

Frailty as a predictor of emergency department utilization among community-dwelling older people: a systematic review and meta-analysis.

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As a result of population aging, there is an increasing number of older adults with disabilities and comorbidities who have high healthcare utilization, especially the emergency department (ED).¹ In comparison with their younger counterparts, older adults use the ED more frequently with a higher urgency, have longer durations of stay and more evaluations at the ED, are more likely to experience adverse health outcomes, to be hospitalized, to return to the ED if discharged, and to have less satisfaction regarding the ED care following discharge.^{2,3}

Frailty is a state characterized by increased vulnerability to stressors due to loss of physiological reserve across multiple systems, and associated with various negative health outcomes.⁴ Since some of these negative outcomes can directly and indirectly predispose frail individuals to ED visits, frailty may be a risk factor for ED utilization, however, there is only limited evidence in the literature regarding the associations. The objectives of the present study were to perform a systematic review and meta-analysis on frailty as a predictor of ED utilization among community-dwelling older adults.

METHOD

Five electronic databases (EMBASE, Medline, CINAHL, PsycINFO, and AMED) were systematically searched in September 2018 for prospective cohort studies published in 2000 or later examining risk of ED visits according to frailty status categories (frail, prefrail, and robust) defined by validated frailty criteria among community-dwelling older adults with a mean age of ≥ 60 . A protocol developed according to the PRISMA statement and search strategy were registered at PROSPERO (CRD42018104640). If the same cohort was used by multiple studies, the results with the largest number of participants were chosen. Studies were examined for risk of bias and methodological quality using the Newcastle-Ottawa scale and considered to have low risk of bias and adequate methodological quality if they meet ≥ 5 of 9 items. Odds ratios (ORs) of ED visit risk according to frailty were combined by meta-analysis. Publication bias was assessed by visually inspecting a funnel plot. All data analyses were conducted using Review Manager 5 (The Cochrane Collaboration, Copenhagen, Denmark).

RESULTS

Among 1,467 citations identified, four studies⁵⁻⁸ (a total of 2,112 participants, mean follow-up 1.4 years) were included. All four studies were considered to have adequate methodological quality and therefore low risk of bias. There is no apparent asymmetry in the funnel plot, suggesting no evidence of publication bias. A fixed-effect meta-analysis was used based on low heterogeneity ($I^2=25\%$ for frail, $I^2=0\%$ for prefrail) and showed that both frailty and prefrailty were significant predictors of ED visit (frailty: 4 studies, pooled OR=2.14, 95% CI=1.58-2.91, $p<0.001$, prefrailty: 4 studies, pooled OR=1.46, 95% CI=1.17-1.82, $p<0.001$). There was a dose-response relationship between the degree of frailty and ED visit risk (p for subgroup differences=0.05). (**Figure**)

DISCUSSION

The present review identified four studies examining ED utilization risk according to frailty and the meta-analysis showed that older adults with frailty and prefrailty were more likely to use the ED than the robust in a dose-response manner.

One study used the Frailty Index to measure frailty and examined risk of ED utilization over two years in 1679 Dutch community-dwelling older adults.⁹ Rates of ED or out-of-hour GP surgery visits increased as the Frailty Index increased over tertile groups: 11.7% (least frail), 24.4%, and 42.9% (most frail).⁹ In another study, researchers involved in the INTER-FRAIL

study developed a postal questionnaire for frailty screening by mail, and showed that ED visit risk was 70% higher among those defined as frail compared with the non-frail (hazard ratio=1.67, 95%CI=1.53-1.84), using a competing risk regression model.¹⁰

The strength of the present study include comprehensive methodology with an extensive and reproducible search strategy using five databases and assessments of methodological quality, heterogeneity, and publication bias. However, the present study is not without limitations. Firstly, only a small number of studies were found; therefore, sensitivity, subgroup, and meta-regression analyses were not possible. Secondly, there is a possibility that other relevant studies may have been missed, especially since the entire systematic review process was conducted by one investigator. Thirdly, although it is preferable to use adjusted effect measures for a meta-analysis, unadjusted ORs were calculated and used for the meta-analysis for one study.⁵

Conclusion/Relevance

The present review highlights the first pooled evidence that frailty is a significant predictor of ED utilization among community-dwelling older adults. Given frailty is not irreversible,⁴ effective frailty interventions may reduce ED utilization of older adults and its related consequences, such as emotional stress due to unfamiliar environment and disrupted daily life, potential hospitalization, iatrogenic adverse outcomes, and healthcare burden.

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CONFLICTS OF INTEREST

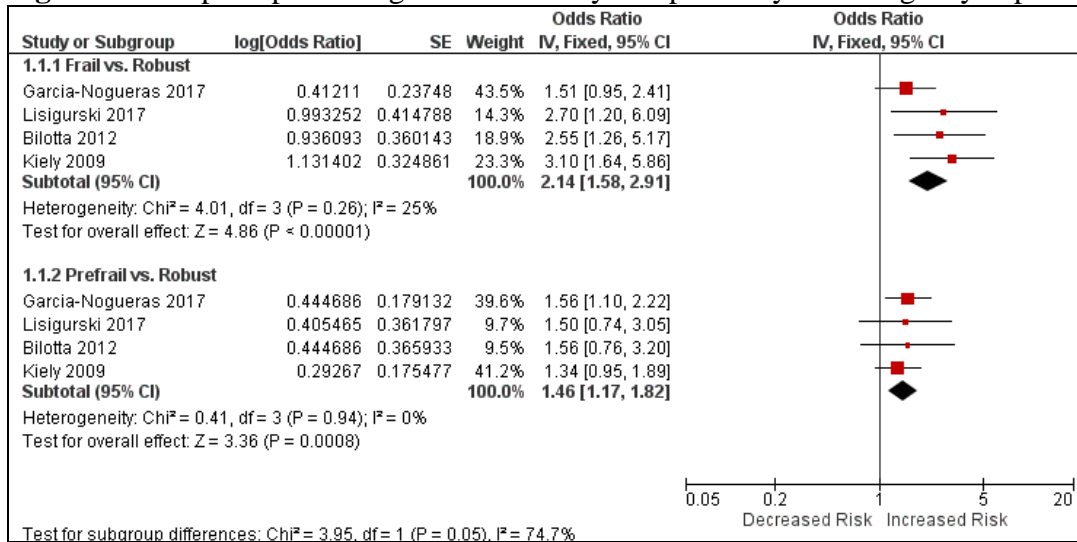
None.

REFERENCES

1. Dent E, Hoogendijk EO, Cardona-Morrell M, Hillman K. Frailty in emergency departments. *Lancet* (London, England) 2016;387:434.
2. Schnitker L, Martin-Khan M, Beattie E, Gray L. Negative health outcomes and adverse events in older people attending emergency departments: a systematic review. *Australasian Emergency Nursing Journal* 2011;14:141-162.
3. Aminzadeh F, Dalziel WB. Older adults in the emergency department: a systematic review of patterns of use, adverse outcomes, and effectiveness of interventions. *Annals of emergency medicine* 2002;39:238-247.
4. Clegg A, Young J, Iliffe S, et al. Frailty in elderly people. *Lancet* (London, England) 2013;381:752-762.
5. Bilotta C, Nicolini P, Case A, et al. Frailty syndrome diagnosed according to the Study of Osteoporotic Fractures (SOF) criteria and adverse health outcomes among community-dwelling older outpatients in Italy. A one-year prospective cohort study. *Archives of gerontology and geriatrics* 2012;54:e23-28.
6. Garcia-Nogueras I, Aranda-Reneo I, Pena-Longobardo LM, et al. Use of Health Resources and Healthcare Costs associated with Frailty: The FRADEA Study. *The journal of nutrition, health & aging* 2017;21:207-214.
7. Kiely DK, Cupples LA, Lipsitz LA. Validation and comparison of two frailty indexes: The MOBILIZE Boston Study. *Journal of the American Geriatrics Society* 2009;57:1532-1539.

8. Zylberglait Lisigurski M, Bueno YA, Karanam C, et al. Healthcare Utilization by Frail, Community-Dwelling Older Veterans: A 1-Year Follow-up Study. *Southern medical journal* 2017;110:699-704.
9. Drubbel I, de Wit NJ, Bleijenberg N, et al. Prediction of adverse health outcomes in older people using a frailty index based on routine primary care data. *The journals of gerontology. Series A, Biological sciences and medical sciences* 2013;68:301-308.
10. Mossello E, Profili F, Di Bari M, et al. Postal screening can identify frailty and predict poor outcomes in older adults: longitudinal data from INTER-FRAIL study. *Age and ageing* 2016;45:469-474.

Figure. Forest plots presenting effect of frailty and prefrailty on emergency department visit.



CI: confidence interval, IV: inverse variance