Original Article

Effects of advance care planning on end-of-life decisions among community-dwelling elderly people and their relatives: a systematic review and meta-analysis

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Background: Currently, more and more older people are inevitably facing the final stages of life and their need for end-of-life care is becoming more prominent. It is therefore important to understand in advance what older people expect from their approaching end-of-life care and attention. We conducted a meta-analysis to explore the influence of advance care planning (ACP) on end-of-life decision-making among older adults living in community settings and their family members.

Methods: We searched databases including PubMed, Embase, Cochrane Library, and Web of Science through 10 August 2022, to locate randomized controlled trials (RCTs) that investigated the effects of ACP on the end-of-life decision-making of community-dwelling elderly individuals and their family members. Studies we obtained from the databases were screened based on specific inclusion and exclusion criteria. The software Stata 15.0 was used for combining and analyzing data.

Results: A total of 8 RCTs were eligible for meta-analysis. They involved 1,292 community-dwelling elderly people. The meta-analysis results revealed the incidence of the following items among participants after the intervention of the ACP: cardiopulmonary resuscitation (CPR) [rate =26%, 95% confidence interval (CI): 11–41%], life-sustaining treatment (rate =12%, 95% CI: 6–18%), gastric gavage (rate =34%, 95% CI: 18–50%), mechanical ventilation (rate =34%, 95% CI: 14–54%), death at home (rate =7%, 95% CI: 3–12%), and death in hospital (rate =6%, 95% CI: 3–10%). The systematic review protocol was prespecified and registered in the international prospective register of systematic reviews (PROSPERO; CRD42022348900).

Conclusions: According to current research, ACP is a promising treatment that can improve the end of life of elderly people living in the community and their families. However, considering the heterogeneity of the included studies, multi-center RCTs with high quality and larger sample sizes need to be conducted to confirm our conclusions.

Keywords: Advance care planning (ACP); elderly; decision-making; systematic review

Submitted Mar 21, 2023. Accepted for publication May 05, 2023. Published online May 18, 2023.
doi: 10.21037/apm-23-367
View this article at: https://dx.doi.org/10.21037/apm-23-367

Introduction

A report from the World Health Organization (WHO) demonstrates an increase in the proportion of people over 60 years old worldwide from 12% in 2015 to 22% in 2020 (1). An increasing number of elderly people are inevitably approaching the last phase of life, so their needs for hospice care are becoming increasingly prominent (2). However, many elderly people may have lost the capacity to express their desires regarding end-of-life care (3), so it is difficult for others such as their family members and healthcare providers to truly fathom the treatment and nursing requirements of elderly people nearing the end of life. Therefore, it is important to preemptively understand the elderly's expectations of their future end-of-life care and nursing (4,5). Studies have pointed out that over-treatment easily happens if older adults do not express their preferences in advance, inflicting greater pain on patients and increasing the burden upon their families. This also increases public health expenditure, resulting in the squandering of medical resources. With the intensification of the aging of the population, topics related to the elderly such as support and hospice care have received great attention (6,7). In this sense, advance care planning (ACP), which is formulated in line with the wishes and expectations of patients at the end of life and aims to provide them with the most appropriate medical interventions, should be given more attention in future research (8-10).

ACP is a significant element of palliative care. It is the process by which patients who have the capacity to speak for themselves and have access to information on the prognosis of the disease and the hospice care measures (11) can share and discuss their wishes and preferences regarding future end-of-life care with their family members and healthcare providers based on their values and life experience (12,13). ACP is an educational intervention to promote mutual understanding between patients and their families on the condition, values, and treatment preferences, and it facilitates clinical decision-making. The implementation of ACP is based on 2 major theoretical models in the United States. The first theory, the Common-Sense Model, advocates that patients should be encouraged to describe their health status from 5 aspects: identity (description of symptoms), cause (pathogenesis), timeline (the temporal nature of the disease such as acute and chronic phase), consequences (short-term or long-term outcomes), and cure or controllability (prognosis). The first step to implement ACP is to allow patients to recall their hospitalization experience and describe their health problems (14). The second theory is the Conceptual Change Model, which encourages patients to recognize the limitations of their knowledge and become eager for new information to achieve better outcomes (15,16). With the help of ACP, patients can gradually learn about the benefits and risks of each medical strategy related to their health problems. However, the impact of ACP on older people living in the community remains controversial. Therefore, our study was designed to present an overview of ACP's effects on older people living in communities and provide new options for end-of-life care among older adults. We present this article in accordance with the PRISMA reporting checklist (available at https://apm.amegroups.com/article/view/10.21037/apm-23-367/rc).

Highlight box

Key findings

- ACP can improve the life quality of community-dwelling elderly people approaching the end of life and their families, so ACP is worthy of clinical promotion.

What is known and what is new?

- Over-treatment easily happens if older adults do not express their preferences in advance, inflicting greater pain on patients and increasing the burden upon their families.
- This study was designed to present an overview of ACP's effects on older people living in communities and provide new options for end-of-life care among older adults.

What is the implication, and what should change now?

- ACP-related education should be provided to increase the understanding and trust of the elderly, thus promoting its application.

Methods

The protocol was prospectively submitted to the international prospective register of systematic reviews (PROSPERO; CRD42022348900).

Literature search

A literature search was carried out in databases including PubMed, Embase, Cochrane Library, and Web of Science from their inception through 10 August 2022. The following subject headings plus keywords were used as search items: ACP, advance directives, advance health care planning, aged, old people, family members, family

caregivers, death, end of life, and so on.

Inclusion and exclusion criteria

The inclusion criteria were as follows: randomized controlled trials (RCTs); participants with their family members as caregivers; ACP intervention was employed in the experimental group and routine care was applied in the control group; primary outcome measures included palliative care, cardiopulmonary resuscitation (CPR), and life-sustaining treatment; secondary outcome measures included nasogastric gavage, mechanical ventilation, and place of death.

The exclusion criteria were as follows: conference summary, letter, case report, repeated publication, systematic review.

Data extraction

The extraction of data from included studies was conducted by 2 researchers (J Wang and A Zhou) independently, and a cross-check was carried out. Disagreements were solved by discussion with a third researcher (R Deng) and a consensus was finally reached. Duplicate publications were first removed, and then titles and abstracts of remaining studies were screened. The exclusion of obviously irrelevant literature was followed by screening the full text of the remaining articles to determine eligible studies for meta-analysis.

Data on the following aspects were extracted: first author's name, publication year, country, study type, sample size, age of patients, and outcome measures.

Quality assessment

Two investigators independently assessed the quality of included studies using the bias risk assessment tool in the Cochrane Manual of Systematic Review of Interventions 5.1.0 (https://handbook-5-1.cochrane.org/), and consulted a third party in case of disagreement. The risk of bias across included studies was evaluated from the following 7 dimensions: randomized sequence generation (selective bias), assignment concealment (selective bias), blinding of personnel and participants (implementation bias), blinding of outcome evaluators (observation bias), the integrity of data results (follow-up bias), selective reporting of results (reporting bias), and other sources of bias. Each study was assessed from these 7 aspects. If a study met all the criteria, it was identified as being with low risk of bias, indicating its high quality; if a study satisfied some of them, it was judged as being with unclear risk of bias, indicating its moderate quality; if a study met none of them, it was regarded as being with a high risk of bias, suggesting its low quality.

Statistical analysis

We utilized the software Stata 15.0 (StataCorp., LLC, College Station, TX, USA) to perform this meta-analysis. The existence of heterogeneity between included studies was assessed by the chi-square test. If $P \geq 0.1$, $I^2 < 50\%$, it was considered that multiple similar studies were homogeneous, and a fixed-effects model was used for meta-analysis. If $P \leq 0.1$, $I^2 \geq 50\%$, it was considered that the studies were similar from a clinical perspective, and then a random-effects model was used and subgroup analysis was performed (regarding specific interventions) to find the source of heterogeneity. For continuous data, if the results were obtained by the same measurement tool, the mean difference (MD) was used to measure the effect size; if the results were obtained by the measurement of the same variables with different methods, the standardized mean difference (SMD) was used to measure the effect size. All effect sizes were expressed as a 95% confidence interval (95% CI). For missing data, the author can be contacted for original data. For the results with publication deviation, shear and complement method can be used to explore the source. The stability of research results was further investigated by sensitivity analysis.

Results

Literature search strategies and outcomes

The search in databases yielded 8,054 articles. A total of 3,029 papers were excluded due to duplicate publication, and 4,920 studies were removed after screening the titles and abstracts. Finally, 8 studies were included for analysis. The literature search and screening strategies are presented in *Figure 1*.

Baseline characteristics of included studies

A total of 8 studies (17-24) were eligible for meta-analysis, 4 of which (17-19,21) were conducted in China. A total of 1,292 community-dwelling older adults were involved in these studies. *Table 1* summarizes the characteristics of

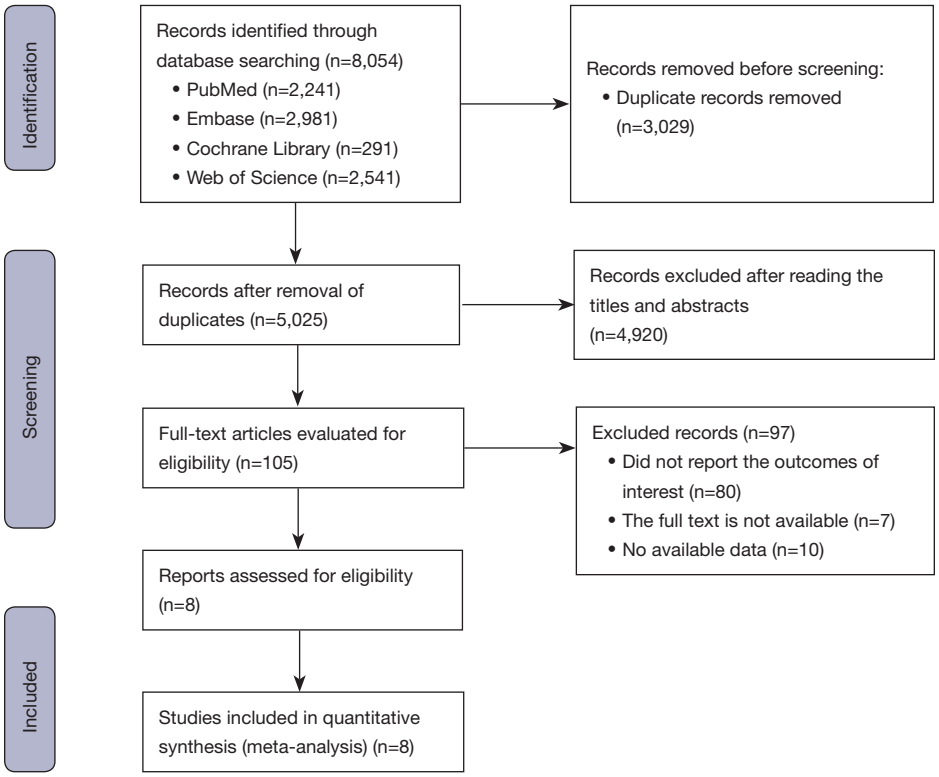

Figure 1 Flow chart of literature retrieval.

Table 1 Literature characteristics

Study	Year	Country	Study design	Sample size	Gender (M/F)	Age (years)	Outcome
Detering	2010	Australia	RCT	154	100/54	85	F1; F2; F3; F4
Ng	2016	Singapore	RCT	600	206/394	81	F1; F2; F3; F4
Chan	2018	China	RCT	222	112/120	77.3	F1; F5; F6;
Sævareid	2019	Norway	RCT	77	22/55	86.4	F7; F8
Chiu Wu	2020	China	RCT	52	15/37	72.67	F1; F3
Ke	2021	China	RCT	27	25/2	87.5	F1; F6
Chan	2021	China	RCT	59	9/50	86.67	F1; F6; F5; F7
Overbeek	2019	Netherlands	RCT	101	50/51	86	F3; F4;

F1: CPR; F2: treatment to prolong life; F3: place of death; F4: home; F5: mechanical ventilation; F6: nasogastric; F7: decisions to limit life-sustaining treatment or hospitalization; F8: patients selected for life-sustaining treatment or hospitalization. CPR, cardiopulmonary resuscitation; F, female; M, male; RCT, randomized controlled trial.

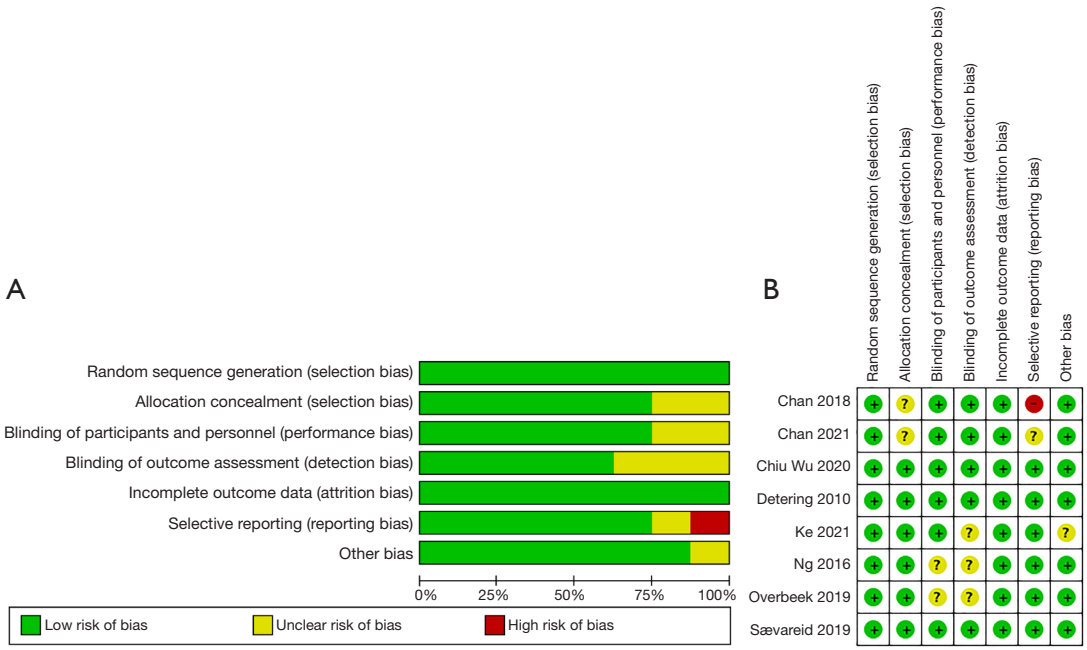

Figure 2 Risk of bias across included studies.

included studies.

Quality of included studies

All eligible studies were double-blind trials that reported on random grouping strategies. *Figure 2* presents the risk of bias assessment results.

Meta-analysis

CPR

Among all eligible studies, 5 articles (17-20,22) reported on CPR. A random-effects model was utilized considering the results of heterogeneity (I^2=96.3%, P<0.001). The meta-analysis results revealed the incidence of CPR after the intervention of ACP (rate =26%, 95% CI: 11–41%), as presented in *Figure 3*. The sensitivity analysis was conducted by removing the 5 studies one by one, and the results demonstrated small sensitivity, indicating the stability of meta-analysis results, as shown in *Figure 4*.

Life-sustaining treatment

A total of 4 studies (18,20,22,24) investigated nasogastric gavage. A random-effects model was employed based on the results of life-sustaining treatment (I^2=76.9%, P=0.005). The meta-analysis results revealed the incidence of life-sustaining treatment after the intervention of ACP (rate =12%, 95% CI: 6–18%), as shown in *Figure 5*. Sensitivity analysis was conducted by removing the 4 studies one by one, and the results demonstrated small sensitivity, indicating the stability of meta-analysis results, as shown in *Figure 6*.

Nasogastric gavage

A total of 3 studies (17,18,21) explored nasogastric gavage. A random-effects model was employed based on the results of heterogeneity (I^2=81.8%, P=0.004). The meta-analysis results revealed the incidence of gavage feeding after the intervention of ACP (rate =34%, 95% CI: 18–50%), as shown in *Figure 7*. The sensitivity analysis was conducted by removing the 3 studies one by one, and the results demonstrated small sensitivity, indicating the stability of meta-analysis results, as shown in *Figure 8*.

Mechanical ventilation

A total of 2 studies (17,18) reported on mechanical ventilation. A random-effects model was employed based on the results of heterogeneity (I^2=87.7%, P=0.004). The meta-analysis results revealed the incidence of mechanical ventilation after the intervention of ACP (rate =34%, 95%

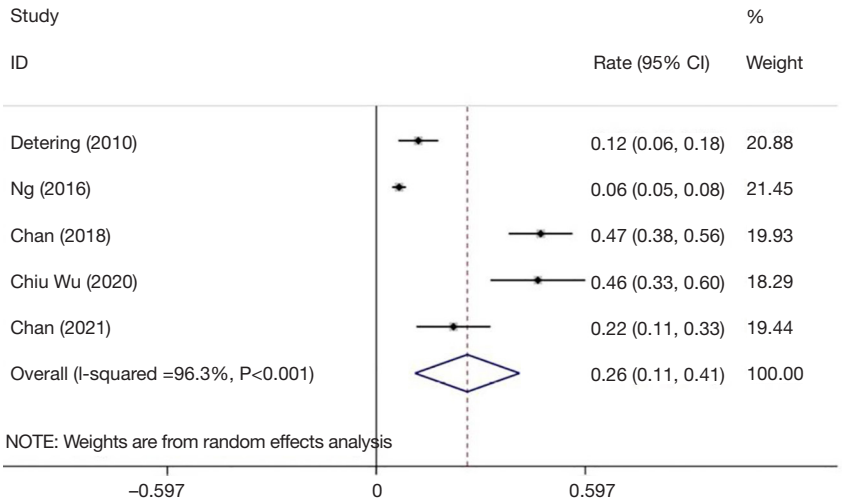

Figure 3 Forest plot for CPR. CI, confidence interval; CPR, cardiopulmonary resuscitation.

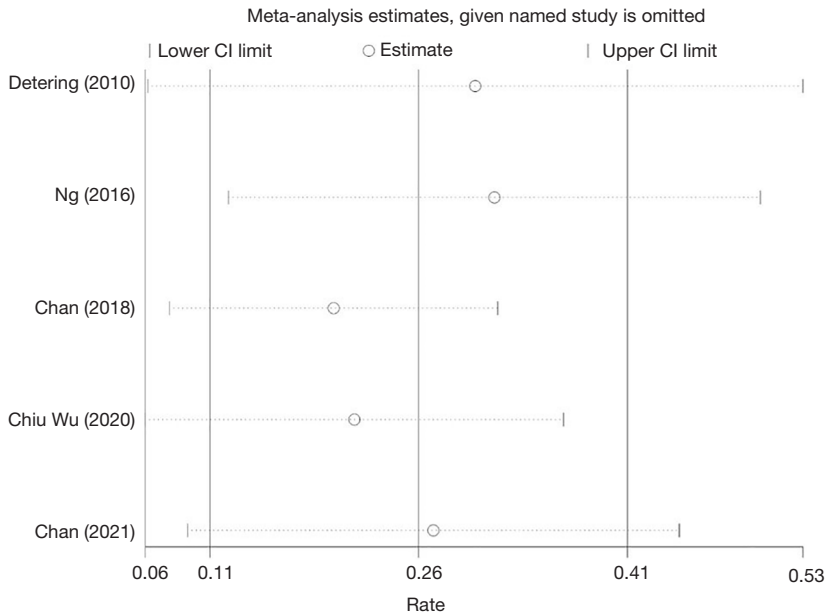

Figure 4 Sensitivity analysis for CPR. CI, confidence interval; CPR, cardiopulmonary resuscitation.

CI: 14–54%), as shown in *Figure 9*. The sensitivity analysis was conducted by removing the 2studies one by one, and the results demonstrated small sensitivity, indicating the stability of meta-analysis results, as shown in *Figure 10*.

Place of death

A total of 3 studies (20,22,23) reported on the place of death among patients. A random-effects model was employed based on the results of heterogeneity (I^2=99.5%, P<0.001). Data were analyzed in 2 groups based on the place of death: at home or in hospital. The meta-analysis results demonstrated the incidence of death at home after the intervention of ACP (rate =7%, 95% CI: 3–12%) and in hospital (rate =6%, 95% CI: 3–10%), as shown in *Figure 11*. The sensitivity analysis was conducted by removing the 3 studies one by one, and the results demonstrated small sensitivity, indicating the stability of meta-analysis results, as shown in *Figure 12*.

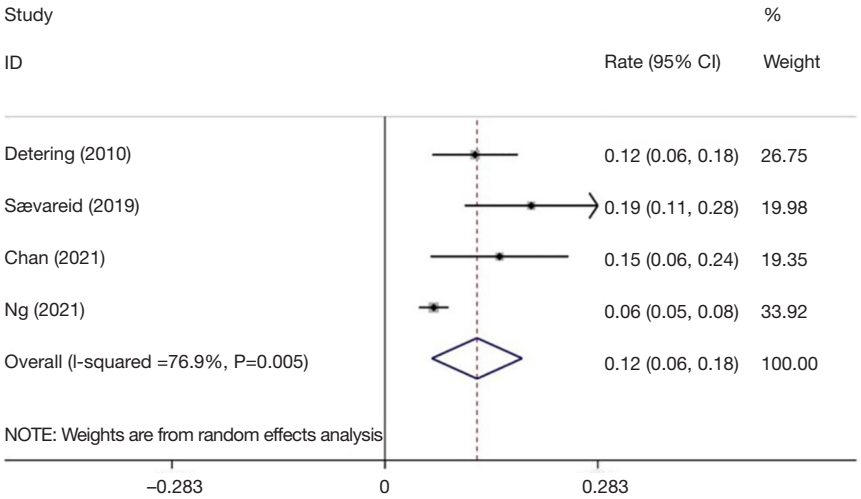

Figure 5 Forest plot for life-sustaining treatment. CI, confidence interval.

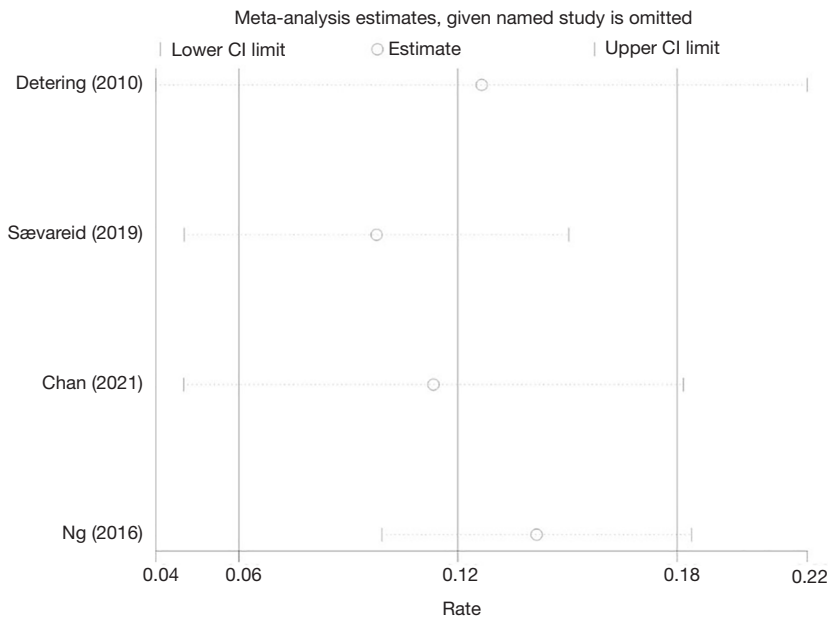

Figure 6 Sensitivity analysis of life-sustaining treatment. CI, confidence interval.

Publication bias

The egger test was used to evaluate publication bias for CPR, and it was found that (P=0.048) this index may have publication bias (*Figure 13*).

Discussion

To our knowledge, this is the first meta-analysis to explore the effects of ACP on end-of-life decision-making among community-dwelling older adults and their relatives. According to the meta-analysis results, the incidence of multiple outcome measures was as follows: CPR (rate =26%, 95% CI: 11–41%), life-sustaining treatment (rate =12%, 95% CI: 6–18%), nasogastric gavage (rate =34%, 95% CI: 18–50%), mechanical ventilation (rate =34%, 95% CI: 14–54%), death at home (rate =7%, 95% CI: 3–12%), and

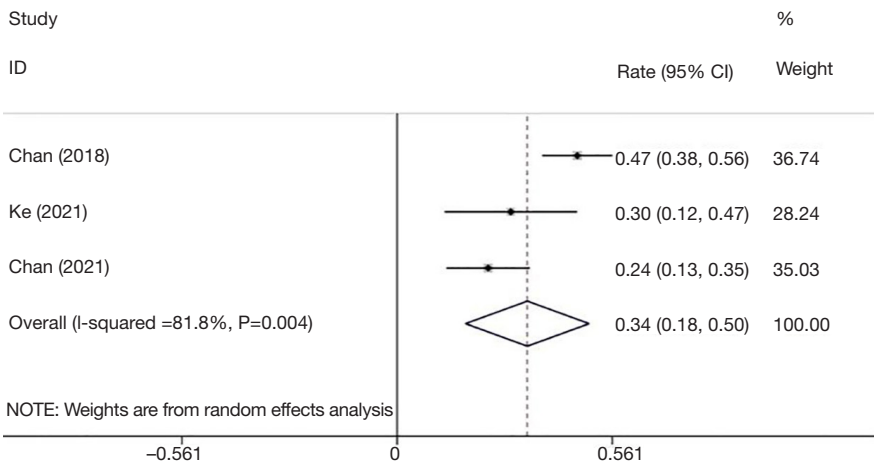

Figure 7 Forest plot for nasogastric gavage. CI, confidence interval.

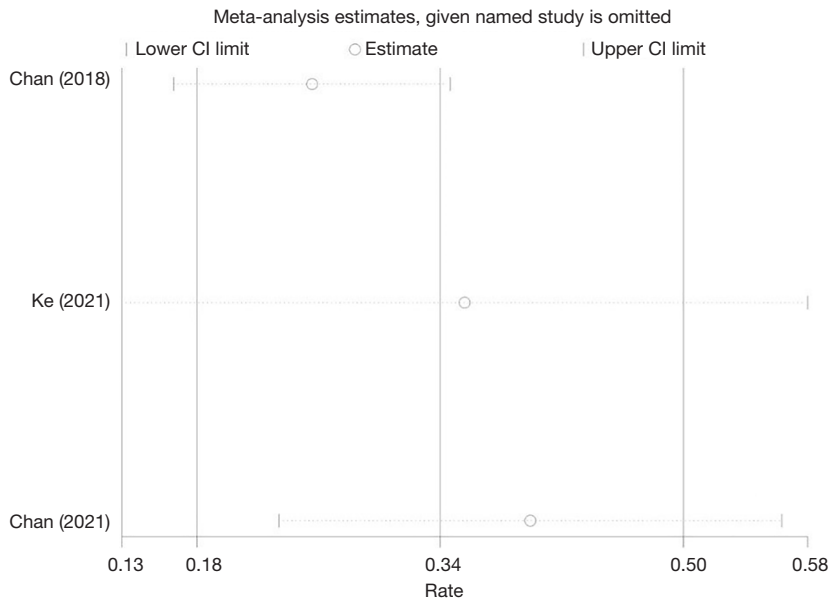

Figure 8 Sensitivity analysis for nasogastric gavage. CI, confidence interval.

death in hospital (rate =6%, 95% CI: 3–10%). These results were consistent with those of the study by Jeong *et al.* (25) which showed that ACP helped to improve the prognosis of patients with chronic diseases who were enabled to express their wishes regarding medical care and get the care they want, and ACP also reduced the burden on the family members of patients regarding decision-making. According to their study, 70% of community-dwelling people who approach the end of life cannot make personal decisions on medical care (25). Multidisciplinary research and practice are needed to strengthen early patient education for the promotion of ACP in communities, which helps to soften the impacts of the aging of the population (26-28). Michael *et al.* (29) conducted focus group interviews with 15 elderly people and 27 children or caregivers. The results revealed the differences in their views on ACP and confirmed the importance of ACP for autonomy-related decisions among older adults (30). Older patients wanted to stay at home, whereas their children or caregivers considered the hospital a better choice, but older adults can express their wishes

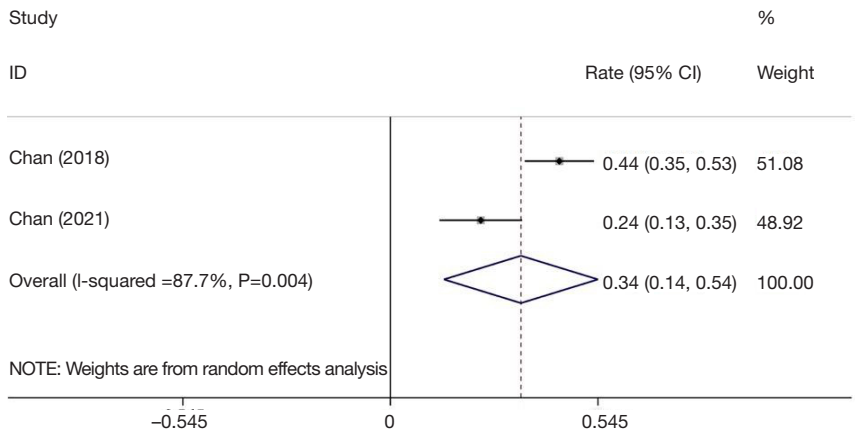

Figure 9 Forest plot for mechanical ventilation. CI, confidence interval.

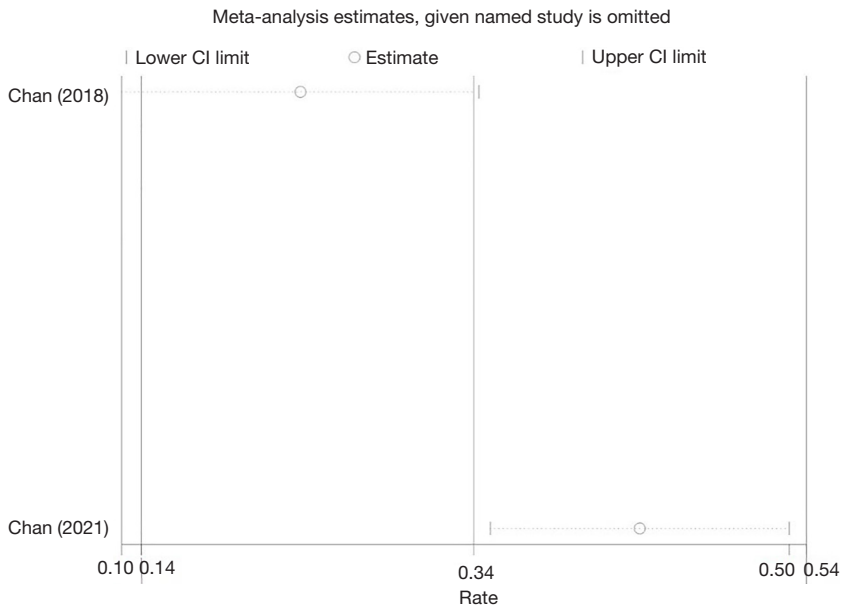

Figure 10 Sensitivity analysis for mechanical ventilation. CI, confidence interval.

and uphold their autonomy for care-based decisions by participating in ACP with the help of substitute decision-makers (31). McLennan *et al.* (32) pointed out that the main factor that hinders the elderly from participating in ACP is that they find it difficult to understand the terms concerning ACP, leading to their misunderstanding and distrust of ACP. Blackwood *et al.* (33) found that more older adults accept ACP as their understanding of it deepens. Many actions have been taken to achieve this goal. For example, the group visit proposed by Lum *et al.* (34), video websites represented by PREPARE, and ACP card games have effectively helped the elderly become more familiar with ACP. Besides, multiple activities can be implemented to promote ACP-related education, such as short videos, official account articles, and paper pamphlets (35). Attractive questionnaires with cartoons and pictures combined with face-to-face surveys and educational activities on healthcare can be used to promote greater familiarity with ACP among the elderly and to enhance the development of ACP (31,36).

This study has some limitations. First, a small number of studies with small sample sizes were included in the meta-analysis, which may lead to the conclusion of the study.

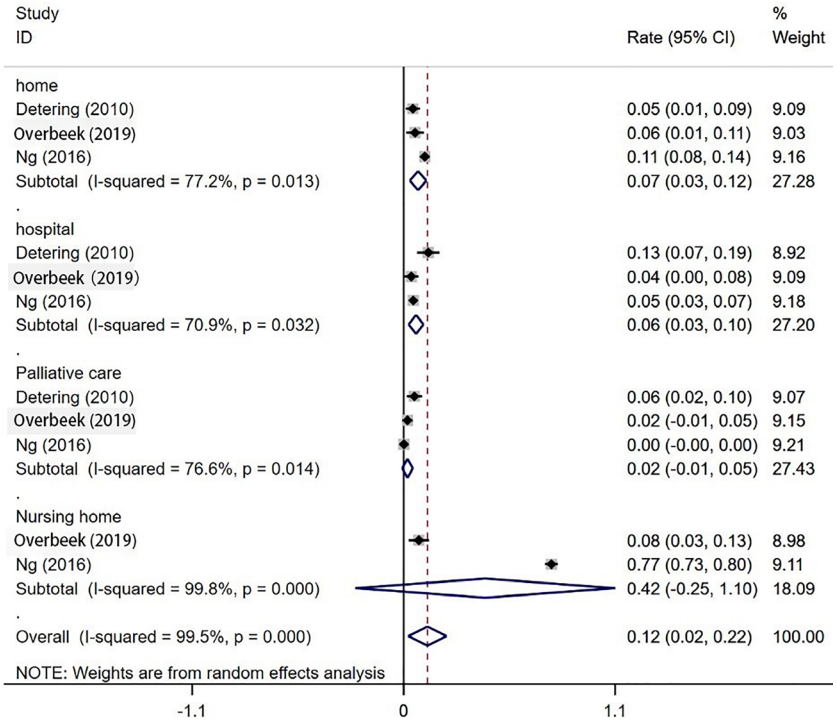

Figure 11 Forest plot for place of death. CI, confidence interval.

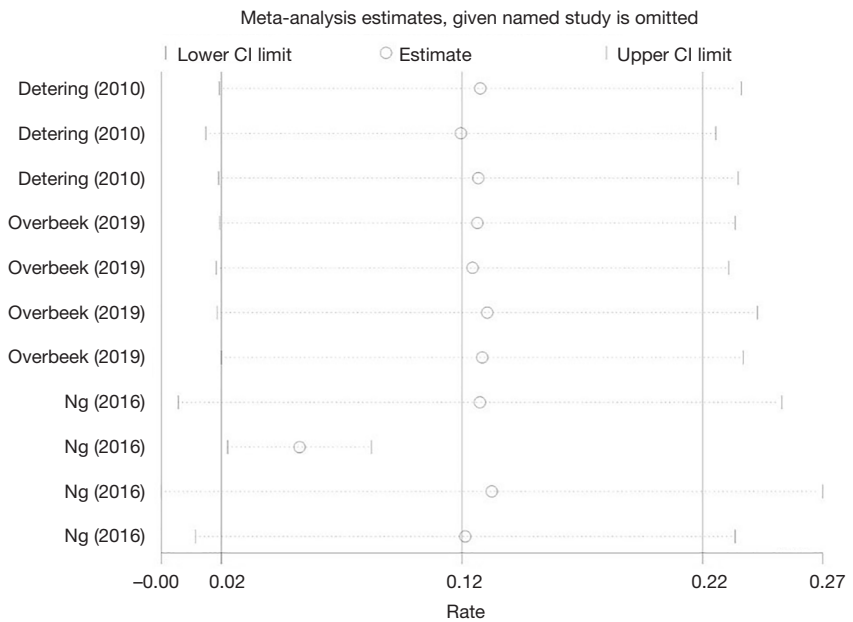

Figure 12 Sensitivity analysis for place of death. CI, confidence interval.

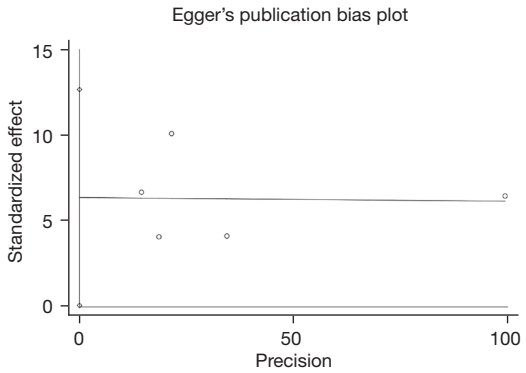

Figure 13 The Egger's test for CPR. CPR, cardiopulmonary resuscitation.

Second, the application of ACP and patient compliance are affected by a variety of factors, which may lead to large heterogeneity between studies, and heterogeneity between studies may affect our conclusions, so we should be cautious about the conclusions. Third, Additionally, the potential for publication bias or selective reporting is not addressed, which may limit the completeness of the study's findings.

Conclusions

According to current research, ACP is a promising treatment that can improve the end of life of elderly people living in the community and their families. However, considering the heterogeneity of the included studies, multi-center RCTs with high quality and larger sample sizes need to be conducted to confirm our conclusions.

Acknowledgments

We would like to thank the researchers and study participants for their contributions.
Funding: The present study was supported by Research on Basic Medical Insurance Payment Strategies of Advance Care Planning under Value Orientation (National Natural Science Foundation of China) (No. 72274235).

Footnote

Reporting Checklist: The authors have completed the PRISMA reporting checklist. Available at https://apm.amegroups.com/article/view/10.21037/apm-23-367/rc

Peer Review File: Available at https://apm.amegroups.com/article/view/10.21037/apm-23-367/prf

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://apm.amegroups.com/article/view/10.21037/apm-23-367/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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(English Language Editor: J. Jones)

Cite this article as: Wang J, Zhou A, Peng H, Zhu N, Yang L, Zheng X, Li M, Xie N, Deng R. Effects of advance care planning on end-of-life decisions among community-dwelling elderly people and their relatives: a systematic review and meta-analysis. Ann Palliat Med 2023;12(3):571-583. doi: 10.21037/apm-23-367

