

Disability in Basic Activities of Daily Living Is Associated With Symptom Burden in Older People With Advanced Cancer or Chronic Obstructive Pulmonary Disease: A Secondary Data Analysis

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Abstract

Context

Managing activities of daily living is important to people with advanced cancer or chronic obstructive pulmonary disease (COPD). Understanding disability in activities of daily living may inform service planning.

Objective

To identify the prevalence of disability in activities of daily living, associations and change over time, in older people with advanced cancer or COPD.

Methods

Secondary analysis of International Access, Rights and Empowerment (IARE) studies in adults aged ≥ 65 years with advanced disease in the United Kingdom, Ireland, and United States, using a cross-sectional (IARE I & II) and longitudinal (IARE II, 3 timepoints over 6 months) data. Measures included disability in activities of daily living (Barthel Index), symptom severity (Palliative Outcome Scale), and assistive device use (self-reported). Logistic regression was used to identify relationships between disability and age, sex, living alone, diagnosis, and symptom burden; visual graphical analysis explores individual disability trajectories.

Results

One hundred fifty-nine participants were included (140 cancer, 19 COPD). Sixty-five percent had difficulty climbing stairs, 48% bathing, 39% dressing, and 36% mobilizing. Increased disability was independently associated with increased symptom burden (odds ratio, 1.08 [95% CI:1.02-1.15], $P = 0.01$) and walking unaided ($z = 2.35$, $P = 0.02$), but not with primary diagnosis ($z = -0.47$, $P = 0.64$). Disability generally increased over time but with wide interindividual variation.

Conclusion

Disability in activities of daily living in advanced cancer or COPD is common, associated with increased symptom burden, and may be attenuated by use of assistive devices. Individual disability trajectories vary widely, with diverse disability profiles. Services should include rehabilitative interventions, guided by disability in individual activities of daily living.

Key Words: Activities of daily living; functional performance; neoplasms; palliative care; pulmonary disease; rehabilitation

Key Message

Disability in activities of daily living is highly prevalent in older people with advanced cancer or chronic obstructive pulmonary disease and is associated with greater symptom burden. Individual disability profiles and trajectories are diverse and require individualized rehabilitation intervention.

Introduction

People are living longer with advanced cancer or chronic obstructive pulmonary disease (COPD) because of earlier identification and diagnosis, advances in treatment, and an aging population.¹ This may lead to greater levels of functional loss and prolonged dependency on others over a longer period of time,^{2,3} thus increasing the demand for health and social care services.⁴ Symptom burden is similar between advanced cancer and respiratory disease diagnoses,⁵ which have a profound effect on functional independence.⁶ Despite these similarities, clinical management differs where palliative care has a strong bias toward cancer,⁵ and rehabilitation has a strong bias toward COPD.⁷ However, toward the end of life, management of advanced conditions in acute care is heavily focused on medical management with little attention to disability.⁸

The World Health Organization (WHO) International Classification of Functioning, Disability and Health characterizes disability as the result of a complex relationship between an individual's health condition, personal factors, and external (environmental) factors, such as the circumstances in which the individual lives.⁹ Activities of daily living are defined as activities that constitute a person's daily life, which can be considered either basic activities of daily living (e.g. washing, dressing, bathing, toileting, feeding) or more complex tasks known as instrumental activities of daily living (e.g., shopping, housework, use of public transportation). Disability in activities of daily living is among the most common unmet supportive care need in patients with cancer¹⁰ and equally important to patients with COPD.¹¹

Associations and individual patterns of disability in activities of daily living, specifically in advanced cancer or COPD, are underinvestigated. Measuring disability in activities of daily living may shed light on how functional decline affects an individual's independence. Self- or proxy-reported disability in the year before death suggests disability trajectories of activities of daily living are disease specific, with cancer following a trajectory of high functioning then a period of rapid decline and respiratory disease following a more unpredictable pattern.³ However, while this approach helps to understand disability in relation to death, prospective individual-level trajectories are needed to provide a more clinical perspective and inform service planning.

Addressing disability is increasingly important as health service costs are primarily related to levels of impairment and/or disability and dependence, but service planning is primarily disease-specific.¹² Current gaps in the literature include an understanding of causes and consequences of disability in activities of daily living in advanced cancer or COPD, including how disability changes over time, and can help establish appropriate services and interventions to reduce functional dependence. This study aimed to 1) describe the prevalence of disability in activities of daily living overall and by each individual activity; 2) examine factors associated with disability in activities of daily living; and 3) explore change in disability over time, in older people with advanced cancer or COPD.

Methods

Data Source—the International Access, Rights and Empowerment Studies

This is a secondary analysis of data from the International Access, Rights and Empowerment (IARE) studies. These two studies were designed to be compatible using similar inclusion criteria and measurement. IARE I¹³ was a cross-sectional patient survey of older patients accessing specialist palliative care services across the United Kingdom, Ireland, and United States between November 2012 and August 2014. IARE II¹⁴ was a prospective cohort study to identify and understand service use, preferences, and palliative care needs of frail older people with advanced disease in the United Kingdom between February 2017 and January 2019. Recruitment was from specialist palliative care services at two large London hospitals, one hospital in Dublin, and one in New York in IARE I and from two acute hospitals, one subacute hospital, and one acute community service in South London (United Kingdom) in IARE II. IARE I inclusion criteria were 1) aged ≥ 65 years and 2) under the care of a palliative care team. IARE II inclusion criteria were 1) age ≥ 65 years; 2) frailty (Rockwood Clinical Frailty Scale score ≥ 5 ¹⁵); 3) one or more unplanned hospital admission or two or more unplanned emergency department attendances in the last 6 months; 4) not currently receiving specialist palliative care. Exclusion criteria were patients with cognitive impairment (IARE I) and without an allocated proxy (IARE II). Participants in IARE II were studied at baseline and followed up at 3 and 6 months. Ethical approval was granted by the Dulwich, and Camberwell and St Giles Research Ethics Committee(s) (refs: 12/LO/0044 and 16/LO/2048).

Selected Sample

From the pooled sample of IARE I and II participants (n = total IARE I and II sample), we included participants with solid advanced cancer or respiratory disease. Respiratory disease was further limited to COPD because of

lack of cases with other respiratory conditions in the data set. This study is reported following STrengthening the Reporting of OBServational studies in Epidemiology (STROBE) guidelines for reporting of observational studies.¹⁶

Outcome Variable

The primary outcome for this study was basic disability in activities of daily living, measured using the Barthel Index.^{17,18} This is a 10-item categorical measure that includes 10 basic activities of daily living items (bowel incontinence, toilet use, grooming, feeding, mobility, bladder incontinence, dressing, bathing, stairs, and transfers). The values assigned to each item in the Barthel Index are based on the amount of physical assistance required to perform the task. Items have between two and four responses, rated on a 0-1, 0-2, or 0-3 scale, ranging from dependent/unable to minor help, major help, or independent.¹⁷ A total score ranges from 0 to 20, where 0 represents fully dependent and 20 fully independent.^{17,18} A minimal important clinical difference in total disability is identified by a change of 3 or more in any direction.¹⁹ Scores from the original Barthel Index using a 0-100 scale were transferred onto the comparable Barthel Index using the recommended 0-20 scale,^{17,18} to pool data. On the 0-100 scale, a total Barthel Index score of 0-20 suggests total dependence, 21-60 severe dependence, 61-90 moderate dependence, 91-99 slight dependence, and 100 fully independent.²⁰ Comparatively on the 0-20 scale, very severe disability is identified by a score of <5, severe 5-9, moderate 10-14, mild 15-19, and 20 no disability.

Explanatory Variables

Explanatory variables were selected based on findings from a recent systematic review of trajectory studies of disability in activities of daily living in advanced cancer or respiratory disease.²¹ In the pooled data analysis, these included age, gender, living alone, diagnosis, symptom burden, and comorbidity. Symptom burden was measured using the Palliative Outcomes Scale family of measures which calculate a total score ranging from 0 to 40 where a higher score equals greater symptom burden.²² Comorbidities were collected using the Charlson Comorbidity Index or the Elixhauser Comorbidity Measure and reported as counts. Further explanatory variables were considered that were only collected in IARE II, including performance status, frailty, and use of an assistive device (yes/no) including walking aid, wheelchair, commode, raiser recliner chair, and chair raisers. Performance status was measured using the Australian Functional Performance Scale, which is a 10-point scale ranging from 0 (dead) to 100 (fully independent).²³ The Rockwood Clinical Frailty Scale was used to measure frailty using a 9-point scale from 1 (very fit) to 9 (terminally ill).¹⁵

Data Analysis

Cross-sectional Analysis

Descriptive statistics were used to summarize participant characteristics. Medians and interquartile ranges for unevenly distributed data or counts (percentages) were used where appropriate. Disability in activities of daily living was reported as prevalence for total disability and for each individual item on the Barthel Index for the whole sample (combined diagnoses), if disability scores are similar across diagnoses and separately by diagnosis if not. Associations between the total Barthel Index score and explanatory variables were calculated using nonparametric tests: Mann-Whitney U or Spearman's rho for binary and continuous variables, respectively. Associations with age, gender, living alone, diagnosis, symptom burden, and comorbidity were calculated. Assistive devices, performance status, and frailty were calculated for IARE II only. Our primary dependent variable in logistic regression analysis was whether the participant had \geq moderate disability (Barthel Index < 15)²⁴ or not (Barthel Index \geq 15) and included complete cases only. Explanatory variables considered for the model were age, gender, living status, diagnosis, symptom severity, and comorbidity, as identified previously.²¹

STATA version 16 was used for all analyses, where all available data were used in complete case analysis. Based on assumed prevalence of disability in activities of daily living in this patient population to be around 50%,^{10,25} a sample size of 150 would achieve a precision of $\pm 8\%$ in the estimation of prevalence of activities of daily living disability. This sample size would also be sufficient to detect a significant correlation (Based on a medium effect size and 80% power at a 5% significance level, a sample of 84 is required.) and for us to enter ≤ 10 planned variables in regression analysis.

Longitudinal Analysis

The longitudinal analysis was exploratory. Change in disability in activities of daily living over time using total Barthel Index score and symptom burden (Palliative Outcomes Scale) was plotted using medians and interquartile ranges at baseline, 3 months, and 6 months. Visual graphical analysis²⁶ was used to discover common patterns of individual change in total Barthel Index score over the three timepoints. Four trajectory groups were identified where a change of ≥ 1 point was used to discriminate the different trajectories. An increase or decrease of ≥ 1 would represent a decreasing or increasing trajectory, respectively, and a combination of at least one increase and one decrease of ≥ 1 would represent a fluctuating trajectory. A change of <1 in either direction would represent a trajectory of no change.

Results

Cross-sectional Analysis

One hundred fifty-nine participants were included in the cross-sectional analysis (Table 1): 94% cancer ($n = 140$), and 6% COPD ($n = 19$). The median [IQR] total Barthel Index score for the whole sample was 17 [14-19], which

was numerically higher for cancer (18 [13-19]) indicating less disability than COPD (17 [14-19]), but was not significantly different ($z = -0.47$, $P = 0.64$). Forty-eight percent of all participants had mild, 18% moderate, 12% severe, and 1% very severe disability. Twenty-one percent had no disability. [Figure 1 shows that the most prevalent difficulties in activities of daily living were reported for climbing stairs \(n=98 \(65%\)\), bathing \(n=74 \(48%\)\), dressing \(n=59 \(39%\)\) and mobilising \(n=54 \(36%\)\)](#). The univariate relationship between explanatory variables and total Barthel Index score is presented in [Table 2](#). More severe disability is associated with greater symptom burden ($r = -0.24$, $P = 0.01$). The multivariable analysis shows that \geq moderate disability (Barthel Index < 15) in activities of daily living ($n = 44$ [31%]) is independently associated with increasing symptom burden (odds ratio, 1.08 [95% CI: 1.02-1.15], $P = 0.01$) ([Table 3](#)).

Table 1 Participant Characteristics

Pooled Data set ($n = 159$)	All ($n = 159$)	Cancer ($n = 140$)	COPD ($n = 19$)
Total Barthel Index score, median [IQR]	17 [14-19]	18 [13-19]	17 [14-19]
Age, median [IQR]	74 [69-81]	73 [68-80]	79 [72-85]
Female, n (%)	86 (54)	74 (53)	12 (63)
White British, n (%)	140 (88)	106 (83)	17 (90)
Lives alone, n (%)	72 (45.3)	61 (44)	11 (58)
Comorbidities, median [IQR]			
Number of comorbidities included in Charlson Comorbidity Index	1 [0-2]	1 [0-2]	4 [1-7]
Number of comorbidities included in Elixhauser Comorbidity Measure	4 [3-6]	4 [3-5]	5 [3-6]
Symptom burden (Palliative Outcomes Scale), median [IQR]	11 [5-16]	11 [5.5-16]	9.5 [4-18]
IARE II ($N = 31$)	All ($N = 31$)	Cancer ($N = 17$)	COPD ($N = 14$)
Total Barthel Index score, median [IQR]	16 [14-19]	16 [13-19]	16 [13-19]
Australian Karnofsky Performance Status, median [IQR]	50 [50-60]	50 [50-60]	50 [50-60]
Frailty, median [IQR]	6 [5-6]	6 [5-6]	6 [5-6]
Current equipment, n (%)			
Walking aid	28 (90)	15 (88.2)	13 (92.9)
Wheelchair	17 (55)	7 (41)	10 (71)
Commode	11 (36)	5 (29)	6 (43)
Raiser recliner chair	13 (42)	7 (41)	6 (43)
Chair raisers	4 (13)	4 (24)	14 (100)

COPD = chronic obstructive pulmonary disease; IQR = interquartile range; IARE = International Access, Rights and Empowerment.

Comorbidity was measured using the Charlson Comorbidity Index in 128 participants (123 cancer, 5 COPD), and the Elixhauser Comorbidity Measure in 31 participants (17 cancer, 14 COPD).

Table 2 Univariate Relationship Between Explanatory Variables and Total Barthel Index Score

Explanatory variables	Z	R	P
Pooled Data set ($n = 159$)			
Cancer	-0.47	—	0.64
Age	—	-0.24	0.66

Female	0.44	—	0.66
White British	-0.01	—	0.99
Lives alone	-0.46		0.64
Number of comorbidities	—	-0.02	0.88
Symptom burden	—	-0.24	0.01
IARE II (<i>N</i> = 31)			
Australian Karnofsky Performance Status	—	0.73	<0.001
Frailty	—	-0.44	0.01
Current equipment: Uses walking aid	2.35	—	0.02
Uses wheelchair	-1.36	—	0.18
Uses commode	0.64	—	0.52
Uses raiser recliner chair	-1.71	—	0.09
Uses chair raisers	-0.77	—	0.44

Z = Mann-Whitney U; R = spearman's rho; P = *P* value; IARE = International Access, Rights and Empowerment.

All variables in this table have been dichotomized, except symptom burden and age which were treated as continuous variables.

Table 3 Adjusted Associations With Moderate/Severe Disability in Activities of Daily Living Using Multivariable Logistic Regression (*n* = 139)

Disability Severity	Odds Ratio (95% Confidence Interval)	<i>P</i> value
Symptom burden	1.08 (1.02-1.15)	0.01
Age	1.02 (0.97-1.08)	0.36
Cancer	0.92 (0.24-3.43)	0.90
Female	0.97 (0.44-2.13)	0.94
Live alone	0.77 (0.34-1.70)	0.51
IARE I	1.02 (0.31-3.34)	0.97
_cons	0.04 (0.00-3.58)	0.16

IARE = International Access, Rights and Empowerment.

Reference group is moderate/severe disability in activities of daily living (Barthel Index < 15); all variables in this table have been dichotomized, except symptom burden and age which were treated as continuous variables.

Australian Karnofsky Performance Status, frailty, and use of a walking aid were reported by the 31 participants in IARE II. At baseline, higher function on the Australian Karnofsky Performance Status was associated with less disability ($r = 0.73$, $P < 0.001$). Increased frailty is related to increased disability ($r = -0.44$, $P = 0.01$). The use of a walking aid was associated with less severe disability ($z = 2.35$, $P = 0.02$) and higher functional performance ($z = 1.96$, $P = 0.05$).

Longitudinal Analysis

Eighteen participants completed activity of daily living measures (Barthel Index) at all three timepoints for longitudinal analysis (8 cancer, 10 COPD). Total disability in activities of daily living slightly increased over 6 months (median, -2 [IQR: -3 to 0]) (Figure 2a), and there was little change in symptom burden (median, -1 [IQR: -3 to 3]) (Figure 2b). Figure 3 shows wide variation in the pattern and speed of change in individual trajectories of total disability

in activities of daily living on the Barthel Index, which are grouped into trajectories of no change ($n = 4$); decreasing disability ($n = 2$); increasing disability ($n = 6$); and fluctuating disability ($n = 6$), which vary across diagnoses. Overall, there was a bigger change in disability between baseline and 3 months (0 to 9 points) than between 3 months and 6 months (0 to 7 points). At 3 months, 7 patients showed a change beyond the minimal important clinical difference, of which 3 improved and 4 had more disability, and 1 patient showed increased disability beyond the minimal important clinical difference between 3 and 6 months.

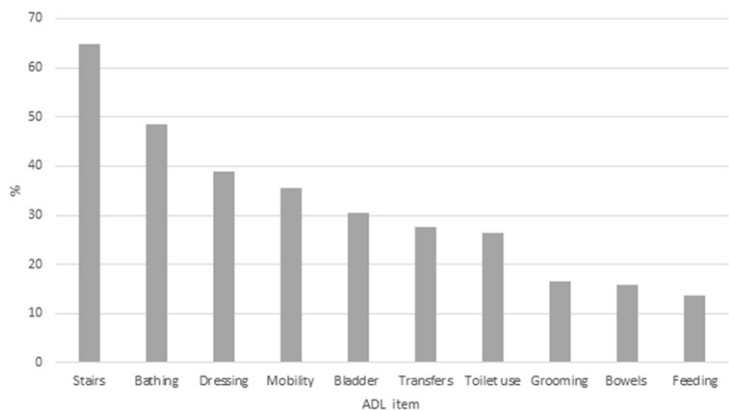


Fig. 1 Prevalence of disability in different activities of daily living (ADLs).

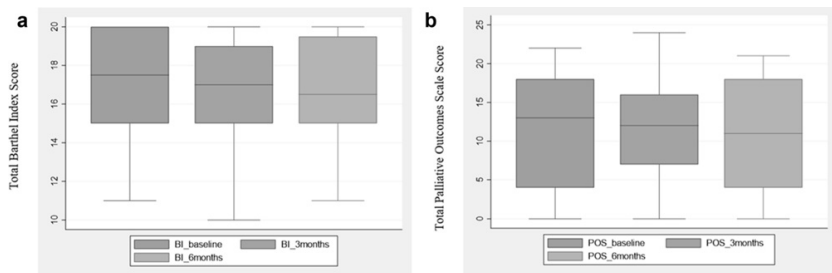


Fig. 2 Change in total disability and symptom burden over 6 months ($N = 18$). a) Total disability on Barthel Index (BI) (lower score equals greater dependency). b) Total symptom burden in Palliative Outcomes Scale (POS) (higher score equals greater symptom burden).

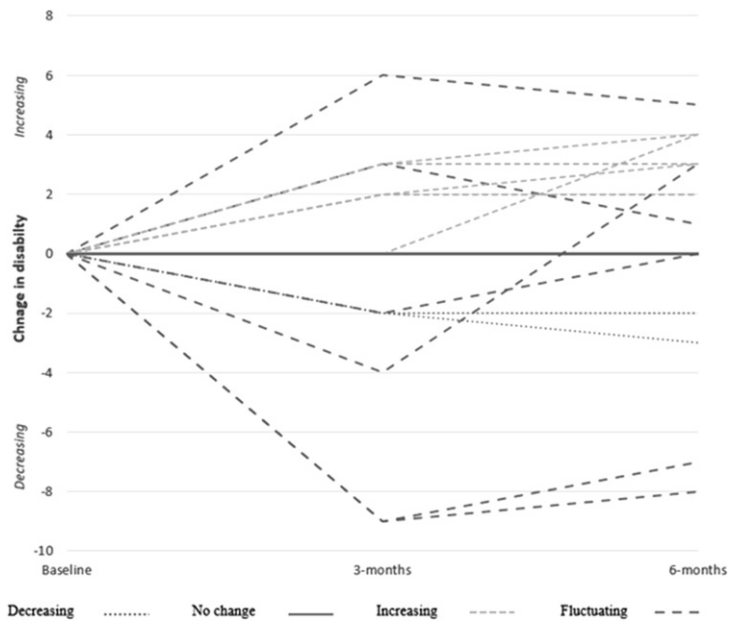


Fig. 3 Individual trajectories of change in total disability in activities of daily living on the Barthel Index over 6 months ($N = 18$).

Discussion

Main Findings

In our analysis of older people with advanced cancer or COPD, disability was highly prevalent. Our main findings were that 1) more severe disability in this population independently related to greater symptom burden but not age or primary diagnosis; 2) less disability related to the use of a walking aid; 3) the most disabling activities of daily living were stairs, bathing, and dressing; 4) wide variability in disability in activities in daily living and symptom burden over 6 months; 5) individual trajectories were variable across all four patterns of activities of daily living disability: no change, increasing, decreasing, and fluctuating disability.

Prevalence of Disability in Activities of Daily Living

Our findings show that disability in basic activities of daily living is prevalent in three-quarters of older people with advanced cancer or COPD. This is greater than identified in a systematic review that found disability in activities of daily living was prevalent in 7.4–49.8% of those with COPD²⁷ and a meta-analysis that identified one-third and half of adults with cancer have difficulty or require assistance to perform basic and instrumental activities of daily living, respectively.¹⁰ This suggests disability may be greater in an older or/and sicker population. The Chinese Longitudinal and Health Longevity Study of 4621 oldest of the old population (≥ 80 years old)²⁸ found independent associations between COPD and disability in basic and instrumental activities of daily living in the community. However, it is known that disability is more prevalent in inpatient than in outpatient settings in advanced cancer cases,¹⁰ particularly relating to basic activities of daily living, which can lead to increased length of hospital stay and discharge to a care facility.²⁹ Comparatively, in a cohort study of 164 patients with advanced cancer living at home, heavy housework was found to be the most problematic of daily activities, and engagement in leisure and social activities was considered a priority.³⁰

We propose that functional assessment should include both basic and instrumental activities of daily living with a focus on individual activities rather than overall decline. Although there can be a hierarchical pattern in loss of independence in activities of daily living, the order can be affected by the sample studied, the choice of response options for each item, the selection and number of items in the scale, and the type of scaling procedure.³¹ This is supported by a population-based longitudinal study of 51,338 older adults, which found that physical function measured by performance tests was significantly associated with self-reported disability in activities of daily living, and risk of disability was higher when the number of activity of daily living domains increased.³² However, one validated questionnaire cannot meet all the assessment and evaluation needs of one population, and a combination of existing questionnaires is recommended to fully assess disability in both basic and instrumental activities of daily living.³³ The Katz Index and the Lawton Brody Instrumental Activities of Daily Living Scale are popular for measuring basic and instrumental activities of daily living, respectively.¹⁰

Factors Associated With Disability in Activities of Daily Living

Our study found symptom burden relates to disability in activities of daily living in cases of advanced cancer or COPD, which is supported by a prospective analytical study of 638 patients referred to a home care support team.³⁴ Symptoms restricting disability are common during the last year of life, and the likelihood of a hospice admission increases in patients with a greater burden of restricting symptoms and number of disabilities in activities of daily living.³⁵ Our findings showed that the use of a walking aid is associated with less disability. As the Barthel Index allows the use of an assistive device to be independent,¹⁷ this does not necessarily mean that the person has changed their underlying functional impairment or has less severe symptoms, but rather the environment has been manipulated to enable them to function. This is supported by the Health and Retirement study³⁶ that identified difficulty in bathing to be a strong and independent predictor of nursing home placement in older people and difficulty in walking not to be associated despite being common in this population, possibly because of the use of mobility devices. This highlights the importance of considering environmental factors⁹ (e.g., assistive devices or place of care) in the causation of disability. However, it is not clear if there is a more specific relationship between a certain symptom (e.g., breathlessness) and a specific disability in certain activities (e.g., bathing) and whether this could be modified by an adaptation to the environment (e.g., shower stool). Research is needed to fully understand relationships between individual symptoms, different basic and instrumental activities, and environmental adaptation. This would help to preempt loss of independence and inform timely preventative interventions rather than wait for irreversible functional decline or crisis.

Our study did not identify a relationship between disability in activities of daily living and age or comorbidity. A cross-sectional study of 6973 cancer survivors identified an association between greater disability in activities of daily living and people aged ≥ 85 years as well as those with metastatic cancer.³⁷ A prospective cohort study of 9058 older adults found complex multimorbidity to be strongly related to the need for assistance in instrumental activities of daily living, and need for assistance in basic activities of daily living was related to a lesser extent.³⁸ In addition, older people with frailty are less likely to recover from disability in activities of daily living than people who were not frail.³⁹ Extending measurement of disability to instrumental activities of daily living could identify associations that may be missed by focusing on basic activities of daily living.

Clinical Implications

Health-care organizations are designed to address acute problems that might explain the medical emphasis in advanced disease.⁴⁰ Prolonged survival in advanced cancer or COPD has implications for health-care services to stretch beyond acute management and recovery, which may not be possible in advanced illness; to adopting an anticipatory, preventative, and adaptive approach to persisting symptoms and functional decline;⁴¹ and to avoid hindrance of an individual's performance (e.g., unavailability of assistive devices).⁹

A focus on symptom management and maximization of function is essential to improve the quality of life in advanced illness, albeit in older adults nonpharmacological interventions should be considered in the first line of treatment to minimize drug-drug interactions and serious side-effects.⁴² Rehabilitation has a role to play in the nonpharmacological management of symptoms, as well as by helping people to maintain their optimal levels of physical, sensory, intellectual, and social functioning with minimum dependence on others for as long as possible.^{43,44}

Utilization of interventions targeting disability in activities of daily living in advanced illness, such as occupational therapy, remains low, possibly because of weak evidence⁴⁵ and lack of referral.⁴⁶ A randomized controlled trial evaluating the efficacy of an occupational therapy-based intervention on disability in activities of daily living in people with advanced cancer showed no significant effects.⁴⁷ A process evaluation of this trial identified that beneficial effect could be limited by lack of presenting disability in the recruited sample; insufficient dosage; and inadequate timing of the intervention and follow-up procedures, which could be potentially overcome by improving the reach, timing, and delivery of the intervention.⁴⁸ Robust prospective studies exploring disability trajectories in activities of daily living could help identify when, where, for whom, and how to intervene, to inform future trial design.

Limitations of Study and Data

This study is limited by data collected in the primary studies from the IARE project. First, the population was restricted to people aged ≥ 65 years either receiving palliative care or frail, which may not be generalisable to everyone with advanced cancer or COPD. The sample consisted mostly of patients with cancer, compromising comparison across diagnoses. Second, measurement of disability in activities of daily living was limited to basic activities and did not collect data on instrumental activities, underestimating the prevalence of disability. Third, it is difficult to fully understand all factors that may relate to disability because of the choice of explanatory variables explored in the primary studies, the differing measures used across the two studies, and the use of complete case analysis. Fourth, the Palliative Care Outcome Scale includes mobility as a symptom overlapping with several items of the Barthel Index (stairs, mobility, and transfers), and it is unknown how this could influence the findings. Finally, the small sample size in the longitudinal analysis means analysis is exploratory and limited by completion bias.

Conclusion

Disability in activities of daily living is common in cases of advanced cancer or COPD. Increased disability relates to greater symptom burden and may be attenuated by use of adaptive interventions. Disability increases over time, but trajectories vary among individuals with differing disability profiles. To directly address disability in activities of daily living, services need to be modified to include rehabilitative interventions which are guided by disability in

individual activities of daily living rather than a total disability score. Further investigation is required to understand the patterns of decline over time in basic and instrumental activities of daily living and the complexity of factors that contribute to this change in people living with advanced cancer or COPD. This includes symptom management and adaptive interventions. Greater understanding of these relationships prospectively and retrospective from death will provide the opportunity to robustly test rehabilitative interventions and positively influence policy and clinical practice.

Uncited Figure

Figure 1.

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None of the authors have any conflicts of interests to declare.

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