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Original Article

The Association between Quality of Life and Nursing Home Facility for the Elderly Population: A Systematic Review and Meta-Analysis

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SUMMARY

Background: To investigate the association between quality of life and nursing home facility for the elderly population.
Methods: We searched the PubMed, Medline, and Cochrane Library for relevant perspective studies without language limitations from inception to 17th June 2020 for relevant publications with a priori defined inclusion and exclusion criteria. Two authors independently selected studies, assessed risk of bias, and extracted data. The disagreement was resolved by discussion with a third author.
Results: There are 18 articles involved in the final meta-analysis. The disparities were found of accessing the quality of life (World Health Organization Quality-of-Life, Quality of Life in Last-Stage Dementia, Nottingham Health Profile-Turkish Version, EUROPE Health Interview Survey-QoL , Visual analogue Scales, Flanagan Quality of Life Scale) and the level of independence (Barthel Index, Kahoku Aging Longitudinal Study Scale, Visual Analogue Scales, Activities of Daily Living Scales, Instrumental Activities of Daily Living Scales).
Conclusion: The available limited, very low-quality evidence does not support a significant association between quality of life and nursing home facility for the elderly population. Further rigorous and long-term follow-up studies should be conducted with more objective measures.

1. Introduction

With economic development and advancement in healthcare technologies, population aging has become a common part of the social changes that all advanced countries are currently experiencing. In Taiwan, the elderly population (aged 65 or over) has reached 3.26 million people at the end of 2017.[1] Due to the increasing prevalence of chronic diseases and physical limitations, the disabled population has been growing at an annual rate of 20%. There has been a drastic rise in the demand for long-term care. The number of nursing homes in Taiwan has expanded rapidly in recent years. The number of registered nursing homes has grown 66 times, from 8 in 1995 to 528 in 2017.[1]

Nursing homes are intended to serve patients who have chronic diseases and need long-term care and patients who need continuous care after being discharged from the hospital. Nursing homes are no longer a facility that provides only short-term medical interventions. They provide continuous, diverse, and integrated healthcare services with an emphasis on providing a better quality of life to residents.[2] Previous studies could summarize indices that have been commonly used to assess the care outcomes of nursing homes as follows: mortality rate, hospitalization rate, pressure ulcer rate, functional status change, accidents, incontinence, weight loss, infection, restraint use, catheter use rate, discharge rate, and staff turnover.[3–7]

The major urbanization trends have been observed in the world. Large joint families have been converted to smaller nuclear families. The number of elder population living either alone or with their elderly spouses has increased. Many elderly have no choice but to live in nursing homes. Nevertheless, many elderly still enjoy a peaceful home life with their loved ones around them. These two living setups have diverse environments and hence, affect the physical and psychological health of the elderly differently.[8] Improving the quality of nursing homes is viewed as a major social priority. The primary measure of nursing home quality has been quality of care as reflected in staff-reported clinical health outcomes. Quality of life is also a widely recognized central element of nursing home care, however, it has not been as widely addressed as quality of care. In addition to quality of care, to collect information of quality of life helps to provide evidence-based feedback for health providers and consumers and further could be useful in targeting care improvements.[9] Thus, the objective of this study was to assess the association between quality of life and nursing home facility for the elderly population.

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2. Materials and Methods

2.1. Literature search and study selection

The PubMed, Medline, and Cochrane Central Register of Controlled Trials (CENTRAL) were searched for the related studies without language limitations from inception to 17th June 2020. The search strategies are illustrated in Table 1. Two authors conducted the literature search and the study inclusion processes, any disagreements were subsequently solved after discussion with a third author.

2.2. Data extraction and risk of bias assessment

First author, publication year, study subjects, intervention approach, the controls, and the outcome were extracted from the included studies. Risks of bias were evaluated using the Newcastle-Ottawa Scale (NOS). Three domains of bias are included in NOS. There are bias of selection (S), the bias of comparability (C), and bias of exposure (E), respectively. A study could be awarded up to one star for each item within the selection and outcome domains and up to two stars for comparability. We considered a study of high quality if seven or more stars were awarded.[10]

In addition to Risk of Bias in Nonrandomized studies of Interventions (ROBINS-I) was applied to detect the potential bias, Grading of Recommendations Assessment, Development, and Evaluation (GRADE) was also conducted to give the summary of the quality and certainty of the available evidence.

2.3. Ethical review

Due to the systematic review and meta-analysis design, the ethical approval was waived and not necessary in this study.

2.4. Statistical analysis

The Review Manager 5.3 (The Nordic Cochrane Centre, The Cochrane Collaboration, 2014) was used for meta-analysis. We presented a standardized MD with a 95% confidence interval (CI) for continuous data. Heterogeneity in meta-analysis refers to the variation in study outcomes between studies. In this study, we used the χ^2 and I^2 inconsistency statistics. The I^2 statistic describes the percentage of variation across studies that is due to heterogeneity rather than chance.[11] A 95% CI for I^2 is constructed using the iterative non-central chi-squared distribution method.[12] Also, we used the fixed-effect model when the I^2 was less than 50% and would have used the random-effects model when the I^2 was 50% or more.

3. Results

3.1. Characteristics of included studies

There are 18 articles involved and respectively performed in Asia, Middle East, American, and Europe in this meta-analysis (Figure 1). The characteristics of the included studies are listed in Table 2. The health-related quality of life was assessed in six types of questionnaires. The enrolled studies receptively utilized World Health Organization Quality of Life questionnaire-short form (WHOQoL-BREF), Quality of Life in Last-Stage Dementia (QUALID), Nottingham Health Profile-Turkish Version (NHP-TV), EUROPE Health Interview Survey-QoL (WHO-8), Visual analogue scales (VASs), and Flanagan Quality of Life Scale.

The scales used in the selected studies are listed as follows. Five studies used WHOQoL-BREF performed the assessment.[13–17] QUALID was applied by two studies.[18,19] NHP-TV was conducted in two studies.[20,21] Two studies used WHO-8.[22,23] VASs were used in two studies.[24,25] Flanagan Quality of Life Scale was applied in one study.[26]

The level of independence was addressed by Barthel Index (BI), Kahoku Aging Longitudinal Study Scale (KLAS), Activities of daily livings (ADLs), Instrumental Activities of Daily Livings (IADLs). The functional independence was present in different measurement as follow. BI was used in four studies.[20–23] KLAS was used in two studies.[24,25] ADLs was used in three studies.[27–29] IADLs was used in two studies.[29,30]

3.2. Systematic review and meta-analysis results

3.2.1. Quality of life

Five studies adopted the WHOQoL questionnaire and the other

Table 1
Search strategy in PubMed up till 17 June 2020 (similar search conducted in other database).

1.	Elder
2.	Older
3.	Elderly
4.	Old population
5.	#1 OR #2 OR #3 OR #4
6.	Nursing home
7.	Long-term care facility
8.	Nursing practice setting
9.	Chronic ward-like facility
10.	#6 OR #7 OR #8 OR #9
11.	Quality of life
12.	Activity
13.	Participation
14.	ADLs
15.	IADLs
16.	AADLs
17.	#11 OR #12 OR #13 OR #14 OR #15 OR #16
18.	#5 AND #10 AND #17

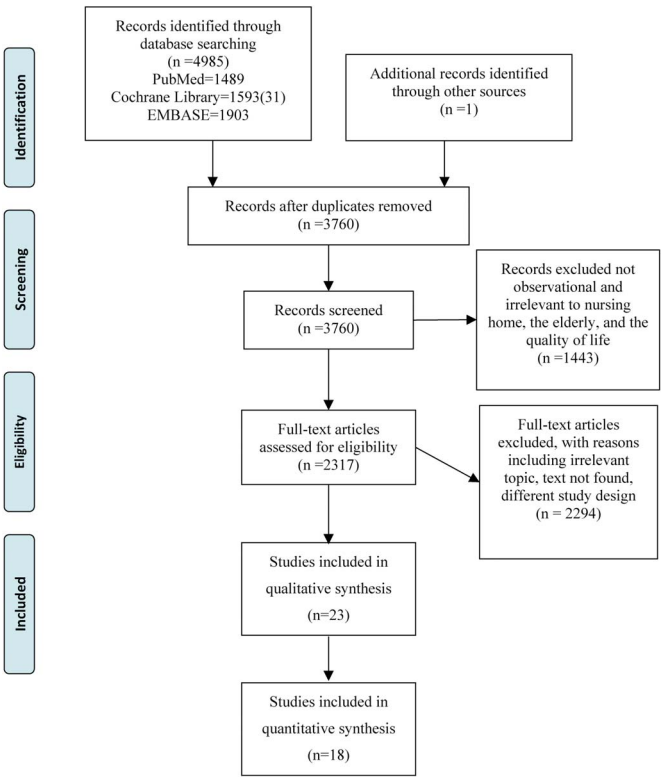

Figure 1. PRISMA flow chart of included studies.

Table 2
Characteristics of included studies.

Author, year, country	Participants	Measurement	Outcome (Means ± SD)	NOS
Barca et al., 2011, Norway	156 dementia participants	QUALID	Nursing home vs. Non-Nursing home 23.88 ± 7.7 vs. 25.0 ± 9.8	S* C** E***
Brajkovic et al., 2009, Croatia	60 elderly	WHOQoL-BREF	Nursing home vs. Non-Nursing home Physical: 28.5 ± 3.25 vs. 17.2 ± 5.0 Psychological: 22.3 ± 3.7 vs. 16.3 ± 4.0 Social relationships: 11.4 ± 1.6 vs. 8.3 ± 1.7 Environmental: 32.8 ± 4.6 vs. 24.0 ± 6.1	S* C** E***
Crist, 2009, United States	87 subjects	Flanagan Quality of Life Scale	Nursing home vs. Non-Nursing home [Median (Variance)] (A) Satisfied overall: 23.53 (1.027) vs. 1.708 (0.862) (B) Satisfied overall: 23.53 (1.027) vs. 1.714 (0.502)	S* C* E***
Ghassemzadeh et al., 2013, Iran	186 elderly diabetic patients	WHOQoL-BREF	Nursing home vs. Non-Nursing home Physical: 11.89 ± 2.194 vs. 14.06 ± 2.714 Psychological: 10.97 ± 2.474 vs. 12.73 ± 2.332 Social relationships: 9.77 ± 2.634 vs. 11.66 ± 2.895 Environmental: 10.75 ± 1.943 vs. 11.35 ± 2.297 Quality of life: 10.95 ± 2.017 vs. 12.43 ± 1.84	S* C* E***
Karakaya, 2009, Turkey	58 elderly	Kahoku Aging Longitudinal Study Scale (KALS) Visual analogue scales (VASs)	Nursing home vs. Non-Nursing home KALS: 25.81 ± 5.79 vs. 22.45 ± 5.21 VASs: 61.34 ± 12.18 vs. 70.58 ± 11.47	S* C* E***
Kuok et al., 2017, China	451 elderly	WHOQoL-BREF	Nursing home vs. Non-Nursing home Physical: 13.0 ± 2.6 vs. 14.6 ± 2.2 Psychological: 13.2 ± 2.4 vs. 14.6 ± 2.2 Social relationships: 14.0 ± 2.6 vs. 14.4 ± 2.3 Environmental: 13.5 ± 2.0 vs. 13.7 ± 2.0	S* C** E***
Lee et al., 2015, Korea	22,557 older adults	Activities of daily living (ADL)	Nursing home vs. Non-Nursing home ADL: 32.49 ± 4.90 vs. 32.69 ± 4.69	S* C** E***
Leon-Salas et al., 2013, Spain	200 AD patients	Instrumental activities of daily living (IADL) Alzheimer's Disease Related Quality of Life Scale (ADRQL)	Nursing home vs. Non-Nursing home IADL: 1.5 ± 2.0 vs. 5.2 ± 1.4 ADRQL: 64.8 ± 18.2 vs. 5.2 ± 1.4	S* C** E***
Nikmat et al.-1, 2015, Malaysia	49 dementia people	Barthel Index WHO-8 AQOL-8	Nursing home vs. Non-Nursing home BI: 77.50 ± 15.63 vs. 90.26 ± 13.59. WHO-8: 16.07 ± 3.71 vs. 19.63 ± 3.53 AQOL-8: 0.3 ± 0.20 vs. 0.43 ± 0.18	S* C* E***
Nikmat et al.-2, 2015, Malaysia	219 older adults with cognitive impairment	Barthel Index WHO-8	Nursing home vs. Non-Nursing home BI: 77.45 ± 17.8 vs. 77.06 ± 20.7 WHO-8: 3.04 ± 0.46 vs. 3.52 ± 0.40	S* C** E***
Nogueira et al., 2018, China	413 suubjects	WHOQoL-BREF	Nursing home vs. Non-Nursing home Physical: 13.1 ± 2.5 vs. 14.6 ± 2.2 Psychological: 13.2 ± 2.4 vs. 14.6 ± 2.2 Social relationships: 14.1 ± 2.4 vs. 14.4 ± 2.3 Environmental: 13.6 ± 2.0 vs. 13.7 ± 2.1	S* C** E***
Olsen et al., 2016, Norway	186 dementia participants	QUALID	Nursing home vs. Non-Nursing home 24.06 ± 7.13 vs. 15.99 ± 4.33	S* C** E**
Scocco et al., 2017, Italy	207 older adults	WHOQoL-BREF	Nursing home vs. Non-Nursing home Physical: 57.40 ± 18.85 vs. 66.19 ± 19.64 Psychological: 54.10 ± 17.88 vs. 56.58 ± 15.18 Social relationships: 64.47 ± 20.99 vs. 60.01 ± 15.90 Environmental: 59.10 ± 17.07 vs. 61.66 ± 12.33	S* C** E***
Tada et al., 1999, Japan	179 elder women	Kahoku Aging Longitudinal Study Scale (KALS) Visual analogue scales (VASs)	Nursing home vs. Non-Nursing home (A) KALS: 2.7 ± 0.3 vs. 1.9 ± 0.7; VASs: 73.8 ± 21.8 vs. 76.8 ± 19.9 (B) KALS: 2.7 ± 0.3 vs. 2.3 ± 0.4; VASs: 73.8 ± 21.8 vs. 68.1 ± 26.7 (C) KALS: 2.5 ± 0.5 vs. 1.9 ± 0.7; VASs: 72.6 ± 18.1 vs. 76.8 ± 19.9 (D) KALS: 2.5 ± 0.5 vs. 2.3 ± 0.4; VASs: 72.6 ± 18.1 vs. 68.1 ± 26.7	S* C* E**
Turan et al., 2012,Turkey	184 elderly people	Barthel Index NHP-TV	Nursing home vs. Non-Nursing home BI: 16.89 ± 4.97 vs. 19.74 ± 0.89 NHP-TV: 158.11 ± 123.60 vs. 109.75 ± 87.05	S* C* E***
Urciuol et al., 19898, Italy	66 old individuals	Activities of daily living (ADL) Instrumental activities of daily living (IADL)	Nursing home vs. Non-Nursing home ADL: 11.93 ± 3.75 vs. 10.16 ± 3.79 IADL: 4.27 ± 2.95 vs. 6.40 ± 1.72	S* C* E***
Xiao et al., 2016, China	451 older adults	Activities of daily living (ADL) SF12-v2	Nursing home vs. Non-Nursing home ADL: 20.9 ± 4.6 vs. 23.8 ± 1.1 SF12-v2: 96.1 ± 39.8 vs. 114.9 ± 27.0	S* C** E***
Yumin et al., 2011, Turkey	122 elderly Turkish people	Barthel Index NHP-TV	Nursing home vs. Non-Nursing home BI: 19.36 ± 1.26 vs. 19.64 ± 0.99 NHP-TV: 174.18 ± 151.86 vs. 99.49 ± 102.22	S* C* E***

used the Visual Analogue Scale. The WHOQoL-BREF testified 4 different aspects for assessing the quality of life, which are: (a) physical, (b) psychological, (c) social, and (d) environmental. These four parts are evaluated in a score from 0–100. We pooled the five studies that perform the quality of life investigation utilized the WHOQoL questionnaire. For the physical domain of quality of life, the pooled result is illustrated in Figure 2. It shows no significant difference between the nursing home group and the control group (Std. mean difference: -0.12, 95% CI -0.68–0.44*).* The psychological domain, demonstrates the psychological outcome and it illustrates no difference between two groups as well (Std. mean difference: -0.19, 95% CI -0.64–0.26). For the social relationship domain of quality of life, there is no significant result obtained (Std. mean difference: 0.05, 95% CI -0.38–0.48). The environmental domain also shows no statistical difference (Std. mean difference: 0.21, 95% CI -0.14–0.56).

QUALID was especially used to evaluate the quality of life among the last-stage dementia population. Figure 3A demonstrates no significance in both groups. (Std. mean difference: 0.64, 95% CI -0.88–2.17). Figure 3B addresses the result of NHP-TV, the nursing home group has a better quality of life. (Std. mean difference: 0.49, 95% CI 0.25–0.73). Figure 3C (WHO-8) shows the significant difference in which the non-nursing home has a better quality of life (Std. mean difference: -1.08, 95% CI -1.34–0.82). The measurement is VASs in Figure 3D, shows no difference (Std. mean difference: -0.15, 95% CI -0.47–0.17). Figure 3E shows there is a significant and better quality of life by Flanagan Quality of Life Scale (Std. mean difference: 0.74, 95% CI 0.36–1.13).

3.2.2. Level of independence

The level of independence was addressed by BI, KLAS, ADLs, and IADLs. In Figure 4A (Std. mean difference: -0.40, 95% CI -0.79–0.01) and Figure 4C (Std. mean difference: -0.17, 95% CI -0.81–0.46) show no significance in the level of independence. Figure 4B (Std. mean difference: 0.85, 95% CI 0.57–1.14) and Figure 4D (Std. mean difference: -1.52, 95% CI -2.70–0.34) show the significance in the level of independence between nursing home and control group.

3.2.3. Risk of bias assessment

There were 18 included studies evaluated by the NOS scale, the result from 4 to 6 which represented low quality (Table 2). Robins-I was utilized to monitor the potential bias that might cause by the intervention (Table 3). Most included studies were low risk, only two studies were a moderate risk.[19,25]

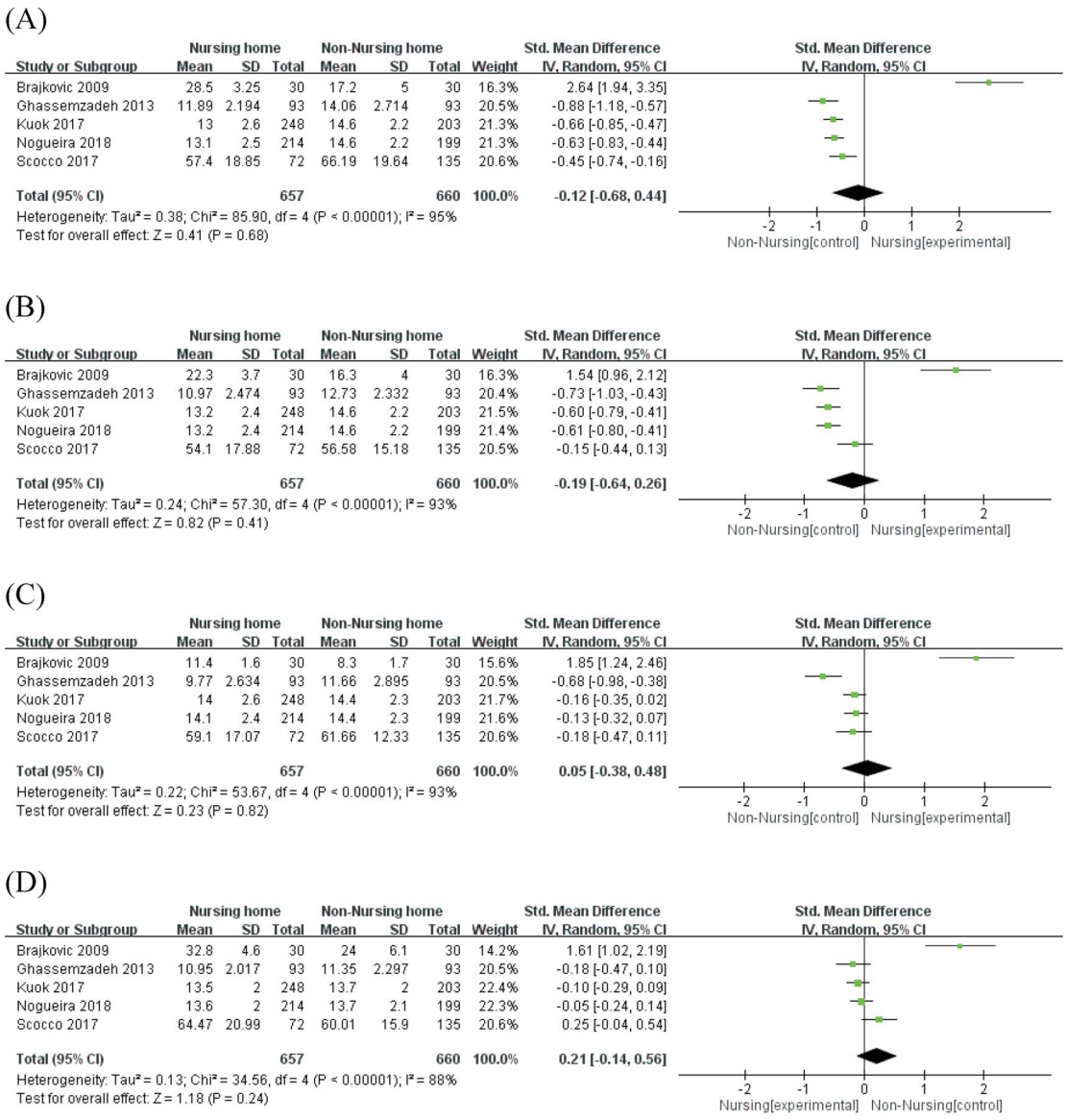

Figure 2. Forest plot of the result of WHOQoL. (A) Physical domain. (B) Psychological domain. (C) Social relationship domain. (D) Environmental domain.

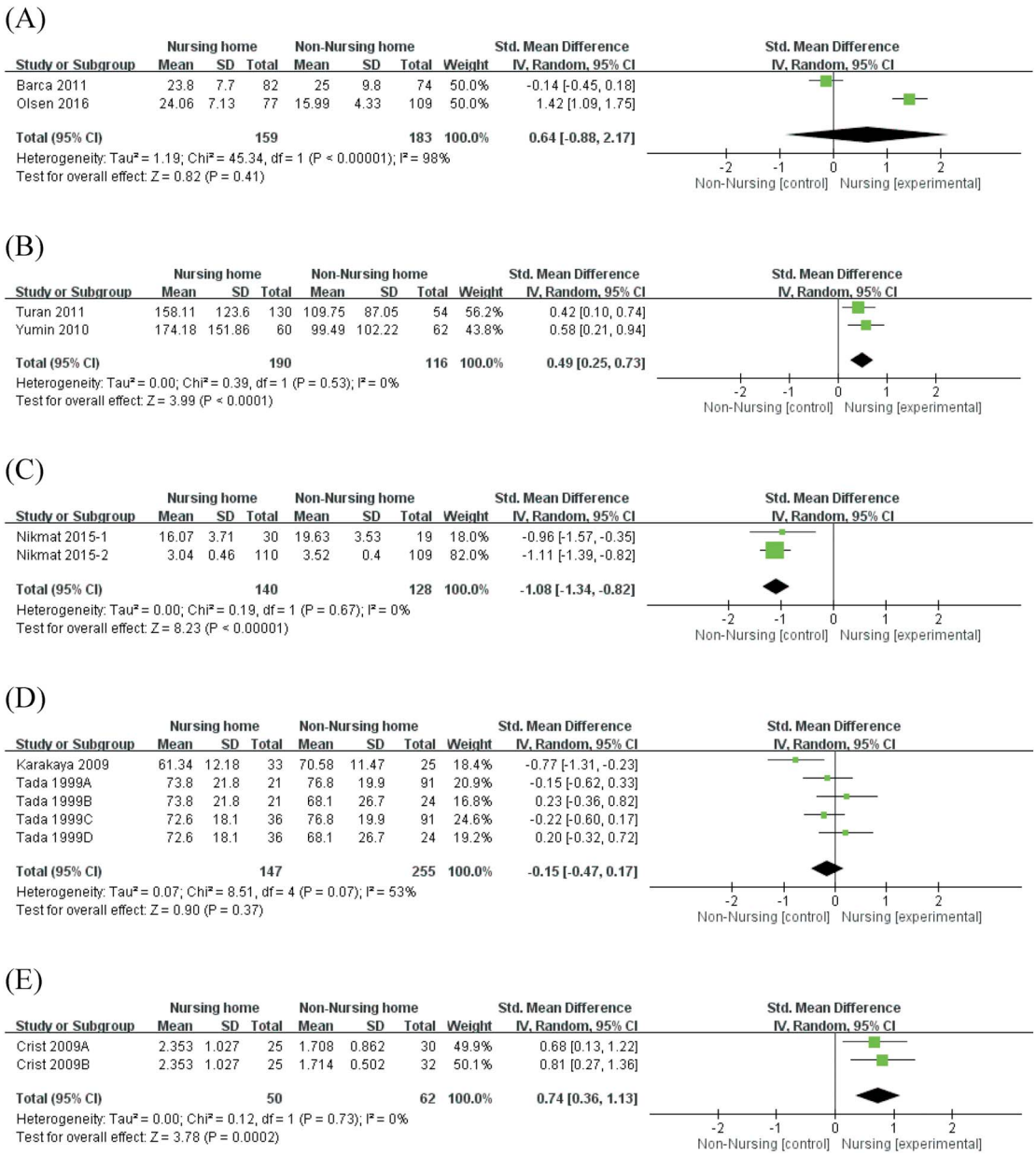

Figure 3. Forest plot of the result of other measurements of quality life. (A) QUALID. (B) NHP-TV. (C) WHO-8. (D) VASs. (E) Flanagan Quality of Life Scale.

3.2.4. GRADE summary of findings table

The summary of findings and the GRADE assessment for each outcome is presented in the Table 4. The quality of evidence from the included observational studies was initially judged to be low but was downgraded to very low quality due to imprecision.

4. Discussion

4.1. The implications of nursing practice

For patients with higher acuity conditions and lower physical activity levels, nursing homes can provide diverse and highly technical care services, such as medical care, care for daily living activities, support for social activities, and residence placement.[31,32] In the long-term care system, nursing homes are the type of institution having more health professionals on staff and offering the widest range of services.[1]

It has been pointed out in studies of the relationship between structural characteristics and care quality among nursing homes that nursing homes with a "for profit status" tend to be associated with a higher mortality rate, a higher hospitalization rate, a higher pressure ulcer rate, a lower infection rate, and a higher discharge rate.[33–37] Larger nursing homes tend to have a higher hospitalization rate, a higher pressure ulcer rate, and a higher constraint use.[2,38] Higher occupancy rates are related to higher mortality rates.[34,38] Facilities with more human resources for nursing and caregiving tend to have a low mortality rate, a lower pressure ulcer rate, a lower constraint use, a higher discharge rate, smaller weight losses in residents, and more improvements in residents' physical functions.[35,39] Facilities with fewer physicians tend to have a higher mortality rate and a higher hospitalization rate.[40] A lower turnover of nursing staff can lead to better physical functions of residents.[41]

Nursing homes' structural characteristics also have affected their care quality. Previous study evaluated the effectiveness of a health coaching self-management program for NHR (HCSMP-NHR) in improving the quality of life of residents.[42] Participants who received HCSMP-NHR intervention for eight weeks showed significant improvements in self-efficacy and goal attainment scaling (GAS) score,

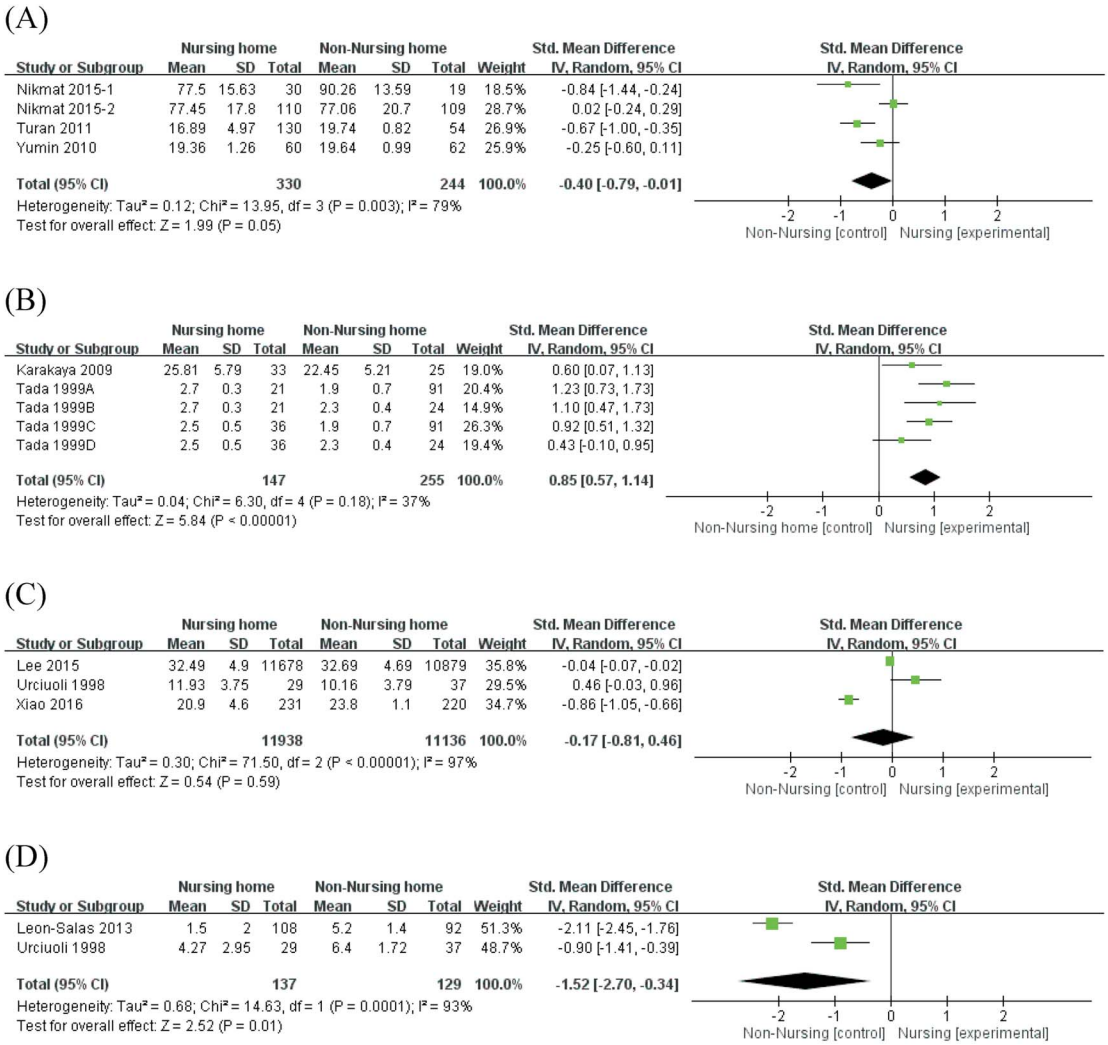

Figure 4. Forest plot of the result of independence. (A) BI. (B) KALS. (C) ADLs. (D) IADLs.

better health statuses, and quality of life than traditional nursing homes.

Nursing homes not only could implement a pre-established nursing plan to achieve early detection of health conditions and alleviation of pain in the residents, but also could discontinue unnecessary medication and activities of residents to improve their living quality.[43] The relocation stress on residents is the strongest in the first six months of their nursing home stay. Therefore, it is necessary to provide integrated evaluations and individualized care to each residents based on the residentss physical, mental, social, spiritual, and environmental conditions.[44] All of this helps improve residents' self-care efficacy and identification with the institution, allowing them to reside in the institution with comfort and ease.[44–46]

4.2. Methodological considerations

There were still several limitations in this meta-analysis. Firstly, the amount of trials which could be searched were too insufficient, the statistical power could be lower due to smaller sample sizes. Secondly, the controversy surrounding random-effects models, that is, the assumption of normally distributed random effects violates the basic principle of randomization in statistical inference.[47] The hypothetical common variance of these so-called random effects would serve only as a nuisance variable if there were no random effects. The result of the application of this nuisance variable to meta-analytic weights would then be to markedly increase estimator variance and equalize the weights through penalizing the larger studies.[48,49] Thirdly, we were unable to conduct subgroup analyses based on age, sex, and concurrent health status because the included studies did not provide adequate data. The addition of more studies in the future may increase the quality of evidence. In addition, the increasing long-term care needs could be potentially derived from the disability ought to be composed of several domains, such as the aging or natural decay, morbid conditions, de-conditioning/disuse or unnatural decay, and contextual factors. Fourthly, nursing has been regarded as extending medical service settings from hospitals in Taiwan. Based on the study design and introduction, long-term care (LTC) settings or sites, has focused on the chronic or high density care oriented infirmary ward, such as nursing homes representative or indicative long-term care facilities (LTCFs), rather than low-medium density counterparts. Nursing home is not definitely the representative terminology of LTCF or similar setting, also be regarded as the auxiliary ward or unit derived from the hospital whatever. This study only aims to evaluate the quality of life among the elderly. All the studies included in the meta-analysis were conducted exclusively in elderly people. In addition, we only included studies from other countries where the nursing home is a key component of long-term care and is normally referred as long-term care facility. It is difficult to conclude globally or summarizedly. Finally, due to health & care problems or morbidities, in itself or in the

Table 3
Risk of bias assessment using ROBINS-I.

Author	Types of research	Pre-intervention		At intervention	Post-intervention				Total
		Bias due to confounding	Bias in selection of participants into study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in selection of the reported outcomes	Total bias
Barca et al., 2011	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Brajkovic et al., 2009	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Crist, 2009	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Ghassemzadeh et al., 2013	Descriptive-analytical	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Karakaya, 2009	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Kuok et al., 2017	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Lee et al., 2015	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Leon-Salas et al., 2013	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Nikmat et al.-1, 2015	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Nikmat et al.-2, 2015	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Nogueira et al., 2018	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Olsen et al., 2016	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Moderate risk	Low risk	Low risk	Moderate risk
Scocco et al., 2017	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Tada et al., 1999	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Moderate risk	Low risk	Low risk	Moderate risk
Turan et al., 2012	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Urciuol et al., 1998	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Xiao et al., 2016	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk
Yumin, 2011	Cross-sectional	Low risk	Low risk	Low risk	Moderate risk	Low risk	Low risk	Low risk	Low risk

Table 4
Grade table for observational studies for quality assessment.

Studies	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	Overall certainty of evidence
WHOQoL (QoL)	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW
QUALID (QoL)	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW
NHP-TV (QoL)	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW
WHO-8 (QoL)	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW
VASs (QoL)	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW
Flanagan Quality of Life Scale (QoL)	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW
Barthel Index	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW
KALS	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW
ADL	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW
IADL	Not serious	Not serious	Not serious	Not serious	Not serious	⊕⊕◯◯ LOW

Grade definition:
High, further research is very unlikely to change our confidence in the estimate of effect.
Moderate, further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low, further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low, any estimate of effect is very uncertain.

nosology or WHO-FIC framework, had own their defining and appliance. It has not been always the “Disease”, but “Disorder”, “Condition”; furthermore, as for functional and care terminology, newer terminologies such as “Disability”, “LTC need”, “Dependence”, even “Frailty” or “Pre-disability” before these. Further studies should consider the sub-group analysis for interrelation and overlap, but not the same ones in definition and operating.

5. Conclusion

In conclusion, the available limited, very low-quality evidence does not support a significant association between quality of life and nursing home facility for the elderly population. Further long-term follow-up rigorous studies should be conducted with more objective measures.

Competing Interests

The authors have no proprietary interest in any aspect of this study.

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Data sharing Statement

All data underlying the findings are within the paper.

Consent to Publish

Not applicable.

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References

1. Ministry of Health and Welfare. *The 2017 annual report of status and utilization of medical care institutions*. Taipei, Taiwan: Ministry of Health and Welfare; 2018. Available at: https://dep.mohw.gov.tw/DOS/cp-4033-42732-113.html. Accessed October 3, 2019. [In Chinese]
2. Zinn JS, Aaronson WE, Rosko MD. Variations in the outcomes of care provided in Pennsylvania nursing homes. Facility and environmental correlates. *Med Care.* 1993;31:475–487.
3. Davis MA. On nursing home quality: A review and analysis. *Med Care Rev.* 1991;48:129–166.
4. Sainfort F, Ramsay JD, Monato H Jr. Conceptual and methodological sources of variation in the measurement of nursing facility quality: An evaluation of 24 models and an empirical study. *Med Care Res Rev.* 1995;52:60–87.
5. Hollaar VRY, van der Putten GJ, van der Maarel-Wierink CD, et al. Nursing home-acquired pneumonia, dysphagia and associated diseases in nursing home residents: A retrospective, cross-sectional study. *Geriatr Nurs.* 2017;38:437–441.
6. Castle N, Engberg JB, Wagner LM, et al. Resident and facility factors associated with the incidence of urinary tract infections identified in the nursing home minimum data set. *J Appl Gerontol.* 2017;36:173–194.
7. Hartmann CW, Solomon J, Palmer JA, et al. Contextual facilitators of and barriers to nursing home pressure ulcer prevention. *Adv Skin Wound Care*. 2016;29:226–238.
8. Shippee TP, Hong H, Henning-Smith C, et al. Longitudinal changes in nursing home resident-reported quality of life: The role of facility characteristics. *Res Aging*. 2015;37:555–580.
9. Siddiqui AT, Hasan M, Abbas K, et al. Health related quality of life of home dwelling vs. nursing facility dwelling elderly - A cross-sectional study from Karachi, Pakistan. *The Journal of the Pakistan Medical Association*. 2019;69:892–895.
10. Stroup DF, Berlin JA, Morton SC, et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis of Observational Studies in Epidemiology (MOOSE) group. *JAMA*. 2000;283: 2008–2012.
11. Higgins JP, Thompson SG, Deeks JJ, et al. Measuring inconsistency in meta-analysis. *BMJ*. 2003;327:557–560.
12. Hedges LV, Pigott TD. The power of statistical tests in meta-analysus. *Psychol Methods*. 2001;6:203–217.
13. Brajković L, Godan A, Godan L. Quality of life after stroke in old age: comparison of persons living in nursing home and those living in their own home. *Croat Med J.* 2009;50:182–188.
14. Ghassemzadeh R, Nasseh H, Arastoo AA, et al. Quality of life in elderly diabetic: comparison between home and nursing home. *Acta Med Iran*. 2013;51:254–259.
15. Kuok KCF, Li L, Xiang YT, et al. Quality of life and clinical correlates in older adults living in the community and in nursing homes in Macao. *Psychogeriatrics*. 2017;17:194–199.
16. Nogueira BOCL, Li L, Meng LR, et al. Clinical characteristics and quality of life of older adults with cognitive impairment in Macao. *Psychogeriatrics*. 2018;18:182–189.
17. Scocco P, Nassuato M. The role of social relationships among elderly community-dwelling and nursing-home residents: findings from a quality of life study. *Psychogeriatrics*. 2017;17:231–237.
18. Barca ML, Engedal K, Laks J, et al. Quality of life among elderly patients with dementia in institutions. *Dement Geriatr Cogn Disord*. 2011;31: 435–442.
19. Olsen C, Pedersen I, Bergland A, et al. Differences in quality of life in home-dwelling persons and nursing home residents with dementia - a cross-sectional study. *BMC Geriatr.* 2016;16:137.
20. Turan E, Yanardag M, Aras O. Functional independence, quality of life, and level of mobility of elderly people living at home and nursing home. *Top Geriatr Rehabil.* 2012;28:201–207.
21. Yümin ET, Şimşek TT, Sertel M, et al. The effect of functional mobility and balance on health-related quality of life (HRQoL) among elderly people living at home and those living in nursing home. *Arch Gerontol Geriatr.* 2011;52:e180–e184.
22. Nikmat AW, Al-Mashoor SH, Hashim NA. Quality of life in people with cognitive impairment: nursing homes versus home care. *Int Psychogeriatr.* 2015;27:815–824.
23. Nikmat AW, Hawthorne G, Al-Mashoor SH. The comparison of quality of life among people with mild dementia in nursing home and home care--a preliminary report. *Dementia (London)*. 2015;14:114–125.
24. Karakaya MG, Bilgin SC, Ekici G, et al. Functional mobility, depressive symptoms, level of independence, and quality of life of the elderly living at home and in the nursing home. *J Am Med Dir Assoc*. 2009;10:662–666.
25. Tada T, Yamamoto S, Morimoto T. Characteristics of the daily lives of elderly women at various facilities for the elderly. *Nurs Health Sci*. 1999; 1:13–18.
26. Crist PA. Does quality of life vary with different types of housing among older persons? A pilot study. *Phys Occup Ther Geriatr.* 2000;16:101–116.
27. Xiao H, Yoon JY, Bowers B. Living arrangements and quality of life: Mediation by physical function and depression. *West J Nurs Res*. 2016;38:738–752.
28. Lee TW, Cho E, Yim ES, et al. Activities of daily living in nursing home and home care settings: a retrospective 1-year cohort study. *J Am Med Dir Assoc*. 2015;16:114–119.
29. Urciuoli O, Dello Buono M, Padoani W, et al. Assessment of quality of life in the oldest-olds living in nursing homes and at home. *Arch Gerontol Geriatr.* 1998;26:507–514.
30. León-Salas B, Olazarán J, Cruz-Orduña I, et al. Quality of life (QoL) in community-dwelling and institutionalized Alzheimer's disease (AD) patients. *Arch Gerontol Geriatr.* 2013;57:257–262.
31. Liang YW. Review and outlook of Taiwan nursing homes accreditation. *Taiwan J Public Health*. 2018;37:615–625. [In Chinese, English abstract]
32. Wu TS, Chen WL, Lin IS, et al. A study of the relationship between job stress and perceptive health status for care provider and family in nursing home. *Chinese Journal of Occupational Medicine*. 2014;21:81–90. [In Chinese, English abstract]
33. Freiman MP, Murtaugh CM. The determinants of the hospitalization of nursing home residents. *J Health Econ.* 1993;11:349–359.
34. Halbur BT, Fears N. Nursing personnel turnover rates turned over: Potential positive effects on resident outcomes in nursing homes. *Gerontologist*. 1986;26:70–76.
35. Porell F, Caro FG. Facility-level outcome performance measures for nursing homes. *Gerontologist*. 1998;38:665–683.
36. Spector WD, Selden TM, Cohen JW. The impact of ownership type on nursing home outcomes. *Health Econ.* 1998;7:639–653.
37. Li AC, Yeh LL, Huang KH, et al. Quality of care in home care and in nursing homes. *Cheng Ching Medical Journal*. 2012;8:38–46. [In Chinese, English abstract]
38. Braun BI. The effect of nursing home quality on patient outcome. *J Am Geriatr Soc*. 1991;39:329–338.
39. Anderson RA, Hsieh PC, Su HF. Resource allocation and resident outcomes in nursing homes: Comparisons between the best and worst. *Res Nurs Health*. 1998;21:297–313.
40. Intrator O, Castle NG, Mor V. Facility characteristics associated with hospitalization of nursing home residents: Results of a national study. *Med Care.* 1999;37:228–237.
41. Spector WD, Takada HA. Characteristics of nursing home that affect resident outcomes. *J Aging Health.*1991;3:427–454.
42. Park YH, Moon SH, Ha JY, et al. The long-term effects of the health coaching self-management program for nursing-home residents. *Clin Interv Aging*. 2017;12:1079–1088.
43. Husebo BS, Flo E, Aarsland D, et al. COSMOS—improving the quality of life in nursing home patients: protocol for an effectiveness-implementation cluster randomized clinical hybrid trial. *Implement Sci.* 2015;10:131.
44. Yang YY, Chen SM. Relocation stress: The assessment and care in relo-

cated nursing home diabetes residents. *The Kaohsiung Journal of Nursing*. 2014;31:90–97. [In Chinese, English abstract]
45. Tsai YY, Yang YY. The assessment of oral health and the application of nursing care for the elderly with dementia residing in nursing homes. *The Kaohsiung Journal of Nursing*. 2016;33:30–37. [In Chinese, English abstract]
46. Thomas KS, Baier R, Kosar CI, et al. Individualized music program is associated with improved outcomes for U.S. nursing home residents with dementia. *Am J Geriatr Psychiatry.* 2017;25:931–938.
47. Cornell JE, Mulrow CD, Localio R, et al. Random-effects meta-analysis of inconsistent effects: a time for change. *Ann Intern Med*. 2014;160:267–270.
48. Al Khalaf MM, Thalib L, Doi SA. Combining heterogenous studies using the random-effects model is a mistake and leads to inconclusive meta-analyses. *J Clin Epidemiol*. 2011;64:119–123.
49. Doi SA, Barendregt JJ, Khan S, et al. Advances in the meta-analysis of heterogeneous clinical trials I: the inverse variance heterogeneity model. *Contemp Clin Trials.* 2015;45:130–138.