



Supplemental Materials for

Herpes Zoster and Frailty in Older Adults: A Systematic Review

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Listing of Supplemental Material(s):

- **Appendix S1:** Search Strategies for Frailty and Herpes Zoster Across Databases
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- **Table S3:** Joanna Briggs Institute Checklist for RCTs

APPENDIX S1. SEARCH STRATEGIES FOR FRAILTY AND HERPES ZOSTER ACROSS DATABASES

PubMed/MEDLINE

```
(frailty OR fragile OR fragility OR frail* OR "frailty index" OR "frailty syndrome" OR "frailty phenotype" OR "physical frailty")  
AND  
("herpes zoster" OR "herpes-zoster" OR shingles OR shingle* OR "postherpetic neuralgia" OR "zoster" OR "varicella-zoster virus" OR VZV OR HZ)  
AND  
("aged" OR elder* OR geriatric OR "older adults" OR "older individuals" OR "senior citizens" OR ageing OR aging)
```

Cochrane Library (via Advanced Search)

```
(frailty OR fragile OR fragility OR "frailty index" OR "frailty syndrome" OR "frailty phenotype" OR "physical frailty")  
AND  
("herpes zoster" OR "herpes-zoster" OR shingles OR "postherpetic neuralgia" OR "zoster" OR "varicella-zoster virus" OR VZV OR HZ)  
AND  
("aged" OR elderly OR geriatric OR "older adults" OR "older individuals" OR "senior citizens" OR ageing OR aging)
```

Embase (via Ovid)

```
(frailty OR fragile OR fragility OR "frailty index" OR "frailty syndrome" OR "frailty phenotype" OR "physical frailty")  
AND  
("herpes zoster" OR "herpes-zoster" OR shingles OR "postherpetic neuralgia" OR "zoster" OR "varicella-zoster virus" OR VZV OR HZ)  
AND  
("aged" OR elderly OR geriatric OR "older adults" OR "older individuals" OR "senior citizens" OR ageing OR aging)
```

APPENDIX S2. DATA EXTRACTION FORM

The standardized data extraction form included the following categories:

- *Study Characteristics*: The form captured the author(s), year of publication, study design (observational or randomized controlled trial), and country/region where the study was conducted.
- *Participant Demographics*: Information on inclusion and exclusion criteria, sample size, mean age and distribution, frailty definition and assessment tool (e.g., Fried Frailty Phenotype, Rockwood Frailty Index), and prevalence of frailty was collected.
- *Exposure and Outcomes*: Data on the definition of herpes zoster, incidence of herpes zoster, severity of herpes zoster (e.g., postherpetic neuralgia, hospitalization rates), frailty progression following HZ diagnosis, vaccination uptake among frail and non-frail older adults, and immune response to vaccination were extracted.
- *Results*: The form included measures of association between frailty and HZ, subgroup differences in HZ incidence and outcomes, and the impact of vaccination on HZ incidence and severity in frail older adults.
- *Conclusions and Limitations*: Key findings, study limitations, and clinical implications were documented to summarize the study's contributions and potential biases.

Data Extraction Table

The extracted data were organized into a structured table, which included columns for each of the categories listed above. This table facilitated the synthesis and comparison of data across studies, ensuring that all relevant information was systematically captured and easily accessible for analysis.

TABLE S1: JOANNA BRIGGS INSTITUTE 8-ITEM CRITICAL APPRAISAL CHECKLIST FOR COHORT STUDIES.

Author, year	Were the two groups similar and recruited from the same population?	Were the exposures measured similarly to assign people to both exposed and unexposed groups?	Was the exposure measured in a valid and reliable way?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?	Were the outcomes measured in a valid and reliable way?	Was the follow up time reported and sufficient to be long enough for outcomes to occur?	Was follow up complete, and if not, were the reasons to loss to follow up described and explored?	Were strategies to address incomplete follow up utilized?	Was appropriate statistical analysis used?
Verschoor, 2017	N	Y	Y	Y	Y	Y	Y	Y	Y	U	Y
Lelic, 2016	N	Y	Y	Y	Y	Y	Y	Y	Y	U	Y
Choi, 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	U	Y
Wang, 2016	Y	Y	Y	Y	U	U	Y	Y	Y	U	Y
Buchan,2021	Y	Y	Y	Y	Y	Y	Y	Y	Y	U	Y
An, 2024	Y	Y	Y	Y	U	U	Y	Y	Y	U	Y

Y=Yes; N=No; U=Unclear; NA=Not applicable

TABLE S2: JOANNA BRIGGS INSTITUTE 8-ITEM CRITICAL APPRAISAL CHECKLIST FOR ANALYTICAL CROSS-SECTIONAL STUDIES.

Author/year	Were the criteria for inclusion in the sample clearly defined?	Were the study subjects and the setting described in detail?	Was the exposure measured in a valid and reliable way?	Were objective, standard criteria used for measurement of the condition?	Were confounding factors identified?	Were strategies to deal with confounding factors stated?	Were the outcomes measured in a valid and reliable way?	Was appropriate statistical analysis used?
Veronese, 2022	Y	Y	Y	Y	Y	Y	Y	Y

Y=Yes; N=No; U=Unclear; NA=Not applicable

TABLE S3: JOANNA BRIGGS INSTITUTE CHECKLIST FOR RCTS.

Study Author: Curran	Study Title: Recombinant Zoster Vaccine Is Efficacious and Safe in Frail Individuals	Study Year: 2020
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Internal Validity		Choice - Comments/Justification	Yes	No	Unclear	N/A
Bias related to selection and allocation						
1	Was true randomization used for assignment of participants to treatment groups?		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Was allocation to treatment groups concealed?		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Were treatment groups similar at the baseline?		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bias related to administration of intervention/exposure						
4	Were participants blind to treatment assignment?		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Were those delivering the treatment blind to treatment assignment?		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	Were treatment groups treated identically other than the intervention of interest?		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bias related to assessment, detection and measurement of the outcome						
7	Were outcome assessors blind to treatment assignment?		Yes	No	Unclear	N/A
	Outcome 1	Frailty status	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 2	Vaccine efficacy	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 3	immunogenicity	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 4	reactogenicity	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 5	safety	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8	Were outcomes measured in the same way for treatment groups?		Yes	No	Unclear	N/A
	Outcome 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 2		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 3		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 4		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 5		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9	Were outcomes measured in a reliable way		Yes	No	Unclear	N/A
	Outcome 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 2		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 3		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 4		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Outcome 5		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Bias related to participant retention

10	Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?					
	Outcome 1		Yes	No	Unclear	N/A
	Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 2		Yes	No	Unclear	N/A
	Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Outcome 3		Yes	No	Unclear	N/A
	Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 4		Yes	No	Unclear	N/A	

Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 5		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 6		Yes	No	Unclear	N/A
Result 1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 7		Yes	No	Unclear	N/A
Result 1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Statistical Conclusion Validity

11	Were participants analysed in the groups to which they were randomized?				
	Outcome 1		Yes	No	Unclear N/A

Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 2		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 3		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 4		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 5		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 6		Yes	No	Unclear	N/A

Result 1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 7		Yes	No	Unclear	N/A
Result 1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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Was appropriate statistical analysis used?					
Outcome 1		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 2		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 3		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 4		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 5		Yes	No	Unclear	N/A
Result 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 6		Yes	No	Unclear	N/A
Result 1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outcome 7		Yes	No	Unclear	N/A
Result 1		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Result 3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		Yes	No	Unclear	N/A

13 Was the trial design appropriate and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?

Overall appraisal:

Include:

Exclude:

Seek Further Info:

Comments:

