

BACKGROUND:

Management of lower limb fractures in a prolonged field care (PFC) scenario is of growing clinical relevance. The global expansion of adventure sports and wilderness recreation has broadened the population at risk of remote musculoskeletal trauma, while evolving patterns of modern conflict – characterised by larger operational theatres, contested airspace, and disrupted communications infrastructure – increasingly threaten the viability of timely casualty evacuation. The specific focus of this review on lower limb long bone fractures reflects the particular evacuation burden they impose; precluding independent mobilisation, rendering the casualty wholly dependent on extraction by others and substantially compounding logistical challenges in resource-limited environments.

SETTING:

- Fractures of femur, tibia, and fibula.
- Managed in the field in the context of prolonged scene-to-hospital time or in pre-hospital environments with limited resources.
- PFC was interpreted as any care outside the scope of basic first aid in the field and/or care provided beyond doctrinal timelines.

OBJECTIVES:

- Broadly assess the quantity and strength of evidence available in the literature, including grey literature.
- Identify avenues for future research
- Determine if there is sufficient literature for a more robust scoping or systematic review.

METHODS:

A literature search of Scopus, EMBASE, CINAHL and PubMed databases was conducted using terms relevant to leg fractures and PFC. Papers were imported into Covidence and screening was conducted, followed by full text reviews and data extraction.

1. Braude D, Shalit M. The Mt. Tyndall incident. *Prehosp Emerg Care*. 1999;3(2):167-169. doi:10.1080/10903129908958927

2. Runcie H, Greene M. Femoral Traction Splints in Mountain Rescue Prehospital Care: To Use or Not to Use? That Is the Question. *Wilderness & Environmental Medicine*. 2015;26(3):305-311. doi:10.1016/j.wem.2015.01.006

3. Bernard M, Martin MJ, Corsa J, et al. Into the wild and on to the table: A Western Trauma Association multicenter analysis and comparison of wilderness falls in rock climbers and nonclimbers. *J Trauma Acute Care Surg*. 2020;89(3):570-575. doi:10.1097/TA.00000000000002705

01 Planning and Improvisation

Rigid protocols are unlikely to anticipate all situations. Furthermore, low call volumes may lead to de-skilling. Effective planning and failure-tolerant, adaptable practitioners are vital in PFC. Skill retention should also be monitored due to vulnerabilities posited by limited communication capabilities and resources in the field [1, 2].

Detailed knowledge of injury context may allow for more optimised equipment haulage when dispatched to a case where evacuation may be delayed [3].

→ Novel methods of equipment delivery (such as drone usage) may be beneficial in austere or inhospitable environments where access is difficult [4].

02 Immobilisation

Traction splints may reduce transfusion requirements and pulmonary complications in femoral fractures [5], but there is no clear advantage (analgesic or otherwise) over rigid splinting with analgesia. Reliable and maintainable immobilisation appears more important than any single splinting modality.

Improvised splints could have a role in PFC or resource-limited settings but are potentially under-utilised [6, 7, 8].

→ Novel devices for management of lower limb fractures in PFC would be most beneficial if able to restore limb function and reduce resource burden by immobility [8,9]

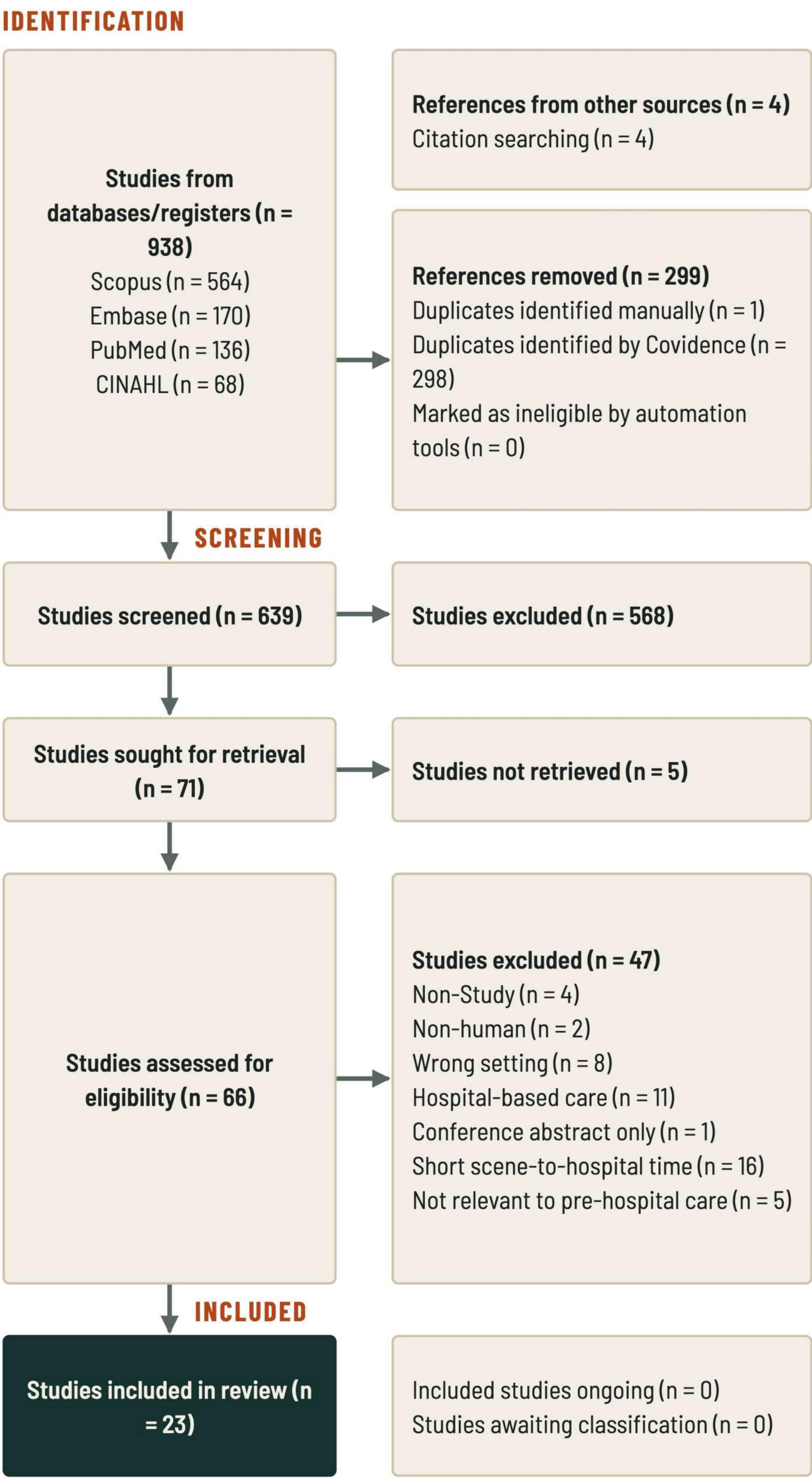
03 Antibiotics in Open Fractures

Prophylactic antibiotics are difficult to administer inline with urban/civilian target timeframes during PFC. They should be administered as soon as practicable following initial stabilisation [10] if evacuation is likely to be delayed (>60 mins).

4. Türkoğlu B, Ünlü MG, Camur M, Coşkun AK, Ünlü A. Massive transfusion on the combat field using autonomous drones: A case report. *Transfusion*. 2025;65(7):1373-1376. doi:10.1111/trf.18279

5. Philipsen SPJ, Vergunst AA, Tan ECTH. Traction splinting for midshaft femoral fractures in the pre-hospital and emergency department environment – a systematic review. *Injury*. 2022;53(12):4129-4138. doi:10.1016/j.injury.2022.09.051

PRISMA flow diagram



WHAT WAS FOUND?

The evidence base is generally scarce regarding PFC scenarios. Some included papers postulated implications on the background of expert opinion. Many studies included provided low levels of evidence (case reports, expert consensus etc.) or evaluations of current methods rather than experimental trials.

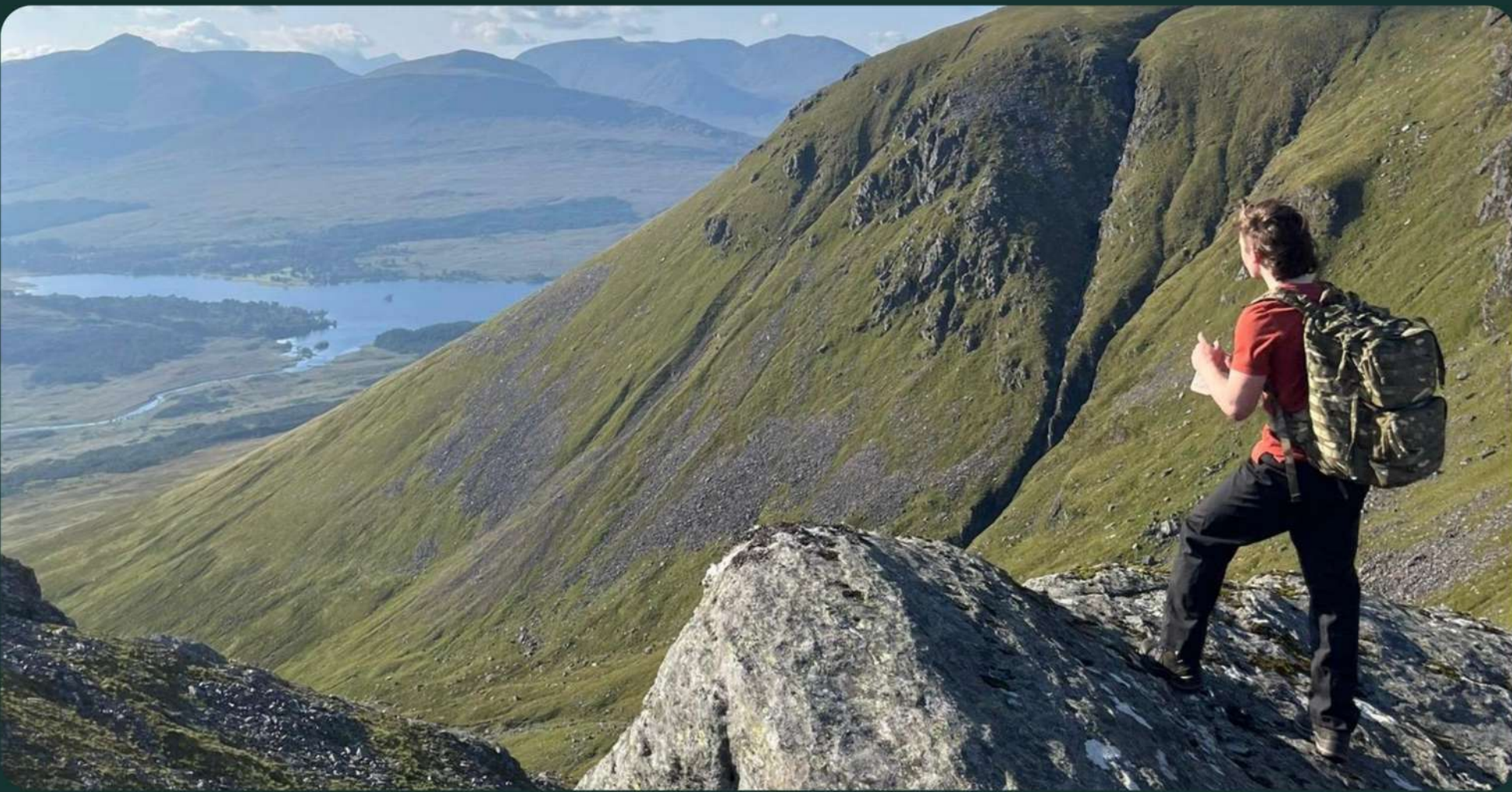
CONCLUSION:

PFC has specific, unique challenges:

1. Delayed definitive care.
2. Limited diagnostic capabilities.
3. Limited personnel and equipment.
4. Prolonged immobilisation/tourniquet use.
5. Extended analgesia with limited monitoring capabilities.
6. Mitigation of environmental factors.
7. Poor access for clinicians and resources.

PFC is not an extension of conventional pre-hospital care. There is an absence of high quality literature assessing management of lower limb fractures in such scenarios. Papers tend to favour extrapolation or retrospective review via case report, rather than investigate directly – likely due to the difficulty of objective study in low volume cases with high fluidity on scene, leading to highly heterogenous data sets.

Further research into the management of lower limb fractures should give consideration to PFC scenarios. Limited resources appear to be a considerable obstacle and new technologies may be helpful in this difficult clinical environment.



6. Mahon AM. Pre-hospital Management of the Fractured Femur Using the Tauranga Thomas Splint. *South African Medical Journal*. 1974;47(4). Accessed 29 September 2026. https://www.ajol.info/index.php/samj/article/view/166943

7. Fahey D. Liston's Splint – a Forgotten First Aid Technique. *Australasian Journal of Paramedicine*. 2009;7:1-4. doi:10.33151/ajp.7.1.150

8. Johnson WB, Perry AD, Flores G, et al. Identifying Improvements in Treating Extremity Musculoskeletal Injuries During Prolonged Care. *Military medicine*. 2024;189(11-12):2731-2738. doi:10.1093/milmed/usae404

9. Dolan CP, Valerio MS, Lee Childers W, Goldman SM, Dearth CL. Prolonged field care for traumatic extremity injuries: defining a role for biologically focused technologies. *NPJ Regen Med*. 2021;6(1):6. doi:10.1038/s41536-020-00117-9

10. Wisniewski P, Becker YA, Larson DT, et al. Antibiotics in Tactical Combat Casualty Care 2025: TCCC Change 25-1. *J Spec Oper Med*. 2025;25(4):85-93. doi:10.55460/SW7X-X82P

11. Caubère A, de Landevoisin ES, Schlienger G, Demoures T, Romanat P. Tactical tourniquet: Surgical management must be within 3 hours. *Trauma Case Reports*. 2019;22:100217. doi:10.1016/j.tcr.2019.100217