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Review Article

The Effect of Advance Care Planning Intervention on Hospitalization Among Nursing Home Residents: A Systematic Review and Meta-Analysis

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ABSTRACT

Objective: To evaluate the effect of advance care planning (ACP) interventions on the hospitalization of nursing home residents.

Design: Systematic review and meta-analysis.

Setting and Participants: Nursing homes and nursing home residents.

Methods: A literature search was systematically conducted in 6 electronic databases (Embase, Ovid MEDLINE, Cochrane Library, CINAHL, AgeLine, and the Psychology & Behavioral Sciences Collection), in addition to hand searches and reference list checking; the articles retrieved were those published from 1990 to November 2021. The eligible studies were randomized controlled trials, controlled trials, and pre-post intervention studies describing original data on the effect of ACP on hospitalization of nursing home residents; these studies had to be written in English. Two independent reviewers appraised the quality of the studies and extracted the relevant data using the Joanna Briggs Institute abstraction form and critical appraisal tools. A study protocol was registered in PROSPERO (CRD42022301648).

Results: The initial search yielded 744 studies. Nine studies involving a total of 57,180 residents were included in the review. The findings showed that the ACP reduced the likelihood of hospitalization [relative risk (RR) 0.54, 95% CI 0.47-0.63; $I^2 = 0\%$)], it had no effect on emergency department (ED) visits (RR 0.60, 95% CI 0.31-1.42; $I^2 = 99$), hospice enrollment (RR 0.98, 95% CI 0.88-1.10; $I^2 = 0\%$), mortality (RR 0.83, 95% CI 0.68-1.00; $I^2 = 4\%$), and satisfaction with care (standardized mean difference: −0.04, 95% CI −0.14 to −0.06; $I^2 = 0\%$).

Conclusion and Implications: ACP reduced hospitalizations but did not affect the secondary outcomes, namely, ED visits, hospice enrollment, mortality, and satisfaction with care. These findings suggest that policy makers should support the implementation of ACP programs in nursing homes. More robust studies are needed to determine the effects of ACP on ED visits, hospice enrollment, mortality, and satisfaction with care.

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The aging population has dramatically grown worldwide, and this trend is seen to continue. By 2050, the number of older people is expected to reach approximately 1.5 billion.[1] This trend has led to a growing need for nursing homes. In the United States, there are 43 nursing home residents per 1000 civilians.[2] Nursing home residents often experience severe medical problems,[3] comorbidities,[4,5] deterioration of mental well-being,[6] hospitalizations,[7–9] and even death.[4]

The rate of hospitalization at the end of life of nursing home residents is 25.5% to 69.7%,[8,10,11] and the proportion of hospital deaths ranges from 5.9% to 77.1%.[10,12,13] Hospitalization is often associated with adverse health outcomes, such as nosocomial infections,[14] stress, delirium, falls, pain, and functional decline,[15] and they may receive low-quality palliative care.[16–19] Because residents'

regular and familiar care is interrupted during hospitalization, they suffer easily. Indeed, many approaches to comfort care can be provided in a nursing home.[20]

ACP is a process that helps people understand and communicate their personal values, life goals, and preferences regarding future health care. This process includes the overall goal of health care.[21] ACP also positively affects nursing home residents by improving the consistency of end-of-life decision making between patients and surrogates, increasing the completion of advance directives,[22,23] decreasing the number of futile life-sustaining treatments,[22,24] enhancing satisfaction with communication,[5,25] and promoting the use of hospice care.[26] Thus, health workers in nursing homes play a critical role in providing quality palliative care[27] by proactively discussing hospitalization preferences with residents and their families.[26]

In 2016, Martin et al[28] performed a systematic review and claimed that ACP reduces hospitalization rates by 9% to 26%. However, they did not perform a meta-analysis because of the lack of high-quality studies and the heterogeneity of the ACP interventions. By contrast, a 2006 prospective study has found that ACP reduces emergency service calls but not hospitalization and mortality among nursing home residents.[29] In summary, there is mixed evidence on the effectiveness of ACP intervention on the hospitalization of nursing home residents. Thus, a rigorous systematic review and a meta-analysis are needed to evaluate the effect of ACP intervention on the hospitalization rate among nursing home residents.

This review focuses only on the medical decision making aspect of ACP. This review thus aims to investigate the impact of ACP intervention on nursing home residents. The primary outcome is hospitalization, and the secondary outcomes are ED visits, hospice enrollment, mortality, and satisfaction with care. It is critical to conduct a meta-analysis to accurately demonstrate the effect of the ACP program on hospitalization.

Methods

Search Strategy

This systematic review was performed according to the PRISMA guidelines[30] (Figure 1). The study protocol was registered in PROSPERO (CRD42022301648). Electronic searches (Embase Supplementary Table 1, Ovid MEDLINE, Cochrane Library, CINAHL, AgeLine, and the Psychology & Behavioral Sciences Collection), hand searches, and reference list checking were limited to the period 1990 to November 31, 2021, as the concept of ACP was introduced only around the year 1990, when the durable power of attorney was established in the United States.[31]

Inclusion and Exclusion Criteria

Articles were selected for review if they met the following inclusion criteria: (1) original research published between 1990 and November 31, 2021; (2) written in English; (3) randomized controlled
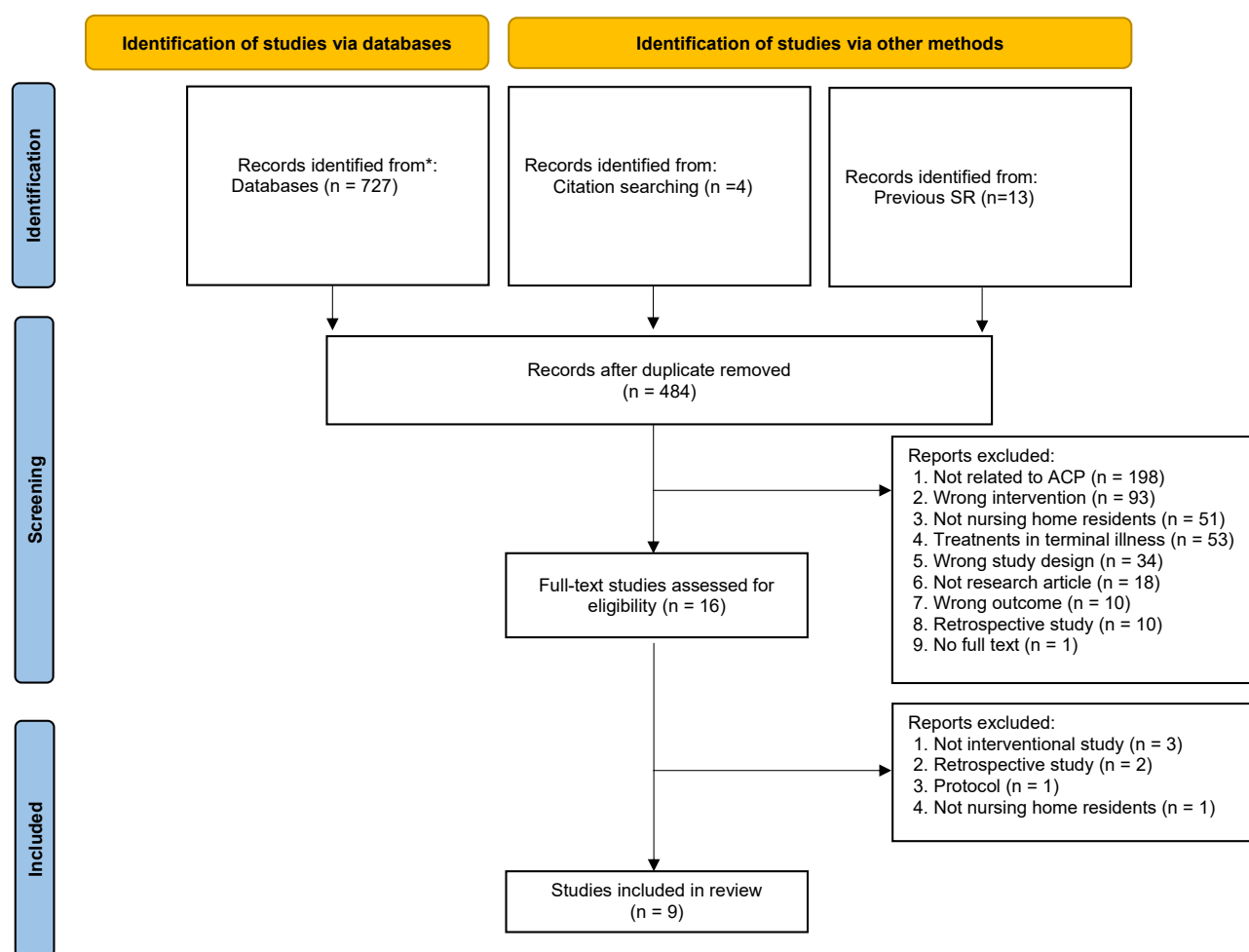

Fig. 1. Screening and selection process of trials.

Table 1
Methodologic Quality of RCT Design Using the JBI Checklist for RCTs

Study	1. True Randomization	2. Allocation Concealment	3. Similarity of Baseline Characteristic	4. Participants Blinding	5. Interventionist Blinding	6. Outcome Assessor Blinding	7. No Exposure to Other Treatments	8. No Potential Attrition Bias	9. ITTs Were Used	10. Same Measurement (Intervention vs Control)	11. Reliable Measurement Statistics	12. Appropriate Statistics	13. Appropriate Statistics	Total Score
Moyo et al (2021)[18]	Yes	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8.46
Lamppu et al (2021)[19]	Yes	Unclear	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8.46
Martin et al (2019)[32]	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8.46
Hanson et al (2017)[17]	Yes	Unclear	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7.69
Molly et al (2000)[33]	Yes	Unclear	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	7.69

Study quality is defined as follows: a total score greater than 70% as high quality, a score between 50% and 70% as medium quality, and a score less than 50% as low quality.

trial (RCTs), controlled trials, or pre-post intervention studies; (4) used ACP intervention to help nursing home residents communicate their future medical care preferences; and (5) analyzed hospitalization as primary outcome. Secondary outcomes were collected in all included articles on hospitalization outcomes. After duplicated articles were excluded, 2 reviewers independently assessed their abstracts for eligibility, and disagreements were resolved through a consensus-based discussion and a third reviewer.

Quality Assessment

Two independent reviewers assessed the methodologic quality using the Joanna Briggs Institute (JBI) checklist for RCTs and quasi-experimental studies (Tables 1 and 2); disagreements were resolved by a consensus-based discussion and by a third reviewer. The JBI checklist included assessment of true randomization, concealed allocation, baseline similarity between treatment and control, blinding, potential dropout bias, reliable outcome measurement, and appropriate statistical analysis. High-quality studies were identified on the basis of a previous meta-analysis,[36] in which studies with a JBI score higher than 70% were classified as having a high quality, those with a score between 50% and 70% as having a medium quality, and those with a score less than 50% as having a low quality. Only high-quality studies were included in the meta-analysis.

Data Extraction

Data were extracted from the selected studies by 2 independent reviewers using the JBI methodology for systematic reviews: data extraction and synthesis (Table 3).[37] We contacted the authors for any ambiguity and missing data. The collected data were intervention characteristics, populations, study design, methodology, and outcomes.

Data Synthesis and Analysis

The outcomes were reported using relative risk (RR) for dichotomous outcomes, standardized mean difference for continuous outcomes, and 95% confidence interval (CI). A fixed effect model was used for the majority of the random effects meta-analysis was used when a statistical heterogeneity ($I^2 > 30\%$) exists between trials. Heterogeneity was assessed by the I^2 statistic and χ^2 test for heterogeneity; the I^2 values implied the following: 0%-30%, heterogeneity is possibly not significant; 30%-60%, heterogeneity is possibly moderate; 50%-90%, heterogeneity is possibly substantial; and 75%-100%, heterogeneity is considerable. When statistical heterogeneity was present, sensitivity analyses were performed. A meta-analysis was performed in RevMan5, and the statistical significance level (P value) was set at .05. When the outcome was measured repeatedly, the longest follow-up time point and complete case analysis were used by excluding the missing data that were described narratively (if the actual data could not be acquired from the authors).

Outcomes

Primary outcome
Hospitalization was measured based on the accumulated events involving the transfer of residents to a hospital's inpatient unit. Transfer to ambulatory units was not included.

Secondary Outcomes

- ED visits were measured based on accumulated events involving the transfer of residents to the ED.

Table 2
Methodologic Quality of Non-RCT Design Using the JBI Checklist for Non-RCT Design

Study	1. Clear Cause and Effect	2. Baseline Was Similar	3. Similar Treatment	4. Control Group	5. Comparing Pre-Post Intervention	6. How Well to Treat Dropout Group	7. Same Outcome Measurement	8. Reliable Outcome Measurements	9. Proper Statistics	Total Score
Loomer et al (2021)[16]	No	Unclear	Yes	Yes	No	Unclear	Yes	Yes	Yes	5.55
Berning et al (2021)[34]	No	Unclear	Yes	No	Yes	N/A	Yes	Yes	No	5.00
O'Sullivan et al (2006)[35]	Yes	Unclear	Yes	No	Yes	N/A	Yes	Yes	No	6.25
Caplan et al (2006)[29]	Yes	Unclear	Yes	Yes	Yes	Unclear	Yes	Yes	No	6.6

Study quality is defined as follows: a total score greater than 70% as high quality, a score between 50% and 70% as medium quality, and a score less than 50% as low quality.

- Hospice admissions were measured based on cumulative events involving the transfer of residents to a hospice unit, whether they remained in the same facility or whether they were transferred to another facility.
- Mortality was measured based on the number of deceased residents.
- Satisfaction with care was measured by residents or proxies who scored their satisfaction with the overall care at baseline and at a follow-up time point.

Results

A total of 744 citations were identified from the 6 databases, from the gray literature, and from the reference lists; among these, 260 were duplicated, leaving 484 potentially eligible citations; 16 underwent full-text screening (Figure 1). Nine trials[16–19,29,32–35] were eligible for the systematic review, and 5 high-quality studies[17–19,32,33] were pooled for the meta-analysis.

The same group of authors conducted 2 studies[16,18] involving different sets of residents. Of the 9 trials, 5[17–19,32,33] were RCTs, 2[16,29] were controlled trials, and 2[34,35] were pre-post interventional studies. Seven[16–19,32,34,35] of the 9 studies were conducted and published after 2010, and the 2[29,33] others were published before 2010. Four studies[16–18,34] were conducted in the United States, 2 in Australia,[29,32] and 1 each in Ireland,[35] Finland,[16] and Canada.[33]

Quality Assessment

We included 9 interventional studies,[16–19,29,32–35] namely, 5 RCTs[17–19,32,33] and 4 non-RCTs.[16,29,34,35] The methodologic quality assessment of the included trials is detailed in Tables 2 and 3. Of the 9 studies, 5 were of high quality[17–19,32,33] and 4 were of medium quality.[16,29,34,35] All 5 high-quality studies were RCTs. Of the 4 medium-quality studies, 2 were controlled trials[16,29] and 2 were pre-post interventional trials.[34,35] The most frequent methodologic shortcomings of the high-quality studies were the failure to blind the interventionists (n = 5, 100%), inability to allocate concealment (n = 4, 80%), and failure to blind the participants (n = 3, 60%). For the 4 medium-quality studies, the most methodologic shortcomings were the failure to address the similarity at baseline (n = 4, 100%), failure to explain the follow-up completion (n = 4, 100%), lack of a control group (n = 2, 50%), and failure to identify the actual effect of the intervention (n = 2, 50%). Finally, we included the high-quality studies in the meta-analysis to render the meta-analysis valid, in which 4 trials were pooled as hospitalization, 3 trials were pooled as ED visits and hospice enrollments, and 2 trials were pooled as mortality and satisfaction with care.

Study Population

This study included a total of 57,180 participants, of whom 2587 were included in the meta-analysis: 1238 in the ACP intervention group and 1349 in the control group. The participants were aged 78-96 years, and 74% to 75% were female. As regards ethnicity, 81.5% to 88.5% were White.[17,18,32,34] As regards educational attainment, 57.26% had completed primary education[16] and 51% have had less than 8 years of education.[19]

Regarding cognitive impairment status, the participants displayed moderate[19,32] to severe[34] cognitive impairment. For the cognitively impaired participants, their proxies were invited to participate in the ACP discussion. The participants' level of dependence ranged from being moderately dependent[32] to being dependent.[16,18,34] The most common medical conditions were advanced dementia (48.5%-72%),[19,32] congestive heart failure and chronic obstructive pulmonary disease (12.5%-31.95%),[18,19] and severe disability (13.5%).[19]

Table 3
Study Characteristics

No.	Author	Year	Country	Setting	Study Design	Samples Characteristic	Intervention	Findings	Quality
1	Moyo et al[18]	2021	USA	360 nursing homes from 2 health care systems	RCT	343 (I 119, C 224); mean age: I 85.4 y, C 85.2 y; long-stay residents; male: I 30.7%, C 37.6%; competent: I 28.4, C 27.6	Video Education in Nursing Homes (PROVEN) is composed of (1) general goals of care; (2) goals of care for advanced dementia; (3) hospice; (4) hospitalization; and (5) ACP for health patients. The interventionists offered the ACP video to residents and proxies (where possible) at the following time points: (1) within 7 d of admission or readmission; (2) when decisions arose for which there was a specific video (eg, hospice); and (3) special circumstances (eg, major health status change).	- Reduced hospital transfers in the last 90 d of life in the intervention group compared to control (proportion difference 1.7%, 95% CI 3.2-0.09) - No significant difference in ≥3 hospital transfers in the last 90 d of life in the intervention group compared with control (proportion difference 0.83%, 95% CI 17.1-0.09) - No significant difference in late transition in the intervention group compared with control (hospitalization, emergency use in the last 3 d of life) (proportion difference 2.22%, 95% CI 5.29-1.26) - No significant difference in acute hospitalization in the last 3 d of life in the intervention group compared to control (proportion difference 1.09%, 95% CI 3.48-1.03) - No significant difference in transfer to hospice on the last day of life in the intervention group compared to control (proportion difference 0.59%, 95% CI 1.78-1.00)	High
2	Loomer et al[16]	2021	USA	360 nursing homes from 2 health care systems	Control-led trial	74,117 (I 23,302, C 50,815); short-stay patients <90 d (no baseline comparison)	Video Education in Nursing Homes (PROVEN) composed of (1) general goals of care; (2) goals of care for advanced dementia; (3) hospice; (4) hospitalization; and (5) ACP for health patients. The interventionists offered the ACP video to residents and proxies (where possible) at the following time points: (1) within 7 d of admission or readmission, (2) when decisions arose for which there was a specific video (eg, hospice), and (3) special circumstances (eg, major health status change)	- No significant reduction in hospital transfers per 1000 person-days alive in the intervention compared with control (rate difference: 0.2, 95% CI 0.4-0.9) - No significant reduction in a burdensome intervention (eg, feeding tube) in the intervention compared with control (proportion difference 0.3, 95% CI 1.4-1.9) - No significant reduction in hospice enrollment in the intervention compared with control (proportion difference 0.0, 95% CI 1.7-1.47)	Medium
3	Lamppu et al[19]	2021	Finland	360 nursing homes from 2 health care systems	RCT	324 (I 151, C 173); mean age: I 83 y, C 84 y; male: I 24%, C 25%; permanent resident with a prognosis of <12 mo (severe dementia, cancer, heart	ACP and palliative care educational workshops use constructive learning theory, focusing on learner-centered and reflective processes. ACP training was designed according to a training-	- No significant intervention effect in ED visits in the intervention compared to control, IRR 1.28 (95% CI 0.37-4.41). - No significant intervention effect in specialized hospital	High

				failure, chronic obstructive pulmonary disease, renal failure, severe disability, or other terminal diseases		needs survey from intervention wards based on learning theories, assuming participants would be best motivated if the given topics were related to experiences. Registered nurses, licensed practical nurses, and physicians in the intervention group participated in 4 afternoon training sessions in small groups. Contents covered the basics of good palliative care; ACP; discussing these issues with residents and their relatives; good symptom management; adverse effects of hospitalizations; communication skills; tailoring end-of-life care; supporting relatives; and confronting challenging situations in end-of-life care.	days in the intervention compared to control, IRR 2.03 (95% CI 0.67-6.692). - No significant intervention effect in subacute hospital days in the intervention compared to control, IRR 2.13 (95% CI 0.65-6.15) - No significant intervention effect in ambulatory hospital days in the intervention compared to control, IRR 0.85 (95% CI 0.29-2.53) - No significant effect in total service costs in the intervention group (including specialized hospital days, rehabilitation hospital days, ambulatory visits to hospitals, and ED visits), V1748/person/y compared with V941/person/y in the control group (ratio 1.74, 95% CI 0.86-3.15, adjusted for age, sex, DNR order, need for help, and clustering). - No intervention effects for health-related quality of life were observed between the groups during the 24 months; mean difference 0, $P = .42$) (adjusted for age, sex, DNR order, need to heap, and clustering).	
4	Berning et al[34]	2021	USA	Two long-term chronic care campuses within a large academic health care organization	Pre-post intervention	n = 315, mean age 87 (±9) y, 30% were male, 33% had moderate to severe cognitive impairment, any residents with proxies	- A structured discussion guide trained health care staff from various disciplines to contact the residents' proxies to conduct COVID-19−focused ACP discussions - Every morning between April 13, 2020, and May 26, 2020, at 8:00 a.m., an automated email was sent to the team with an updated list of residents without DNH orders and the following information: date of last COVID-19 test and status, unit location, health care proxy name, and contact number, and cognitive function (ie, surrogate for decisional capacity). - The SWAT team then called proxies to conduct a COVID-19−focused ACP discussion,	- Increase postintervention advance directive uptake by 39% - Postintervention, 1.6% of residents were hospitalized with illnesses unrelated to COVID-19, and 23% died	Medium

(continued on next page)

Table 3 (continued)

No.	Author	Year	Country	Setting	Study Design	Samples Characteristic	Intervention	Findings	Quality
							prioritizing residents with a positive COVID-19 test. Two subsequent attempts were made if the proxy was unavailable on the first call. Each SWAT team member conducted 3-7 ACP discussions per day. - To track efforts, the emailed spreadsheet was linked to a research electronic data capture form on which the SWAT Team could document the results of the telephone call (ie, decided on DNH directive, decided against DNH, undecided, or could not contact). If a decision was made to initiate a DNH directive, the SWAT team member called or emailed the resident's primary care provider so that they could write the order.		
5	Martin et al[32]	2019	Australia	6 nursing homes in Melbourne	RCT	326 (I 181, C 145); median age: I 88 y (83-92 y), C 88 y (85-91 y); male: I 24.8%, C 30%; permanent resident	A GOCP form (ACP conversation and physician order related to ACP) was completed by a medical physician and facilitated by nurses. Geriatricians discussed with residents and family (where possible) the current illness situation, trajectory, value, preferences, and place of death. Before the meeting, all those involved received a copy of the GOPC document to be completed. The GOPC documents were then completed and placed in their RACF notes.	- Reduced ED visits and emergency hospitalization at 12 mo in the intervention compared to control, IRR 0.63, 95% CI 0.41-0.99, $P = .044$ - No significant difference in ED visits and emergency hospitalization at 12 mo, IRR 0.52, 95% CI 0.16-1.68, $P = .27$ - No significant difference in total hospital bed-days at 12 mo, IRR 0.82, 95% CI 0.43-1.57, $P = .55$ - No significant difference in overall mortality at 12 mo, IRR 1.14, 95% CI 0.77-1.67, $P = .51$	High
6	Hanson et al[17]	2017	USA	22 nursing homes	RCT	302 (I 151, C 151); mean age: I 85.7 y, C 87.3 y 39; male I 33.1%, C 31.8%; severe dementia: I 22.5%, C 27.8%; residents with advanced dementia and their proxies	A GOC video decision aid and structured discussion with nursing homes. The decision aid was developed using the International Patient Decision Aid Standards, which include information about dementia, goals of prolonging life, supporting function, or improving comfort, treatments consistent with each goal, and prioritization of goals. Communication is based on the VALUE guide (valuing family comments, addressing emotions, listening,	- No significant difference in the quality of end-of-life communication at 12 mo in the intervention group compared to control (QOC end-of-life subscale, 5.6 vs 5.8; $P > .99$). - Increased goal concordance in the intervention group compared to the control group at 12 mo (88.4% vs 71.2%, $P = .001$). - No significant difference in symptom management in the intervention compared to	High

#	Author	Year	Country	Setting	Design	Participants	Intervention	Outcomes	Quality
							understanding the patient as a person, and asking family questions).	control [mean (SD) 32.6 (9.7) vs 33.7 (8.6), P = .48] - No significant difference in satisfaction with care in the intervention compared to control [mean (SD) 31.0 (5.9) vs 31.6 (5.3), P = .16] - Increased ACP document in the intervention compared to control 95% vs 52%, P = .001). - No significant difference in hospice enrollment in the intervention compared with control, probability 17 vs 18, P = .97.	
7	O'Sullivan et al[35]	2016	Ireland	3 nursing homes, including 2 private and 1 publically funded (community nursing unit), totaling 290 beds at baseline	Pre-post intervention	Pre: 290; post: 304; competent residents with proxies (SMMSE score >10)	Let Me Decide ACP program, an educational program discussing end-of-life preferences for patients, families, and nurses. The participants received ACP discussions by nurses, and senior nurses provided ACP feedback monthly to residents and staff. Moreover, senior nurses delivered a one-off ACP educational session to residents and families.	- Reduced hospitalization post-intervention compared to pre-intervention 14.6 from 27.8% to, z = 3.96, p 0.001. - Reduced inpatient hospital days post-intervention compared to pre-intervention 0.36 from 0.54%, z = 8.85, p < 0.001). - Decreased percentage of hospital deaths post-intervention compared to pre-intervention 8.4 from 22.9%, z = 3.22, P = .001 - Increased length of stay (LOS) post-intervention compared to pre-intervention marginally (7-9 d) but not statistically significant. - Increased uptake of an ACD or end-of-life care post-implementation rose to 76% from 25%. - Reduced health care expenses from hospitalization to €10 and €17.8 million/annum - Reduced health care expenses from ambulance transfers by €0.4 million/annum	Medium
8	Caplan et al[29]	2006	Australia	21 nursing homes	Controlled trial	1857 (I 1334, C 523), competent residents with MMSE scores ≥16	Let Me Decide program is an educational program discussing end-of-life preferences for patients, family, and nurses. We educated residents, their families, staff, and general practitioners about the terminal nature of dementia, ACP, and life-sustaining treatment. ACP is the discussion with residents, families, and health care providers to form advance	- Reduced hospitalization in the intervention group compared to control (RR, 95% CI): 0.89 (0.85-0.93) vs 1.10 (1.06=1.14), P < .001 - Reduced length of stay in the intervention group compared to control (RR, 95% CI): 0.74 (0.72-0.77) vs 1.01 (0.98-1.04), P < .001 - No significant difference in mortality rate per 100 nursing	Medium

Table 3 (continued)

No.	Author	Year	Country	Setting	Study Design	Samples Characteristic	Intervention	Findings	Quality
							directives. The research processes screened the cognitive impairment with nurses' MMSE and Decisional Aid Scoring. For the incompetent residents, the proxies discussed ACP and advance directives.	home days in the intervention group compared to control, 30.3 vs 29.7	
9	Molly et al[33]	2000	Canada	6 nursing homes	RCT	1292 (I 636, C 656), residents with consent, mean age: I 82 y, C 84.16 y; female: I 65%, C 74%; competent resident: I 36%, C 41%	Let Me Decide advance directive program included educating residents, family members, and staff about advance directives and offering an advance directive that included a choice of treatment preferences: life-threatening illness, cardiac arrest, and nutrition. Head nurses assessed residents' capabilities using the SMMSE. The proxies were asked to complete and discuss incompetent residents' advance directives. Physicians then reviewed and signed the directives, originals remained in the residents' medical records, and copies were given to residents, families, proxies, and primary care physicians. Charts with directives were labeled, and additional copies were made to accompany residents when they were transferred to hospitals.	- Decreased hospitalization per patient in intervention group compared to control, mean difference 0.27 vs 0.48, $P = .001$ - Decreased length of stay per patient in intervention group compared to control, mean difference 2.61 vs 5.86, $P = .01$ - No significant difference in death percentage in intervention group compared to control, 24% vs 28%, $P = .20$ - No significant difference in discharge in intervention group compared to control, 10 vs 16 times - No significant difference in competent patient satisfaction between intervention and control group, mean difference 0.16, 95% CI 0.41-0.10. - No significant difference in incompetent patients and families' satisfaction between intervention and control group, mean different 0.07, 95% CI 0.08-0.28	High

C, control; DNH, do not hospitalize; DNR, do not resuscitate; I, intervention; MMSE, Mini Mental State Examination; SMMSE, Standardized Mini Mental State Examination.

Regarding participant demographics, 5[17−19,32,33] of the 9 studies showed no significant difference between the intervention and control groups, suggesting the homogeneity of the residents included in this study. The remaining 4 studies[16,29,34,35] did not provide demographic data.

Intervention

In the 9 trials, the ACP intervention focused on presenting the general concept of ACP[16−19,29,33,35] and on introducing ACP documents, including do not resuscitate orders[34] and nonhospitalization orders.[32,34] The methods employed in the ACP interventions varied. Four studies[19,29,35,33] employed an educational intervention to help residents, their families, and nursing home staff to understand ACP. Three studies[16−18] used video support for ACP; this material covered topics such as end-of-life goals, hospitalization, and hospice care. In one study,[34] an ACP conversation focusing on hospitalization preference was conducted via telephone because of the COVID-19 pandemic. In another study, the ACP conversation directly involved the nursing home residents and their proxies.[32]

Various components of ACP interventions have been developed: ACP communication skills,[19] structured ACP discussion,[16,34] end-of-life communication and symptom management guided by the Let Me Design program,[29,33,35] and identification of the goal of care guided by the General Goal of Care Program.[17] As regards the duration of educational sessions in ACP programs, most studies provided details such as 1-hour session,[17,32,34] 4-session workshop,[19] and 2-day workshop[29,33,35]; 2 trials delivered 5 short videos (6- to 18-minute) to residents.[16,18] However, no studies provided details on the duration or frequency of ACP discussion among residents and health care providers.

The persons who delivered ACP interventions included facilitators,[33] experienced geriatricians,[19] nurses,[16−18,29,32,35] physicians,[32] social workers, therapists, and nutritionists.[16−18]

Seven trials delivered ACP intervention rather than usual care; the 2 other trials[34,35] employed pre-post intervention. The definition of usual care in the 7 trials varied, such as routine meetings without a specific written ACP,[33] lack of a video-aided intervention,[17] and residents completing advance directives without input from health care professionals. The 4 other trials did not comprehensively define usual care.[16,18,19,29]

The duration of follow-up in each study varied, as follows: 1 month after the start of the study,[34] 9 months,[17] 12 months,[16,32,35] 18 months,[33] 2 years,[19] 3 years,[29] and the last 90 days of life.[18] Three studies[19,29,33] measured the hospitalization events after the intervention was completed up to a given time point. The remaining 5 studies investigated the outcomes on the start of the study.[16−18,32,34,35]

Primary Outcome

Hospitalization

Hospitalization among nursing home residents was reported in 9 trials; 4[17,18,32,33] of 9 studies were pooled in the hospitalization outcome. Four studies[16,29,34,35] were excluded because of poor quality, and another[19] was excluded because it considered the transfer to an ambulatory unit as hospitalization. All 4 studies included the same ACP intervention elements: discussing ACP, providing materials that aid in decision making, and documenting the discussion. This may indicate homogeneity in intervention characteristics. The results demonstrated that the ACP program reduced the likelihood of hospitalization among nursing home residents compared with the usual care, with little to no statistical heterogeneity (RR 0.54, 95% CI 0.47 to 0.63; and $I^2 = 0$%) (Figure 2). We explored the possible causes of excessive homogeneity, that is, $I^2 = 0$%. We concluded that it could be circumstantial, as the finding was unlikely to have been caused by insufficient statistical analysis, rare events, or analysis of duplicated publications.

Secondary Outcomes

Emergency department visits

Three high-quality studies[18,19,32] that examined the effect of ACP on emergency department (ED) visits were pooled with a random effects model. The results showed that ACP had no effect on ED visits (RR 0.60, 95% CI 0.31-1.42; $I^2 = 99$%) (Figure 2). Thus, $I^2 = 99$% indicated heterogeneity, which may be due to clinical heterogeneity according to Lamppu et al.[19] In this study, the ACP concept was taught to nursing home staff; by contrast, in 2 other studies, ACP was discussed directly with the residents and their families. We excluded the clinical heterogeneity[19] for the sensitivity analysis (RR 0.48, 95% CI 0.30-0.76; $I^2 = 95$%), but the heterogeneity remained. Although clinical heterogeneity precluded additional calculations, our results still provided meaningful insights.

Hospice enrollment

Two trials[17,18] examined the effect of ACP intervention on hospice enrollment, wherein the general concept of ACP was delivered to residents and their families. However, there was no information on where the hospice care was provided, whether in the same facility or in another facility where a patient was transferred. The finding suggested that there is no significant difference in hospice enrollment between the intervention and control groups (RR 0.98, 95% CI 0.88-1.10; $I^2 = 0$%) (Figure 2). More high-quality studies are needed to determine the effect of ACP on hospice enrollment.

Mortality

Two studies[32,33] reported on the effect of ACP on mortality; both trials covered the discussion of ACP and the introduction of ACP documents. The finding implied that there is no significant difference in mortality between the intervention and control groups (RR 0.83, 95% CI 0.68-1.00; $I^2 = 4$%) (Figure 2).

Satisfaction with care

Two studies[17,33] explored the satisfaction of care outcomes using different measurements; however, they did not provide the measurement's psychometry. Molly et al[33] measured the satisfaction score (range: 1-7) of residents at baseline vs 18 months postintervention. Meanwhile, Hanson et al[17] measured the satisfaction scores (range: 1-10) of proxies at baseline vs 9 months postintervention or on death. In both studies, structured ACP discussions were conducted and ACP-related materials were provided. A meta-analysis suggested that there is no significant difference in the care satisfaction between the intervention and control groups (standardized mean difference: −0.04, 95% CI −0.14 to −0.06; $I^2 = 0$%) (Figure 2). These 2 studies did not use validated instruments. In addition, Molly et al[33] did not explain how they measured the satisfaction scores of deceased residents, leading to potentially biased results.

Other outcomes

Three studies[17,34,35] reported on ACP documents, but they could not be pooled for the meta-analysis because they lacked a control group.[34,35] The findings suggested that ACP's documents tend to increase by 39% to 51%. Moreover, varied findings on service cost outcomes have been reported; a pre-post trial[35] reported that hospitalization expenses decreased from €17.8 to €10 million/annum postintervention, but an RCT[19] found no significant difference in health care expenses pre- and postintervention.

Discussion

To our knowledge, this is the first meta-analysis on the effect of ACP on hospitalization and related outcomes among nursing home residents. This review systematically assessed the impact of ACP
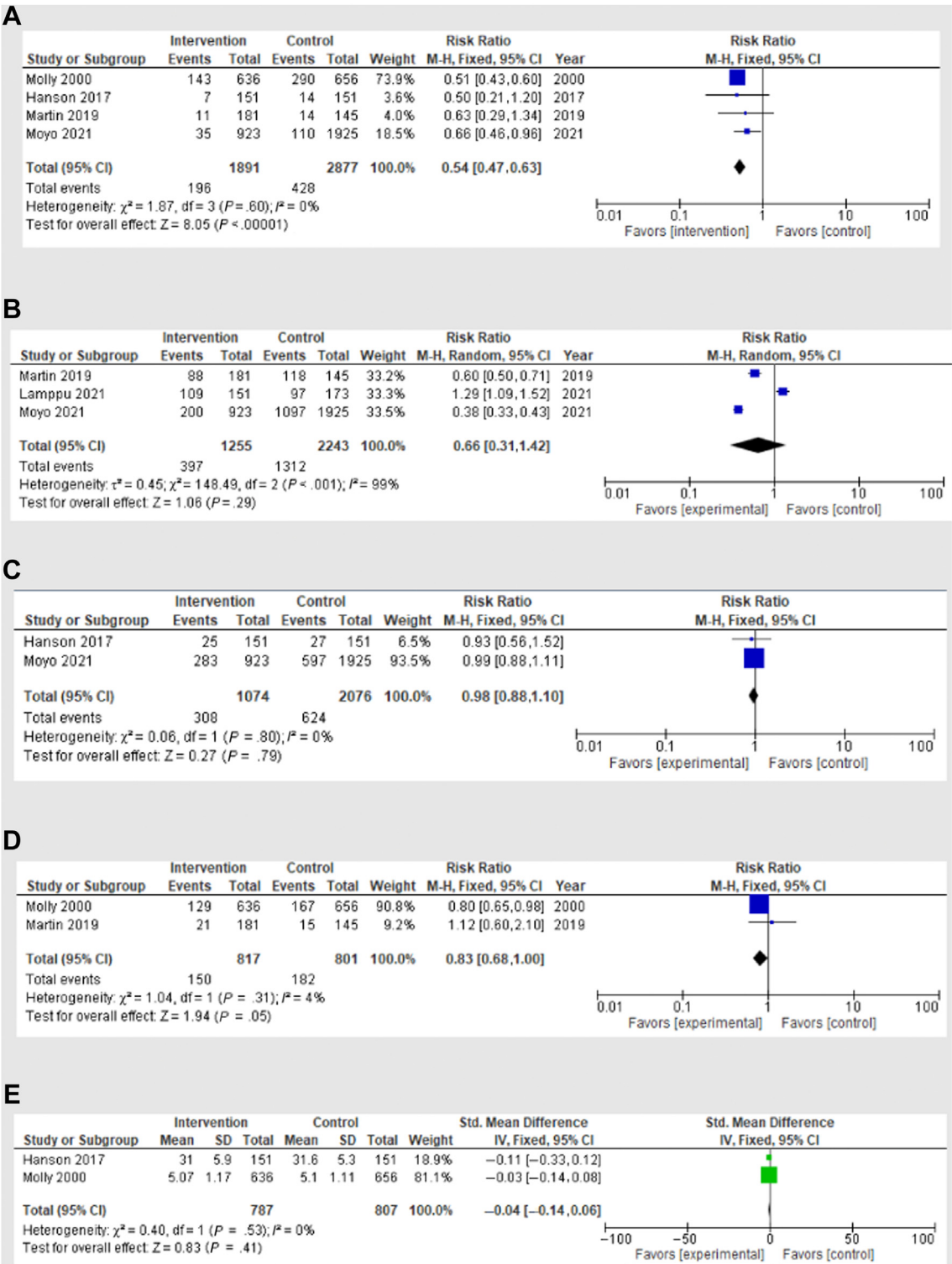
Fig. 2. Effect of ACP interventions on nursing home residents: (A) hospitalization, (B) ED visits, (C) hospice enrollment, (D) mortality, and (E) satisfaction of care.

intervention on nursing home residents. The ACP intervention reduced the likelihood of hospitalization among nursing home residents. No significant differences were observed in secondary outcomes, namely, ED visits, hospice enrollment, mortality, and satisfaction with care. Four of the 9 studies were pooled to measure hospitalization outcomes. All 4 studies assessed the same ACP intervention elements, namely, discussing ACP, providing materials that aid

in decision making, and documenting the effect of the discussion on ACP. This approach is consistent with the 2017 International ACP consensus, which identified the important features of ACP.[38] Other factors that may affect the hospitalization of nursing home residents include differences in nursing home size and staff, as well as differences in ACP definition and implementation. All included studies were conducted in large nursing homes with adequate staffing; findings

have shown that facilities with more nursing staff and physicians are associated with lower rates of resident hospitalization.[39,40] In addition, there are many international differences in ACP in nursing home care, and most importantly, ACP is now part of standard care. Thus, this could have an impact on the number of hospitalizations of nursing home residents.

The findings showed that ACP does not significantly affect hospice enrollment, suggesting that hospices are underused by nursing home residents, similar to other populations.[41] This may be due to the difficulty in predicting life expectancy. To be enrolled to hospice, residents must have a life expectancy of less than 6 months. Although there is a guideline for determining life expectancy in the United States, prediction of life expectancy is still based on the subjective judgment of physicians without scientific justification.[42] Hospice enrollment may be given to a few residents, which has a small impact on the number of hospice enrollment. The above finding was inconsistent with a retrospective study conducted in the United States.[41] However, note that the said study is a retrospective chart review with a potential bias.

ACP tends to become more widely accepted and is becoming more common in nursing homes. In this review, 2 of the 9 studies were conducted before 2015, and it includes a 2018 review[43]; the results of this review showed the dramatic increase in ACP after 2015. However, further calculations were not possible because this review included studies published within a short time period (1990-2021), and only a small number of studies have investigated this population. More high-quality RCTs are needed to determine whether the trend for ACP in nursing home residents changes over time.

Strengths

One of the strengths of this work is the inclusion of both RCT and non-RCT studies in the systematic review, thereby providing more meaningful results. We also included high-quality RCTs in the meta-analysis, leading to the acquisition of robust evidence. We screened studies from the gray literature to avoid publication bias, and these studies were assessed using the JBI assessment tools, which comprehensively addressed the potential bias. We also used a standardized instrument to conduct and report this review according to the PRISMA guidelines. In addition, explicit homogeneity in effect size could provide evidence supporting the robustness of ACP interventions in reducing hospitalizations among nursing home residents. As regards the presence of heterogeneity, we performed a sensitivity analysis to demonstrate the validity of the meta-analysis.

Limitations

Currently, only a limited number of studies on ACP interventions in nursing home residents is available, which may lead to study power bias. Nevertheless, the current review provides meaningful results that inform the academic community about the areas of knowledge that require further consolidation. In addition, no details have been provided regarding the cause of hospitalization of the residents; moreover, some hospitalizations may be necessary for nursing home residents, whereas others may be avoidable and preventable. Our review could not describe the characteristics of hospitalization. In addition, this review did not use incomplete data for a meta-analysis of the pooled effect size. Our review might have been biased by the scarce data obtained from the incomplete studies.

The most common methodologic limitation in the RCT studies was the lack of blinding of interventionists or participants; this is due to the nature of ACP interventions, which are difficult to blind. In the other intervention studies, the most common shortcomings were the failure to examine baseline similarity, for which insufficient data were provided. Another limitation was the failure to determine the true effect of the intervention; as a result, not all studies could be combined in the meta-analysis.

Recommendations

We recommend that nursing home residents be given the opportunity to participate in and discuss their health care planning through ACP. This could encourage residents to receive end-of-life care that aligns with their hospitalization preferences. Reducing potentially avoidable hospitalizations among nursing home residents may prevent adverse outcomes and may increase health care savings.[10,12,13,44] However, health care providers must consider the implementation of ACP from various perspectives related to death and dying,[45−49] assess risks and benefits, and evaluate the cost-effectiveness of ACP programs for nursing home residents.

There is a relatively limited number of RCTs evaluating hospitalization among nursing home residents. More studies are needed to provide a more accurate, valid, and homogeneous picture of this phenomenon. There is also a need to use an internationally accepted approach to hospitalization in this population. In addition, RCTs in this area have not been able to use triple-blinded methods because of the nature of the ACP intervention. Future studies will need to overcome this methodologic issue to avoid potential bias. Finally, this study addressed the lack of evidence on the impact of ACP on hospitalizations among nursing home residents. Our meta-analysis included only 4 high-quality RCTs performed in 3 countries, namely, the United States, Canada, and Australia; a transcultural ACP study is desirable to explore the different perceptions of death and dying in different regions.

Conclusion and Implications

ACP reduced the hospitalization of nursing home residents, although this finding exhibited low certainty, and it had no effect on secondary outcomes, namely, ED visits, hospice enrollment, mortality, and satisfaction with care. These findings suggest that policy makers should support the implementation of ACP programs in nursing homes. More robust studies are needed to determine the effects of ACP on ED visits, hospice enrollment, mortality, and satisfaction of care.

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Supplementary Table 1
Example of Keywords and Control Vocabularies Used

Database	No.	Search Syntax
Embase	1	((nursing OR geriatric OR old OR senior OR retirement OR elderly OR aged) near/3 (home* OR facility OR cent* OR housing OR resident* OR patient*)):ti,ab,kw,de
	2	'long term care patient':ti,ab,kw,de
	3	'continuing care retirement center':ti,ab,kw,de
	4	'Nursing home patient'/exp
	5	'Home for the aged'/exp
	6	#1 OR #2 OR #3 OR #4 OR #5
	7	((Advance* OR living OR shar*) near/3 (plan* OR statement OR medical* OR wish OR directive* or will* OR decision)):ti,ab,kw,de
	8	(('end of life' OR 'end of life') NEAR/4 (discussion OR decision OR plan* OR preference* OR conversation OR wish OR shar*)):ti,ab,kw,de
	9	(treatment NEAR/2 (withhold* OR withdraw* OR refus*)):ti,ab,kw,de
	10	'power of attorney':ti,ab,kw,de
	11	'Do not resuscitate order':ti,ab,kw,de
	12	'advance care planning'/exp
	13	#7 or #8 or #9 or #10 or #11 or #12
	14	Hospitaliz*:ti,ab,kw,de
	15	hospitalization/exp
	16	#14 OR #15
	17	(randomized control trial' OR 'intervention study' OR 'prospective study' NOT 'retrospective study'):ti,ab,kw,de
	18	#6 AND #13 AND #16 AND #17