Risk factors for post-stroke shoulder pain: a systematic review and meta-analysis

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Aim

To identify the variables and potential risk factors measured within the first month after stroke that predicted the onset of shoulder pain within the first year after stroke.

Methods

Search strategy
- Databases: AMED, CINAHL, EMBASE, Medline, PubMed
- Keywords: variants of 'stroke', 'shoulder pain', and 'risk factors'
- No limitations applied
- Further articles sourced through hand-searching reference lists of key articles

Study selection
- Only prospective cohort studies that measured a potential risk factor in first month and measured pain as a key outcome
- Studies excluded if data collected retrospectively or if measurement of pain taken at same time as other variables (thereby assessing correlation rather than risk)
- Also excluded case reports, conference/poster abstracts or any study where the full report was not available
- Two reviewers independently screened, assessed and selected papers. Where there was disagreement a consensus was made through discussion with a third reviewer

Risk of bias assessment
- Risk of bias assessed using the Quality in Prognosis Studies (QUIPS) tool
- Tool considers 6 domains: Study participation; Study attrition; Prognostic factor measurement; Outcome measurement; Study confounding; Statistical analysis
- Independently assessed by 2 reviewers

Data extraction
- Main data extracted included all risk factors that were identified and analysed as potential risks or where sufficient data was supplied to enable the calculation of an odds ratio
- Other data extracted included the aims and methodology of each study, the period of observation, baseline characteristics of the cohort, inclusion/exclusion criteria, how pain was measured and defined, the temporal aspects of baseline and repeated measures, and any limitations of each study in relation to the research question

Data synthesis
- Articles described and summarised in a narrative form
- Where possible, raw data was extracted to calculate odds ratios so that meta-analysis could be performed on factors with sufficient data
- Heterogeneity was assessed at face value based on methodological characteristics and statistically using the I2 statistic

Results

- Included 9 papers from 7 different countries published between 2003 and 2018
- Mean sample size was 309 (range: 31-1474)
- A total of 2474 patients were included in the data synthesis with a 50:50 male to female ratio
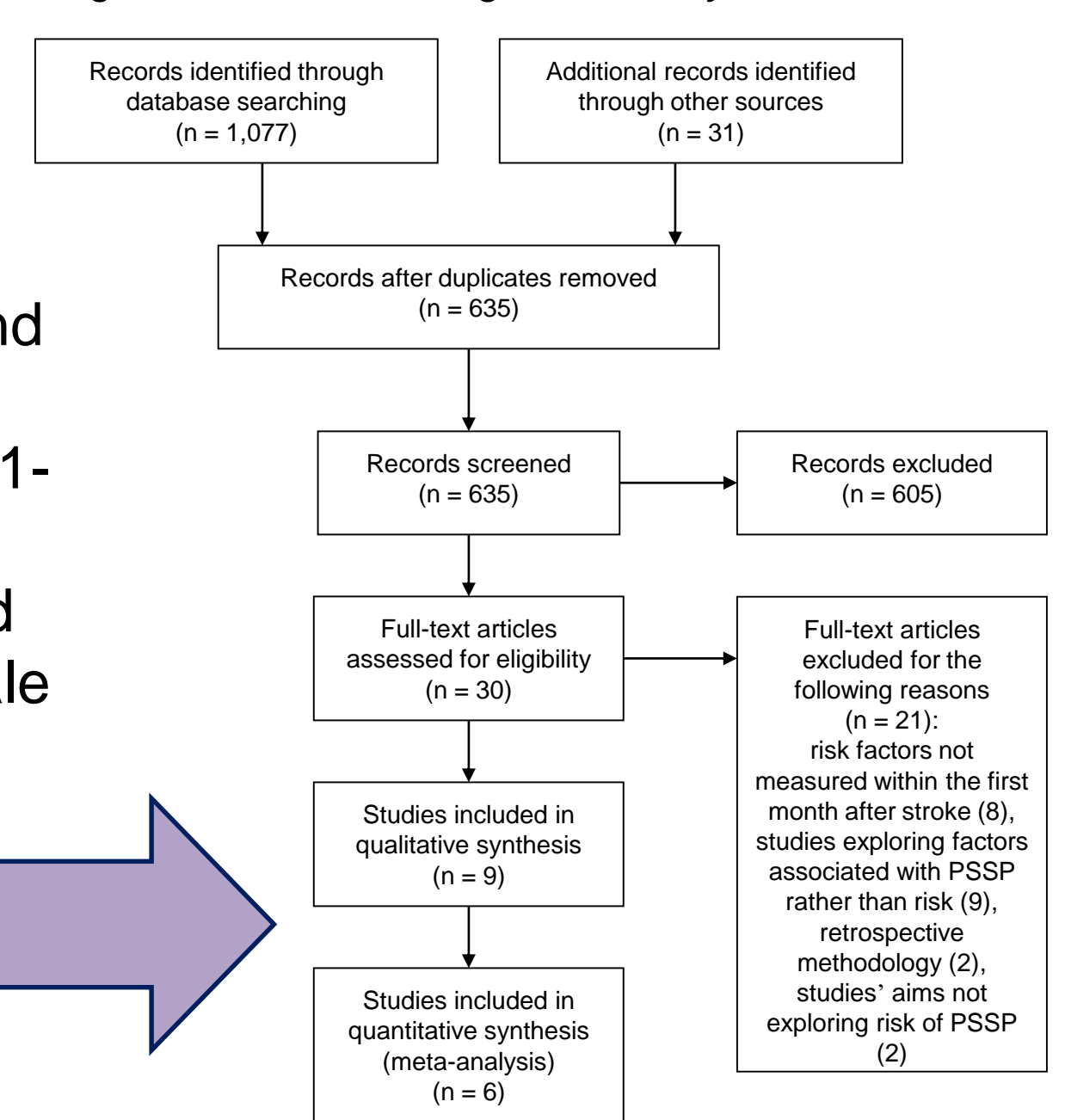

Fig 1. PRISMA flow diagram of study selection

Fig 2. Risk of bias assessment

- The two assessors had a substantial degree of agreement (weighted κ = 0.68) when evaluating risk of bias
- Majority of included studies rated as either moderate or high risk of bias

- A total of 54 different factors were measured temporally to allow the calculation of an odds ratio
- Only four factors (sex, diabetes, laterality, history of shoulder pain) had sufficient data to enable meta-analysis (see below)
- 'Impairment in UL motor function' was a significant factor from the qualitative synthesis

Fig 3. Forest plots displaying the pooled odds ratio analyses
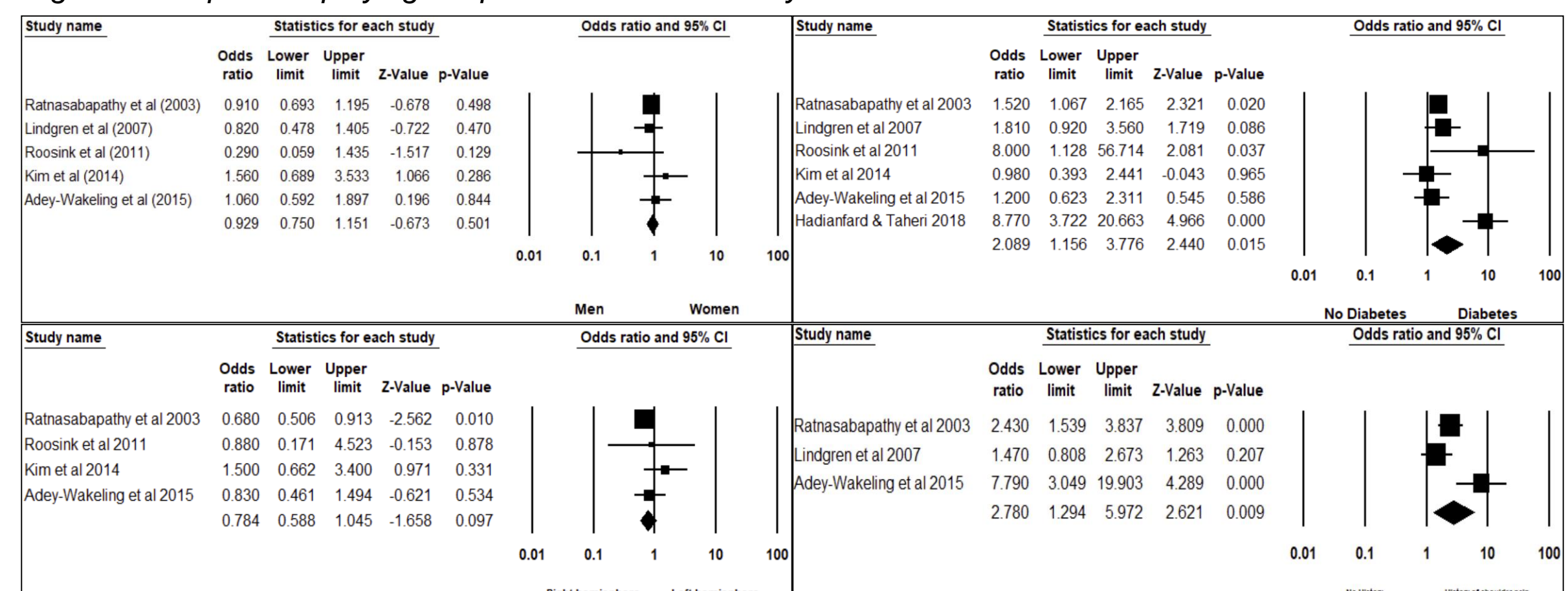
Conclusions

Motor deficits in the arm, diabetes and a history of shoulder pain are significant predictors for the development of post-stroke shoulder pain within the first year after stroke

- It is advised that clinicians routinely asked about diabetes and a history of shoulder pain when taking a patient's history
- These findings should be used to guide clinical reasoning when deciding where to focus preventative strategies as well as provide clinicians with prognostic information to better inform patients, carers and relatives
- The current definition of post-stroke shoulder pain may be too much of an umbrella-term to allow accurate conclusions to be made. It is recommended that future research could improve specificity by investigating subtypes of shoulder pain

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