

## Commentary

# Pre-hospital immobilisation for neck of femur fractures in Australia – a break in the evidence

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## Abstract

Neck of femur (NOF) fractures present a significant challenge for healthcare systems and are associated with major complications and high mortality. Hospital clinical pathways aim to improve care and optimise outcomes for individuals sustaining NOF fractures; however, these pathways exclude the pre-hospital management of suspected NOF fractures. Therefore, there remains a lack of evidenced-based standardisation for pre-hospital management. To date, research into pre-hospital management of NOF fractures has mostly focussed on pain relief, with very little research examining immobilisation techniques. This is despite immobilisation offering great clinical benefit for other long bone fractures. Unlike hospital clinical pathways that undergo annual reports and reviews, pre-hospital guidelines for NOF fracture immobilisation have received little attention in the past decade. Given advances in research-informed practice for pre-hospital management of other fractures, it seems timely and pertinent to examine current clinical practice guidelines for NOF fractures, focusing on the appropriateness of current immobilisation techniques.

### Keywords:

splinting; paramedic; emergency; NOF

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## Background

Falls are a common occurrence among the elderly, often resulting in hospitalisation as a result of a neck of femur (NOF) fracture (1). More than 200,000 Australians are hospitalised annually due to NOF fractures, at an estimated cost of more than AUD445 million (2). NOF fractures result in a high degree of mortality with more than 6% of patients dying within 30 days of injury (2). Together with increased carer burden, NOF fractures present a significant challenge for healthcare systems in Australia.

From 2018 to 2019, the Queensland Ambulance Service (QAS) attended nearly 42,000 older adults (>65 years) who experienced a fall; an increased incidence of 26.3% compared to 2007–2008 (3). As the majority of falls resulting in a NOF fracture occur in the home or community setting, paramedics will often be the first to render medical assistance (2). Concerningly, initial medical assistance may be delayed for patients who reside in independent living or remote locations, further highlighting the importance of efficient, evidenced-based practice guidelines for the pre-hospital setting. Yet, unlike those developed for in-hospital care, pre-hospital clinical guidelines for suspected NOF fractures appear absent from paramedic training or practice standards in Australia. This oversight may negatively impact patient presentation to emergency departments and compromise pre-hospital care for individuals with a suspected NOF fracture.

Hospital clinical pathways for NOF fractures aim to improve care and enhance outcomes, by optimising pain relief, timing and type of surgery, mobilisation strategies, and multidisciplinary management (4). Recent improvements in hospital clinical pathways for NOF fractures have reduced mortality from 7.1% in 2017 to 6.5% in 2019 (5). Similarly, since 2012, the average length of hospital stay following a NOF fracture has reduced by 2.7 days, with a flow on saving in healthcare expenditure (5). However, these pathways are limited to the hospital setting. In contrast, there remains a lack of evidenced-based standardised care for managing suspected NOF fractures in the pre-hospital setting (5). Indeed, there is contradiction between ambulance services. When reviewing guidelines for generalised fracture management, some services recommend pain relief with a non-specific form of immobilisation or splinting (6-8). Yet for suspected NOF fractures, many ambulance services provide no specific guideline for suspected NOF fracture management. Non-standardised and/or inconsistent management of NOF fractures by paramedics could impact on readiness for surgery, in addition to morbidity and mortality outcomes.

### Research on NOF fractures

Recent research into the pre-hospital management of NOF fractures has mostly focussed on pain relief, with emphasis on the dose and route of narcotic administration (1), highlighting the need to balance adequate pain relief with the known adverse reactions from the drug itself (9). The use of local anaesthetics

and femoral nerve blocks have also been examined for feasibility in the pre-hospital setting (1). The findings suggest a reduction in patient reported pain, with few adverse reactions being reported; however, there is limited research on their impact to patient satisfaction and potential time delays both on-scene and transporting (9). In contrast, immobilisation of NOF fractures to assist with pain relief has received little attention, despite showing great benefit for other long bone fractures (10).

Immobilisation aims to support the fracture site to minimise bone displacement, decrease pain and reduce blood loss; the latter of which is important for stabilisation of the patient's haemodynamic status (10). Management of haemodynamic status is critically important as many patients with NOF fractures have a high prevalence of age-related comorbidities, which could be exacerbated by stress and uncontrolled haemorrhage (4). Furthermore, effective pre-hospital immobilisation of the NOF fracture could also reduce the dosage required for pharmacological pain relief, thereby lowering the risk of adverse reactions to narcotics and possible exacerbation of pre-existing comorbidities (9). Optimising patients' vital signs before arrival at hospital may assist in reducing surgical delays and improve clinical outcomes. Recent data from the HIP fracture Accelerated surgical Treatment And Care track (HIP ATTACK) trial has shown that while accelerated surgery for NOF patients does not have a significant effect on mortality, accelerated surgery results in reduced rates of delirium, infection, and cerebrovascular accident, ensuring earlier mobilisation and discharge (4).

Pre-hospital immobilisation for NOF fractures is not without risk. Applying an immobilisation device such as a splint, may result in an increase in pain for some patients. Moreover, due to the anatomical position of the NOF it may be difficult to achieve effective immobilisation of the fracture site. Once applied, immobilisation requires the patient to lay supine for sustained periods with the potential to exacerbate underlying conditions, such as chronic obstructive pulmonary disease and congestive heart failure (11). Furthermore, prolonged periods without movement, as may occur for patients in rural locations with long transport times, can increase the risk of pressure sores, compartment syndrome, and/or thrombosis (12). Therefore, careful consideration and further research is warranted to examine if these risks are outweighed by potential benefits and if strategies can be implemented to mitigate possible complications.

Current guidelines for pre-hospital immobilisation of NOF fractures have received little attention since Lee and Porter's seminal 2005 paper 'Prehospital management of lower limb fractures' (13). Despite forming the basis for many national and international guidelines on pre-hospital management of lower limb fractures, evidence-based guidance on NOF fractures based on this seminal work is notably scarce. Recommendations are limited to immobilisation for pain reduction and to reduce secondary trauma. Based on Lee and Porter's paper, the recommended technique includes placing

padding between the legs, securing the ankles via a figure of eight bandage and placing two broad bandages above and below the knee (Figure 1).



Figure 1. Immobilisation of a NOF fracture as suggested by Lee and Porter (13)

The immobilisation technique described by Lee and Porter has remained unchanged and unchallenged for the past 15 years, and a recent scan of relevant literature using search terms such as 'neck of femur' 'fracture' and 'immobilisation' and a forward citation search in Scopus failed to identify any empirical study evaluating its efficacy. O'Connor and colleagues conducted a literature review in 2019 and likewise, highlighted the lack of evidence for immobilisation in suspected NOF fractures (1). Notably, the immobilisation technique described by Lee and Porter (13) does not identify source information and the recommendations appear to be drawn from practice-based evidence. Given the advances in research-informed practice for the pre-hospital treatment of other fractures, it seems timely and pertinent to more closely examine the technique suggested by Lee and Porter (13). We propose future research is needed to examine current clinical practice guidelines both nationally and internationally for standardisation and consistency in care.

#### Future directions

The most appropriate first step in addressing the research-practice gap would be a critical examination of paramedic curricula and practice guidelines for the pre-hospital management of suspected NOF fractures. Next, we propose gaining expert consensus on the most appropriate immobilisation method for NOF fracture through a Delphi-style study. Once agreement is achieved, the proposed method can be implemented and evaluated for feasibility, clinical and cost effectiveness, and appropriateness of immobilisation across

various geographic settings. Relevant outcome measures should include (but not be limited to) patient-reported pain levels, volume and route of narcotics administered, haemodynamic status, adverse reactions, and paramedic-reported factors such as ease of intervention administration. Additional studies may consider these outcomes where rapid access to hospital care is not possible, such as in rural and remote locations. Given the importance of evidence-informed practice, such research may provide the basis for standardised pre-hospital NOF fracture guidelines and lead to improved hospital outcomes, better recovery, reduced healthcare costs and a more positive patient experience.

NOF fractures can be painful and complicated to manage. Given the high number of NOF fractures seen by paramedics, and the economic and financial load they present to healthcare systems, it is unclear why immobilisation for NOF fractures in the pre-hospital setting has not been evaluated for over a decade. The lack of an evidence-based guideline regarding immobilisation of NOF fractures appears to be a gap in clinical practice and education for paramedics and further research appears warranted to standardise care for patients with NOF fractures.

## Author contributions

All authors contributed to the concept and design of the manuscript. EM drafted the manuscript and all authors contributed to editing of the manuscript.

## Competing interests

The authors declare no competing interests. Each author of this paper has completed the ICMJE conflict of interest statement.

## References

1. O'Connor R. Prehospital care in isolated neck of femur fracture: a literature review. *Journal of Paramedic Practice* 2019;11:21-7.
2. Australian Institute of Health and Welfare. Trends in hospitalised injury due to falls in older people 2007-2008 to 2016-2017. Canberra: AIHW; 2019.
3. Queensland Health. Fall statistics - stay on your feet 2019. Available at: [www.health.qld.gov.au/nav?a=363431](http://www.health.qld.gov.au/nav?a=363431)
4. Borges FK, Bhandari M, Guerra-Farfan E, et al. Accelerated surgery versus standard care in hip fracture (HIP ATTACK): an international, randomised, controlled trial. *Lancet* 2020;395:698-708.
5. Royal College of Physicians. National hip fracture database annual report 2019. London: RCP, 2019. Available at: [www.rcplondon.ac.uk/projects/outputs/national-hip-fracture-database-nhfd-annual-report-2019](http://www.rcplondon.ac.uk/projects/outputs/national-hip-fracture-database-nhfd-annual-report-2019)
6. Ambulance Victoria. Ambulance Victoria clinical practice guidelines 2017. 2018. p. 1-303. Available at: [www.ambulance.vic.gov.au/paramedics/clinical-practice-](http://www.ambulance.vic.gov.au/paramedics/clinical-practice-)

guidelines/

7. NSW Ambulance Protocols [mobile application software] (version 2.1.0). Rozells: NSW Ambulance ICT. Available at: [www.ciap.health.nsw.gov.au](http://www.ciap.health.nsw.gov.au) [Accessed 12 January 2021].
8. Queensland Ambulance Service. Clinical practice guidelines limb injury. Brisbane: Queensland Ambulance Service; 2016. Available at: [www.ambulance.qld.gov.au/docs/clinical/cpg/CPG\\_Limb%20injury.pdf](http://www.ambulance.qld.gov.au/docs/clinical/cpg/CPG_Limb%20injury.pdf)
9. Hards M, Brewer A, Bessant G, Lahiri S. Efficacy of prehospital analgesia with fascia iliaca compartment block for femoral bone fractures: a systematic review. *Prehosp Disaster Med* 2018;33:299-307.
10. Sprouse RA, McLaughlin AM, Harris GD. Braces and splints for common musculoskeletal conditions. *Am Fam Physician* 2018;98:570-6.
11. Katz S, Arish N, Rokach A, Zaltzman Y, Marcus E-L. The effect of body position on pulmonary function: a systematic review. *BMC Pulm Med* 2018;18:1-16.
12. Cross D. Comparison of perceived pain with different immobilization techniques. *Prehosp Emerg Care* 2001;5:270-4.
13. Lee C, Porter KM. Prehospital management of lower limb fractures. *Emerg Med J* 2005;22:660.