



Systematic Review of the Effects of Topical Oxygen Therapy on Wound Healing

Khanjan Nagarsheth, M.D.¹, Aman Kankaria B.S.¹, Justin Marsella B.A.¹, Eleanor Dunlap CRNP¹, Shannon Hawkins RN¹, Areck Ucuzian, M.D.^{1,2}, Brajesh K. Lal, M.D.^{1,2}
¹Division of Vascular Surgery, University of Maryland School of Medicine, Baltimore, MD, USA. ²Vascular Service, VA Maryland Health Care System, Baltimore, MD, USA

Introduction

- Impaired wound healing occurs from adverse location, tissue ischemia, infection, or comorbidities.
- Metabolic activity of cells responsible for wound healing require an abundance of oxygen
- Increased tissue oxygenation has been used to assist wound healing (e.g., hyperbaric therapy)
- Transcutaneous oxygen therapy (TCOT) is an alternate means of localized oxygen delivery to the wound.
- **Aim:** Systematic review & meta-analysis of the impact of TCOT on wound healing, focusing on complete healing, wound area reduction, wound recurrence, and pain.

Methods

- PRISMA methodology.
- Included studies: Double-arm randomized & non-randomized studies; and single-arm studies.
- Bias assessment conducted via Cochrane Risk of Bias tools for randomized and non-randomized studies.
- Statistical analysis: proportion analysis, odds ratios, and standardized mean differences with OpenMeta[analyst] software.

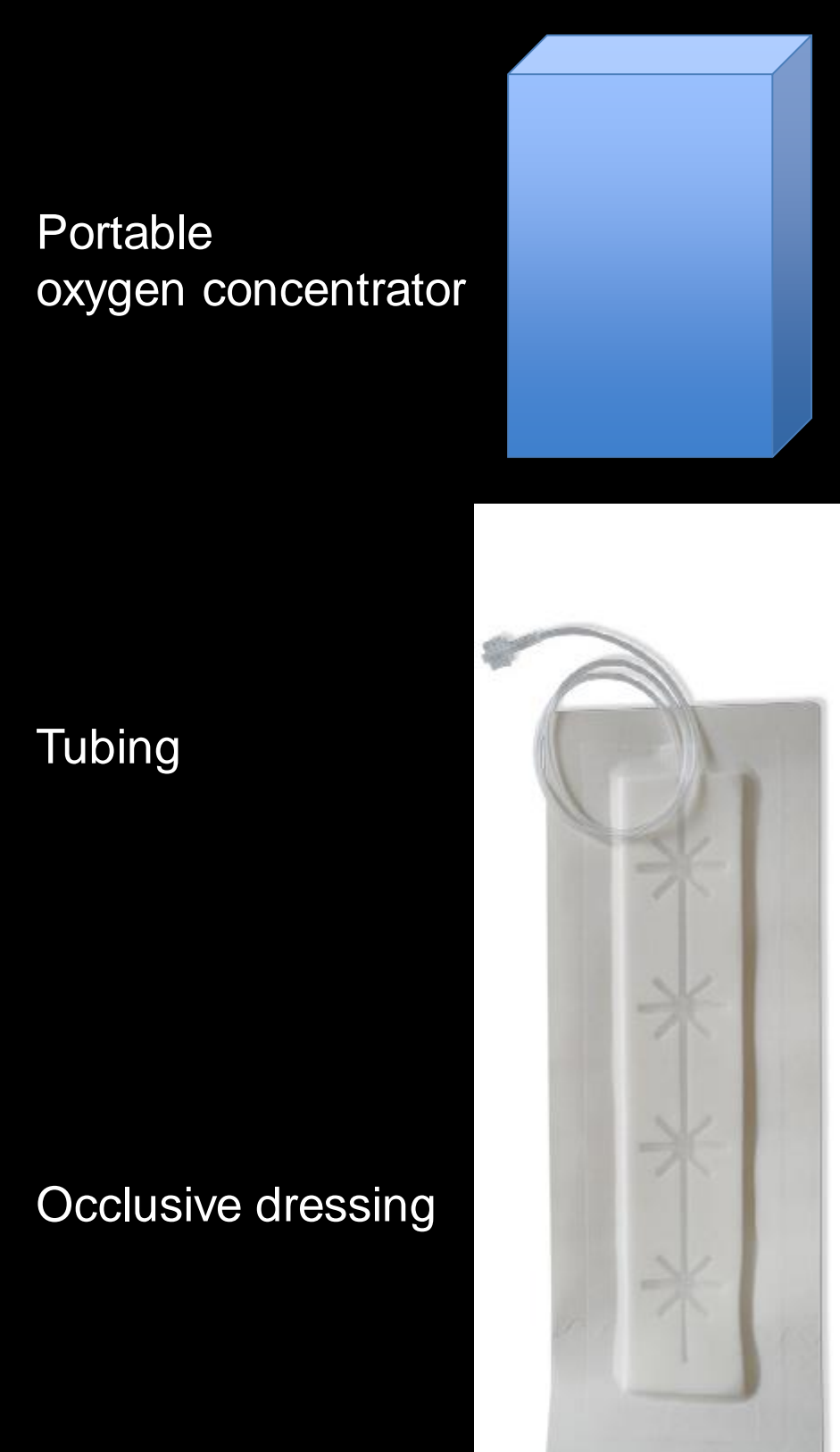


Fig 1. Basic components of a transcutaneous oxygen delivery device

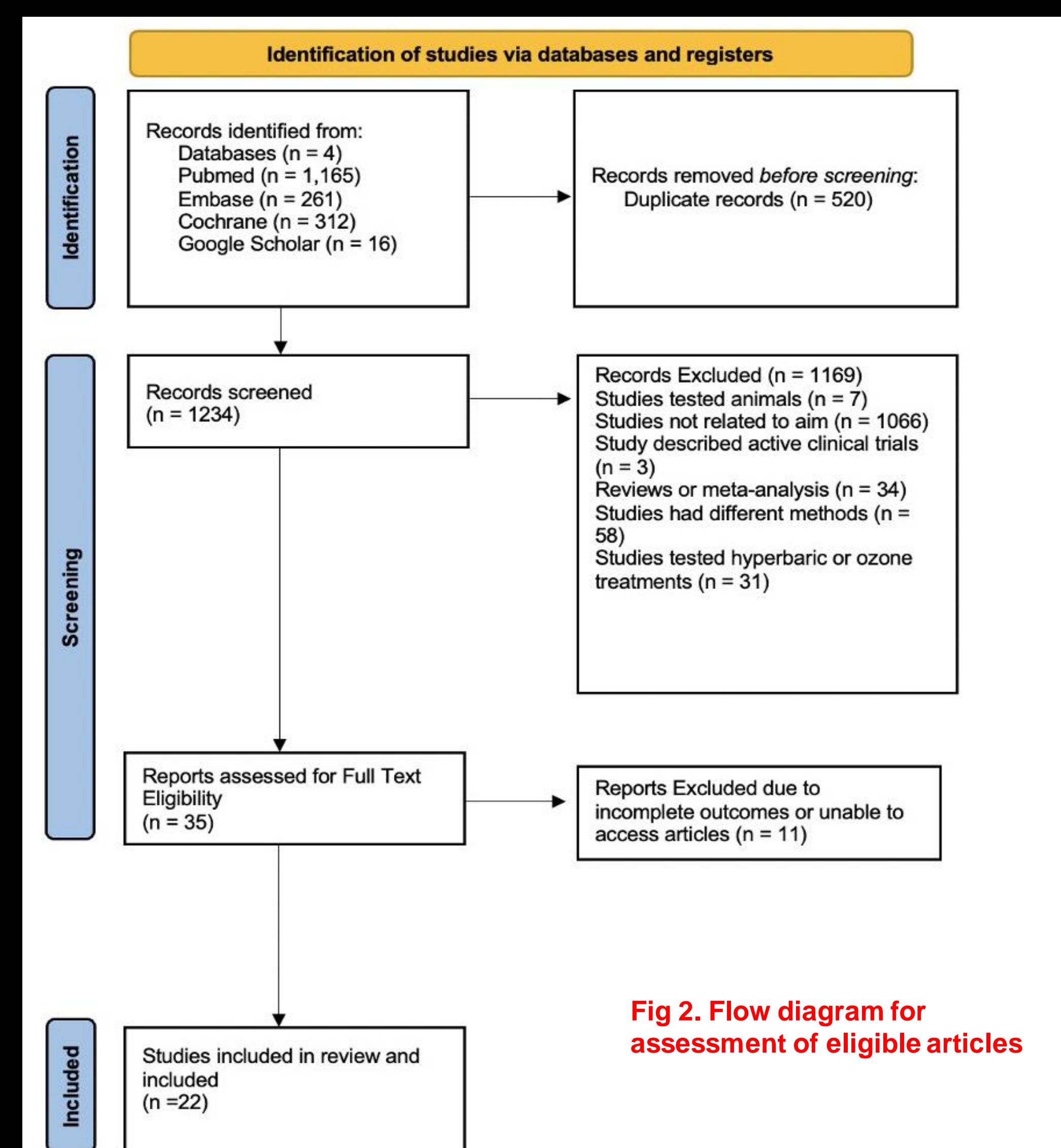
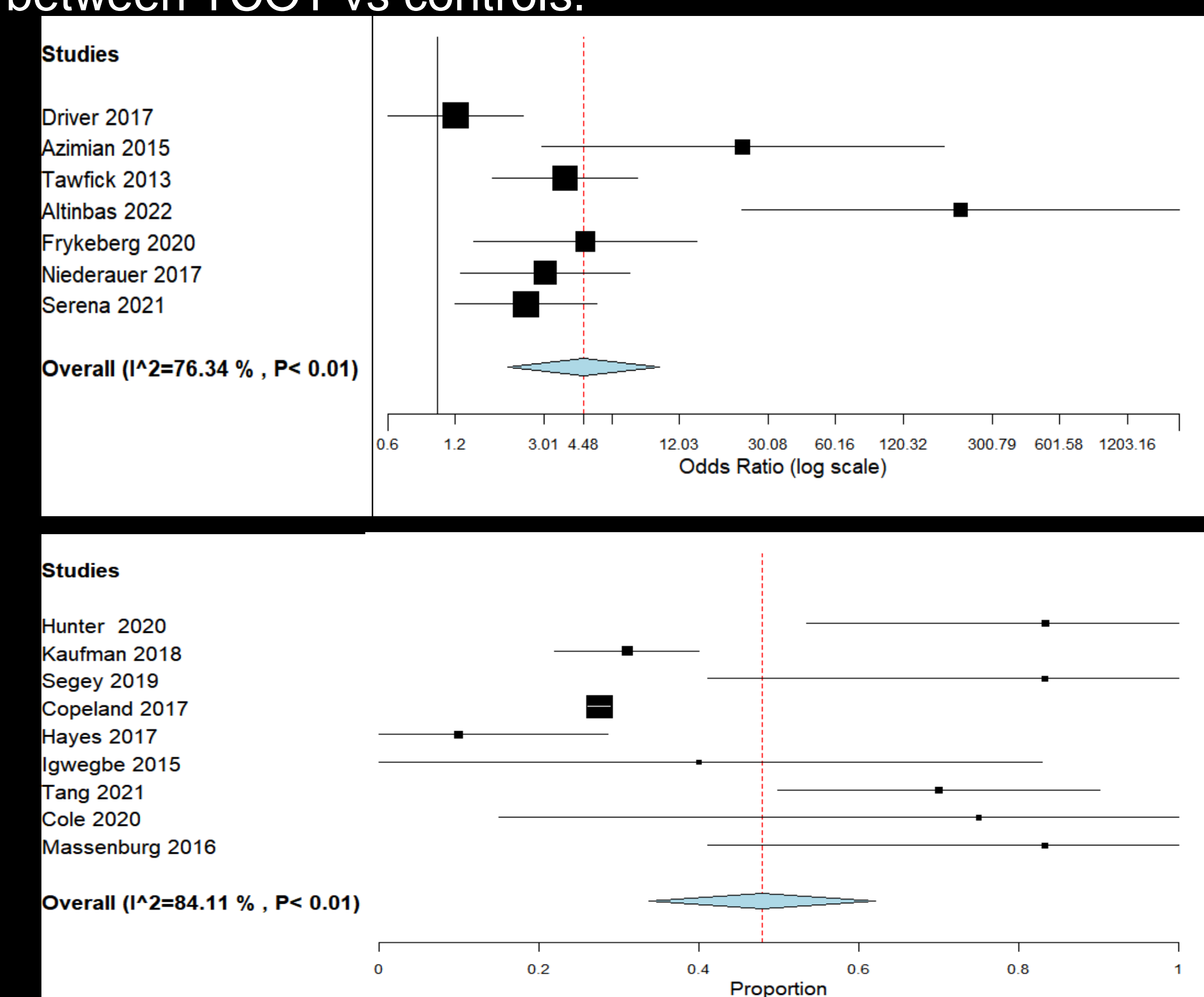


Fig 2. Flow diagram for assessment of eligible articles

Results

- **10** randomized, and **12** non-randomized double- or single-arm studies included.
- **Co-primary endpoints:** Proportion of completely healed wounds, and standardized mean difference in percent wound reduction after TCOT.
- TCOT **significantly increased completely healed wounds** in randomized and non-randomized studies (Figures 3 and 4).
- TCOT **significantly reduced ulcer recurrence rates** compared to controls (OR 0.08, P < 0.001).
- TCOT **did not increase percent wound reduction** in treatment vs. control groups (SMD -0.85, P = 0.12), including single-arm studies (P = 0.33).
- No differences in **Pressure Ulcer Scale of Healing (PUSH) score** or **Visual Analog Pain Scale (VAPS) scores** between TCOT vs controls.



Figures 3 and 4: Forrest plots assessing the proportions of wounds completely healed in double- and single-arm studies.

Conclusion

- TCOT **holds promise** for improving wound healing.
- While not impacting wound reduction or pain scores significantly, it shows potential for complete healing and ulcer prevention in wound management.
- **Further research is needed** to optimize treatment, standardize measurements, and understand long-term benefits for different wound types.