prior period. The varied approaches lead to subjective recordings or direct observation at the time of assessment. Each tool relies on different items to elicit some ADLs. For example, while the FIM-FRG, Barthel Index and OASIS B have specific ADL items of grooming and bathing, the MDS 2.0 and MDS 3.0 uses a generic term of personal hygiene. However, the five tools share some similarities: they all assess eating, dressing, toileting, ambulation/walking and transferring.

ADL Measures in SNF

The Functional Independent Measure Functional Related Group (FIM-FRG)—

One study used the FIM –FRG to describe physical function of patients in a SNF (Lee, 2006). The FIM-FRG items are components of the IRF Patient Assessment Instrument (IRF-PAI). This tool was designed specifically for the inpatient rehabilitation population. The FIM-FRG includes 18 items rated on a 7-point scale based on the level of independence demonstrated during the performance of each activity (1=total assistant, 7=complete independence). This scale measures degree of dependence and frequency of need for assistance/supervision. All items are scored for their highest levels of dependence during the three prior days for an admission and discharge assessment. Studies have found that its ADL items lack sufficient variation to be used across the range of PAC settings (Jette, Haley & Pengsheng, 2003).

MDS 2.0—Under the MDS, nurses assess a resident's performance over a 7-day period. Physical function is evaluated according to the ability to perform each of seven activities of daily living (Table3). Each activity is rated from 0 to 4 points: 0 indicates independence, 1 the need for supervision, 2 the need for limited assistance, 3 the need for extensive assistance, and 4 dependence. The scores on this tool range from 0 to 28 points, lower scores represent higher levels of performance.

The weighted kappas for the seven component activities have been reported to be greater than 0.75, indicating excellent reliability, internal consistency of the scale is also high ($\alpha = 0.94$) (Morris, Fried and Morris, 1999). Validity studies of the MDS focus on criterion validity consistently found scores on the ADL subscales to correlate with other instruments commonly used in home care and nursing homes including the Barthel Index of Activities of Daily Living (Landi et al., 2000).

MDS 3.0 (ADL Self Performance items)—The unique feature of ADL Self Performance items under the MDS 3.0, is that each activity must occur 3 or more times within the previous 7 days to be coded on a scale of 0 (independent) to 4 (total dependence). If the activity occurred 2 or fewer times within the previous 7 days, the item is coded 7 (occurred only once or twice) or 8 (activity did not occur). Unlike the MDS 2.0, MDS 3.0 requires ADL assessments to also be completed on discharge.

The MDS 3.0 and MDS 2.0 measures remain the same, however, some definitions within the tool have changed. Within the MDS 3.0, “bed mobility” now includes “alternate sleep furniture” for residents who sleep in chairs. Dressing is no longer specific to street clothes as in MDS 2.0 but includes any clothing. In assessing the ADL of Eating, the MDS 3.0 instructs the clinician not to consider eating or drinking during medication administration. MDS 3.0 also specifies that toileting does not include emptying of bedpans, urinals, bedside commodes, or ostomy or catheter bags.

ADL Measures in HHC

The Barthel Index—One study conducted outside of the U.S. used the Barthel Index to assess ADLs (Thygesen et al., 2009). In this study clinicians assess patients based on their ability to perform each activity over a 24–48 hour period. The Barthel Index uses different response metrics for various items (Table 4). ADL ability is rated by level of assistance needed with each task, this yields a maximum score of 100 points.

The OASIS B ADL—Under the OASIS B, for all ADLs a value of 0 indicates complete independence and is the best score possible. The number of response categories varies from item to item and the response categories differ across the eight ADL items, making comparisons difficult. Each ADL item is organized according to whether a person can conduct the activity independently, with the use of an assistive device or human supervision, with the help of another person, or cannot do the activity at all. OASIS data for ADLs are only collected on admission and discharge. ADLs are not assessed when a patient’s clinical status changed during the HHC stay, or is transferred to an acute care hospital. Therefore, it is not possible to collect data on ADL change during HHC stay prior to hospitalization.

Discussion

The purpose of this paper was to examine published research articles that describe methods used to assess ADLs in HHC and SNF. The most common instruments were the MDS and OASIS, which is not surprising because the MDS and OASIS are mandated instruments in SNF and HHC in the United States. Although the OASIS C1 was already used during the publication period of two HHC studies (Scharpf et al., 2010; Tinetti et al., 2012), neither of

the studies utilized the OASIS C1, probably because of the time lag between conduct of study and publication. Using national MDS 3.0 data, one SNF study found that 99 % of ADL self-performance items at admission and discharge were complete (Wysocki et al., 2015).

While there are some similarities between the assessments of ADLs using MDS and OASIS, they are different in a few ways. First, the approach to assessing ADLs in the OASIS varies from the MDS. While MDS 3.0 mandates observation of a patient's performance of ADLs with 3 observations over a 7-day period, OASIS relies on the self-report from patient or proxy interview to assess patient's ADLs. According to the OASIS guidance described by CMS, the intent of the ADL items in the OASIS is to identify a patient's ability to safely perform ADLs (CMS, 2014). In practice, self-report and proxy interview methods of ADL assessment are frequently used by HHC clinicians, particularly during the lengthy initial assessment process. This approach may be less accurate, especially when individuals have poor insight into their ADL ability (Jekel et al., 2015). Recent studies found that in the assessment of ADL abilities, proxy reports tend to overestimate ADL limitations (Li, Harris, & Lu, 2015).

Second, within the OASIS, the meaning of the numerical score for each ADL also varies from task to task. For example, human assistance is at Level 1 for Transferring, but at Level 2 for Feeding/Eating, Grooming, Ability to dress upper body and Ability to dress lower body. The use of a device moves from Level 0 for Grooming to Level 1 for Bathing and Ambulation/Locomotion. Within the MDS, all ADL items are coded on a scale of 0 to 4.

Finally, in HHC the initial assessment can be completed by a registered nurse or physical therapist, but the MDS must be completed by a nurse. A previous review found that ADL assessments conducted by nurses differ from assessments conducted by therapists (O'Connor & Davitt, 2015). Such variation can lead to different levels of ADL dependence, patient case mix and consequently reimbursement for the episode of care.

The need to standardize assessment of ADL items across SNF and HHC is a clear priority to improve quality of care and decrease variation in PAC spending. The fragmentation under the current system has limited our ability to describe the characteristics of patients treated under each setting and compare the outcomes of patients across PAC settings. Increasing concerns over the growth and wide variation in PAC spending and the lack of standardized patient assessments to measure quality prompted the enactment of the *Improving Medicare Post-Acute Care Transformation* (IMPACT) Act of 2014 (CMS, 2016; Miller, 2014). This Act mandates the development of standardized self-care and mobility ADL data elements in PAC settings. A step in the standardization of ADL assessments is to establish uniformity in the definition and method of assessing each ADL item in SNF and HHC. This would provide standardized patient specific information on ADL ability independent of the site of care.

Researchers have relied on clinicians to collect standardized ADL data. Of note is that additional data collection with the implementation of IMPACT can be a burden added to the work of clinicians, and patients who will endure lengthy assessment processes. In 2017,

HHC will implement a new version of the OASIS, Version C-2 which will include a few more items that are expected to address the IMPACT mandates for ADL self-care and mobility domains (CMS, 2016). Beyond the need to ensure uniformity in the ADL measures in SNF and HHC, the approach employed by clinicians to assessing ADLs in both settings must also be standardized to accurately capture a patient's ADL ability at start of care.

Furthermore, increased investment must be directed at the training of clinicians in SNF and HHC settings to ensure that the approach to assessing ADLs is consistent, standardized, reliable and reflective of a patient's ability on start of care. Others have also suggested that in both HHCs and SNFs, more attention must be directed to training the staff who are conducting the MDS and OASIS assessments to assure high-quality data (Fortinsky & Madigan, 2004; Pentz & Wilson, 2001).

Limitations

This integrative review has limitations. Publication bias may have affected the findings because the search was limited to peer reviewed literature. Grey literature, unpublished reports, dissertations, and articles published in languages other than English were not included. Studies published outside the United States posed a challenge to screen because of variations in the definitions of SNF patients, (for example, home for the aged, long term care residential facilities). None of the HHC studies were conducted with the current OASIS C1, which limits the generalizability of these findings to current practice.

Conclusions and Recommendations

This review adds to the growing body of evidence to evaluate ADL measures across PAC settings to ensure efficiency of health care expenditure and standardization of assessment. There is substantial variation in the ADL measures of self-care and mobility in SNF and HHC. To address this, uniform ADL terminology and measures are needed, and standardized training is warranted for clinicians assessing ADLs. This is particularly important in HHC where registered nurses or physical therapist can conduct OASIS assessment. Additional research is needed particularly on the reliability and validity of ADL measures using OASIS-C1

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Figure 1.
Literature search flowchart

Table 1

Database Search Strategy

PubMed	
#1	"Self Care"[Mesh] OR self care[tiab] OR self cares[tiab] OR self caring[tiab] OR self manage[tiab] OR self management[tiab] OR self managing[tiab] OR self managed[tiab] OR self monitor[tiab] OR self monitoring[tiab] OR self monitored[tiab] OR self monitors[tiab] OR "Recovery of Function"[Mesh] OR recovery of function[tiab] OR functional recovery[tiab] OR recovery of functions[tiab] OR functional status[tiab] OR functional statuses[tiab]
#2	"Activities of Daily Living"[Mesh] OR activities of daily living[tiab] OR ADL[tiab] OR ADLs[tiab] OR daily living activities[tiab] OR daily living activity[tiab] OR physical function[tiab] OR physical functioning[tiab] OR "Health Status"[Mesh] OR health status[tiab] OR health statuses[tiab]
#3	#1 OR #2
#4	"Home Care Agencies"[Mesh] OR "Home Care Services"[Mesh] OR "Community Health Services"[Mesh] OR "Health Services for the Aged"[Mesh] OR home[tiab] OR home-based[tiab] OR homes[tiab] OR "Nursing Homes"[Mesh] OR nursing home[tiab] OR nursing homes[tiab] OR skilled nursing facility[tiab] OR skilled nursing facilities[tiab] OR extended care facility[tiab] OR extended care facilities[tiab] OR post acute[tiab] OR postacute[tiab] OR community health[tiab]
#5	#3 AND #4
#6	#4, Filters: English, Aged
	Key: [MeSH]: Medical Subject Heading; [tiab]: Title/Abstract fields
Cumulative Index of Nursing and Allied Health Literature (CINAHL).	
#1	"Self Care"[Mesh] OR self care[tiab] OR self cares[tiab] OR self caring[tiab] OR self manage[tiab] OR self management[tiab] OR self managing[tiab] OR self managed[tiab] OR self monitor[tiab] OR self monitoring[tiab] OR self monitored[tiab] OR self monitors[tiab] OR "Recovery of Function"[Mesh] OR recovery of function[tiab] OR functional recovery[tiab] OR recovery of functions[tiab] OR functional status[tiab] OR functional statuses[tiab]
#2	"Activities of Daily Living"[Mesh] OR activities of daily living[tiab] OR ADL[tiab] OR ADLs[tiab] OR daily living activities[tiab] OR daily living activity[tiab] OR physical function[tiab] OR physical functioning[tiab] OR "Health Status"[Mesh] OR health status[tiab] OR health statuses[tiab]
#3	#1 OR #2
#4	"Home Care Agencies"[Mesh] OR "Home Care Services"[Mesh] OR "Community Health Services"[Mesh] OR "Health Services for the Aged"[Mesh] OR home[tiab] OR home-based[tiab] OR homes[tiab] OR "Nursing Homes"[Mesh] OR nursing home[tiab] OR nursing homes[tiab] OR skilled nursing facility[tiab] OR skilled nursing facilities[tiab] OR extended care facility[tiab] OR extended care facilities[tiab] OR post acute[tiab] OR postacute[tiab] OR community health[tiab]
#5	#3 AND #4
#6	#4, Filters: English, Aged
	Key: [MeSH]: Medical Subject Heading; [tiab]: Title/Abstract fields

Table 2

Characteristics of Studies

Study, Year	Data Period	Study Design	Sample and Setting	ADL Instrument	ADL Measures Assessed	Results
Lee et al. (2006)	Jan-Dec 2002	Cross sectional	SNF n=131 patients mean age 77.1 White=70.2 % Female=74.8% Medicare Fee-for-Service	Functional Independence Measure -Function Related Groups (FIM-FRG)	Eating, grooming, bathing, dressing upper, dressing lower, toileting, bladder mgt, bowel mgt, bed/chair/chair/wheelchair mobility/transfer, toilet mobility/transfer, tub or shower mobility/transfer, walking or wheelchair locomotion, ascending/descending stairs	Physical function defined as ADL on admission was the strongest predictor of physical function (ADL) at discharge.
Thygesen et al. (2009) <i>Norway</i>	Baseline data 1998-2001	Prospective Cohort	HHC n=208 patients mean age=84.5 no race reported Insurance=tax funded	Barthel ADL-Index	Bowel and bladder function, feeding, grooming, dressing, transfer from bed to chair, toilet use, mobility, walking stairs and bathing	Cognitive impairments and physical disabilities affecting ADLs predict nursing home admission
Scharpf et al.(2010)	2005	Cross sectional	HHC n=95,048 patients mean age 80.9 White=83% Medicare & Medicaid	OASIS B ADL Tool	Grooming, dressing upper body, dressing lower body, toileting, bathing, transferring, ambulation, and feeding/eating	ADL change index score provided the most comprehensive analysis of functional status change
Madigan et al.(2012)	2005	Cross sectional	HHC n= 82 080 patients with a diagnosis of HF Mean age 81.0 White=83% Medicare & Medicaid	OASIS B ADL Tool	Grooming, dressing upper body, dressing lower body, bathing, toileting, transferring, ambulation/locomotion, and feeding or eating	Strongest influence on ADL change score for improvement in functional capacity was admission functional status(ADL) score
Tinetti et al.(2012)	2012	Quasi experimental	HHC n=770 patients Mean age 77.4 Medicare 15% Not White, 47% Male	OASIS B ADL Tool	Grooming, dressing upper body, dressing lower body, bathing, toileting, transferring, ambulation/locomotion, and feeding or eating	Restorative model of care was associated with on third fewer readmissions than usual care
Wysocki et al (2015)	July 2011-June 2012	Cross sectional	SNF n =1,023,036 mean age=77.4 Medicare FFS 15.8 Not White, 64.4 female	MDS 3.0 ADL Self Performance items	Bed mobility, transfer, walk in room, walk in corridor, locomotion on unit, locomotion off unit, dressing, eating, toilet use, personal hygiene	MDS 3.0 ADL self-performance items are complete at admission and discharge. SNFs are completing ADL assessments at discharge fulfilling new requirement
Leland et al.,2015	1999-2007	Cross sectional	n=27,305 SNF Mean age=84.9 White=94.0% Female=70.8% Medicare	MDS Long form	Transfer Locomotion on unit Locomotion of unit Walking in Room Walk in corridor Bed Mobility	Duration of hip fracture acute care hospitalization was 6.8 days. SNF patients that experienced a hip fracture and still had successful discharge to community were higher functioning as

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Study, Year	Data Period	Study Design	Sample and Setting	ADL Instrument	ADL Measures Assessed	Results
Jung et al.,2016	2000–2009	Retrospective cohort	n=481 908 SNF Mean age=94.8% Men=22.8% Medicare	MDS Long form	Transfer Locomotion on unit Locomotion of unit Walking in Room Walk in corridor Bed Mobility	indicated by lower ADL Scores Secondary analysis stratified by RUG category observed a positive relationship between increased therapy and discharge home

Table 3

Description of ADL Instruments in SNF

Instruments	MDS 3.0 ADL self-performance items	MDS 2.0 MDS ADL-Long Form	(FIM-FRG) Motor sub scale of FIM
Number of items	10 items	7 items	13 items
ADL categories/domains	Bed mobility Transfer Walk in room Walk in corridor Locomotion on unit Locomotion off unit Dressing Eating Toilet use Personal hygiene	Bed mobility Transfer Locomotion Dressing Eating Toilet use Personal hygiene	Self care: Eating Grooming Bathing Dressing upper Dressing lower Toileting Sphincter control: Bladder management Bowel management Transfers: Bed/chair/wheelchair mobility/transfer Toilet mobility/transfer Tub or shower Locomotion: Mobility/transfer Walking or wheelchair Ascending/descending stair
Response	Frequency of activity needed for each activity at least 3 times in 7 days	Frequency of activity needed for each activity	7 point ordinal scale
Method of Assessment	Minimum of 3 observations for each activity within the past 7 days required	Observation proxy respondent Self-reported	Observation Caregiver/nurse interview Self-reported
ADL Independence	No help or staff oversight at any time	No help or oversight or help/oversight provided 1 to 2 times during last 7 days	All task which compose the activity are performed safely, within a reasonable time, and without modification, assistive devices or help from another person
ADL dependence	Staff oversight, supervision, encouragement, cueing, staff assistance in non- weight bearing or weight bearing activity over a 7 day period	Staff oversight, supervision, encouragement, cueing, staff assistance in non- weight bearing or weight bearing activity over a 7 day period or/full staff performance of activity	Patient requires assistive device or activity takes more than reasonable time to perform or there are safety considerations

Table 4

Description of ADL instruments in HHC

	OASIS ADL Tool	Barthel Index
No. of items	6 items	10 items
ADL items	Grooming, Dressing/upper, dressing/lower, Bathing, toileting, transferring, Ambulation/locomotion	Feeding Grooming Dressing Bowel and bladder function Transfer from bed to chair Toilet use Mobility Walking stairs and bathing
Response	For all ADLs a value of 0 indicates complete independence and is the best possible score Items have different level of scoring, from(0 to 5) or (0 to 3)	0–5 Bathing and Grooming 0–10 Feeding, dressing, continence and toilet use 0–15 Transfers and Mobility
Method of Assessment	Data obtained from medical record Direct Observation Self-reported proxy respondent	Data obtained from medical record Direct Observation Interview Proxy respondent Self-reported
ADL independence	No assistance required to perform a task	Does not require any help, physical or verbal assistance
ADL Dependence	Assistance required to perform a task	The need for supervision renders the patient not independent.