

This is an Open Access document downloaded from ORCA, Cardiff University's institutional repository: <https://orca.cardiff.ac.uk/id/eprint/160667/>

This is the author's version of a work that was submitted to / accepted for publication.

Citation for final published version:

Evans, Bridie Angela, Brown, Alan, Fegan, Greg, Ford, Simon, Guy, Katy, Jones, Jenna, Jones, Sian, Keen, Leigh, Khanom, Ashrafunnesa, Longo, Mirella, Pallister, Ian, Rees, Nigel, Russel, Ian T, Seagrove, Anne C, Watkins, Alan and Snooks, Helen 2019. Is fascia iliaca compartment block administered by paramedics for suspected hip fracture acceptable to patients? BMJ Open 9 (12), e033398. 10.1136/bmjopen-2019-033398 file

Publishers page: <http://dx.doi.org/10.1136/bmjopen-2019-033398>



Please note:

Changes made as a result of publishing processes such as copy-editing, formatting and page numbers may not be reflected in this version. For the definitive version of this publication, please refer to the published source. You are advised to consult the publisher's version if you wish to cite this paper.

This version is being made available in accordance with publisher policies. See <http://orca.cf.ac.uk/policies.html> for usage policies. Copyright and moral rights for publications made available in ORCA are retained by the copyright holders.



BMJ Open Is fascia iliaca compartment block administered by paramedics for suspected hip fracture acceptable to patients? A qualitative study

Bridie Angela Evans ¹, Alan Brown,² Greg Fegan,¹ Simon Ford,³ Katy Guy,³ Jenna Jones,¹ Sian Jones,² Leigh Keen,⁴ Ashrafunnesa Khanom,¹ Mirella Longo,⁵ Ian Pallister,³ Nigel Rees,⁴ Ian T Russell,¹ Anne C Seagrove,¹ Alan Watkins ¹, Helen Snooks¹

To cite: Evans BA, Brown A, Fegan G, *et al*. Is fascia iliaca compartment block administered by paramedics for suspected hip fracture acceptable to patients? A qualitative study. *BMJ Open* 2019;**9**:e033398. doi:10.1136/bmjopen-2019-033398

► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2019-033398>).

Received 08 August 2019
Revised 15 October 2019
Accepted 23 October 2019



© Author(s) (or their employer(s)) 2019. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Medical School, Swansea University, Swansea, UK

²Public contributor c/o Swansea University, Swansea, UK

³Abertawe Bro Morgannwg University Health Board, Port Talbot, UK

⁴Welsh Ambulance Services NHS Trust, Swansea, UK

⁵Marie Curie Palliative Care Research Centre, Cardiff University School of Medicine, Cardiff, UK

Correspondence to

Dr Bridie Angela Evans;
b.a.evans@swansea.ac.uk

ABSTRACT

Objective To explore patients' experience of receiving pain relief injection for suspected hip fracture from paramedics at the location of the injury.

Design Qualitative interviews within a feasibility trial about an alternative to routine prehospital pain management for patients with suspected hip fracture.

Setting Patients treated by paramedics in the catchment area of one emergency department in South Wales.

Participants Six patients and one carer of a patient who received fascia iliaca compartment block (FICB).

Intervention FICB administered to patients with suspected hip fracture by trained paramedics. We randomly allocated eligible patients to FICB—a local anaesthetic injection directly into the hip region—or usual care—most commonly morphine—using audited scratch cards.

Outcomes Acceptability and experience of receiving FICB, assessed through interview data. We audio-recorded, with participants' consent, and conducted thematic analysis of interview transcripts. The analysis team comprised two researchers, one paramedic and one lay member.

Results Patients had little or no memory of being offered, consenting to or receiving FICB. They recalled the reassuring manner and high quality of care received. They accepted FICB without question. Partial or confused memory characterised experience of subsequent hospital care until surgery. They said their priorities when calling for emergency help were to receive effective care. After hospital treatment, they wanted to regain their health and mobility and resume the quality of life they experienced before their injury.

Conclusions This study did not raise any concerns about the acceptability of FICB administered at the scene of injury by paramedics to people with suspected hip fracture. It adds to existing evidence about patient and carer experience of on-scene care for people with suspected hip fracture. Further research is needed to assess safety, effectiveness and cost effectiveness of this health technology in a new setting.

Trial registration number ISRCTN60065373.

Strengths and limitations of this study

- This study is the first qualitative investigation to report patients' experience of receiving fascia iliaca compartment block (FICB) in the prehospital setting and provides a rare insight into the experiences of patients and carers but the small number of respondents limits the strength of our conclusions.
- Our qualitative method allowed us to explore patients' experiences but cannot conclude that FICB is acceptable to most patients.
- Half the patients who consented to interview were too unwell to take part or could not be contacted; these patients' perspective on FICB and prehospital care for hip fracture may differ from those who took part in interviews.

BACKGROUND

Hip fracture has a high mortality rate and is associated with delay to surgery beyond 48 hours.^{1–3} Death rates are around 7% at 30 days, 10% at 6 months and 20% at 1 year.^{4–6} Hip fractures generate more admissions to orthopaedic trauma wards than any other injury, with an average inpatient stay of 21 days. In the UK, approximately 75 000 patients sustain such an injury each year and use 2.5% of all hospital beds,⁷ thus imposing substantial costs on the National Health Service (NHS).^{8,9}

Hip fractures are very common.¹⁰ It is predicted that 6.3 million hip fractures a year will occur worldwide by 2050.⁸ Many patients require prehospital emergency care to manage trauma and transport to hospital. Paramedics have a range of available pain relief options for patients at the scene of their injury, most commonly intravenous morphine and also paracetamol and entonox.^{11 12} However, morphine can cause several serious

side effects, including nausea, constipation, delirium and respiratory depression. These side effects may delay surgery, require the patient to need further treatment and worsen patient outcomes.¹³ Adequate pain relief for patients at the point of injury and during transport to hospital is a major challenge. Untreated pain will increase the neuro-hormonal stress response and the risk of delirium.^{14 15} Up to 40% of patients with suspected hip fracture report inadequate or no prehospital pain management.^{11 16–18}

Fascia iliaca compartment block (FICB)—a local anaesthetic injection directly into the groin region—is routinely used in the emergency department by medical and, increasingly, nurse practitioners. It has equal pain relief to opioids and fewer side effects, potentially improving patient outcomes and length of hospital stay.^{14 19–27} The Association of Anaesthetists of Great Britain and Ireland supports delivery of FICB by trained non-medical health professionals.²⁸ FICB could potentially be delivered prehospitally, by nurses²⁹ or paramedics.^{30 31}

Older people who sustain hip fractures often have comorbidities and are vulnerable to the side effects of opioids.^{32 33} These side effects may need ameliorating by further treatments. Avoiding opioids in this population may therefore reduce morbidity and length of stay in hospital and improve health-related quality of life.^{34–40}

Although FICB may provide effective analgesia in the prehospital setting³⁰ as well as reduce morphine, it was not known whether it would be acceptable to patients. We convened a multidisciplinary team including paramedics, anaesthetists, patients, carers, ambulance service managers and methodologists who advised on the rigorous planning and conduct of this study. We conducted a study to assess the feasibility of undertaking a fully powered multi centre pragmatic randomised trial to test the clinical and cost effectiveness of paramedics providing FICB as early pain relief at the scene of their injuries for patients who have fractured their hip.¹⁹ Within this feasibility study, we explored patients' experience of receiving FICB for suspected hip fracture. We wanted to explore patients' responses to being offered a local anaesthetic injection in their groin area, the location of the painful injury. We also wished to identify any effects on their experience of treatment and recovery. Appropriate and well-conducted qualitative research can make an important contribution to feasibility studies of randomised trials providing information on acceptability and practical implementation issues.⁴¹

In this paper, we report patient and carer experience of receiving paramedic-administered FICB for a suspected hip fracture.

METHODS

Setting and intervention

We carried out a feasibility trial of paramedic-administered FICB for suspected hip fracture, the rapid analgesia for prehospital hip disruption (RAPID) trial described in

our published protocol.³¹ We recruited and trained 19 paramedics based at ambulance stations in the catchment area of one emergency department in South Wales to administer FICB to patients with suspected hip fracture. A participating emergency paramedic who attended a 999 call and identified a hip fracture in an eligible patient then used a scratchcard⁴² to randomly allocate the individual to receive FICB (if not contra-indicated) or usual care. Full RAPID results are available.¹⁹

Data collection and analysis

To explore patients' experiences of receiving FICB, we invited patients to take part in interviews, either face to face or over the telephone as they preferred. A paramedic research support officer (LK) visited patients in hospital or the community and sought informed consent in writing, usually within 10 working days of their injury. We sought written informed consent from carers if a patient preferred them being interviewed in their place. To enable patients and carers to make an informed decision, we provided information about the aim of the RAPID trial and what they could expect from taking part and answered any questions.

Interviews were carried out by BAE or JJ who are experienced qualitative researchers. The interview schedule is available in online supplementary appendix 1. With participants' consent, we audio-recorded and transcribed discussions. Interviews lasted between 11 and 31 min and took place between 6 and 30 weeks after patients were attended by a paramedic and received FICB for their hip fracture.

We carried out thematic analysis. The analysis team included a lay member (SJ), paramedic research support officer (LK) and two researchers (BAE, JJ). They independently read transcripts and made notes before jointly discussing explicit and implicit ideas to develop themes. We looked for consistency between respondents and diverse views also. BAE coordinated discussions and prepared drafts, for critical review by the study team.⁴³

Reporting

We report results according to themes identified in the data. We selected quotations to be representative of respondents' comments unless otherwise stated. We identify respondents as patient or carer and with a unique number (eg, Patient 78).

Public and patient involvement

Lay members (SJ and AB) with experience and knowledge of hip fractures and emergency care contributed to developing, undertaking and disseminating all aspects of the research during the RAPID feasibility study. They were research co-applicants and also active members of the multidisciplinary trial management group. This group, made up of co-applicants and study advisors, included paramedics, anaesthetists, ambulance service managers, patients, carers, methodologists and research staff, and was responsible for trial implementation. SJ also

analysed all interviews, developing themes, guiding interpretation and reviewing draft results with BAE, JJ and LK. These were then reported back to the trial management group for comment and synthesis in the full study findings. We supported our lay members to collaborate as equal members of the research team throughout. In addition we recruited lay members to the independent trial steering committee.⁴⁴

RESULTS

Of the 13 RAPID participants who received FICB and consented to interview, we interviewed six patients and one daughter who was present when her mother received FICB. When contacted to arrange the interview, two people said they were too sick to take part, and we could not contact the other four. One respondent requested a face to face interview at home (Patient 14) while the remainder asked to talk over the telephone.

We identified three themes relating to care received and experiences of paramedic-administered FICB which were consistent across respondents.

Memories of receiving pain management from ambulance teams

Most respondents said they could not clearly remember being treated by the paramedics or receiving pain relief. After making an emergency call, respondents said they waited for between half an hour and 6 hours for an ambulance to arrive. In all cases, their overriding memory was of extreme pain and desperation for it to be eased.

I can't really remember exactly what was happening because I was in so much pain. I think somebody gave me something to ease the pain...whatever they did for me, it eased that terrific pain. (Patient 111)

Some respondents vaguely recalled being offered pain relief and the paramedics suggesting they could try a new drug to make them feel better.

I think he asked me if I would go into this scheme and I have a feeling that they asked me that and I know I said yes to something. And he gave me an injection and that was fine. I don't even remember going into the hospital. (Patient 64)

The daughter, whose memory was also dominated by her mother's distress and who recalled little detail, said she agreed to her mother receiving an injection because she wanted her to be more comfortable. Just one respondent remembered being offered FICB. He said he consented because the paramedic suggested it would enable them to carry him to the ambulance in a chair through the front door rather than pass him by stretcher through a window. He recalled how the paramedic carried out the process and when they were able to move him.

On top of my inner leg, he searched a while and put a few marks and said 'right, I'll inject you now ...and

we'll wait then we'll see if we can get you into a chair.' ...We waited about quarter of an hour, twenty minutes before we attempted to go into the ambulance. With my good leg and then lifting me, I got in all right into a chair and into the ambulance. (Patient 78)

Trust in paramedic care

Respondents praised the care they received throughout the time they were attended by paramedics as 'perfect' (P78), 'fabulous' (P61); they were 'absolutely charming' (P64), 'miracle workers' (C68), 'lovely' (P111) and 'marvellous' (P41). Their soothing, calm manner in difficult circumstances made respondents and families feel safe and reassured. Respondents appeared to have confidence in paramedics. By making an emergency call, they were seeking and anticipating the most appropriate treatment and best care.

Gentle...they've got a lot of time for you, they kept talking to her (respondent's mother), assuring her, they did everything they could (Carer 68)

Most respondents recalled a sensation or sound of a crack when they fell and suspected a major injury such as hip fracture. Respondents said they expected pain relief.

...the ambulance men came. And then I kept thinking, you know, a jab of morphine... (Patient 14)

If they recalled events well enough, they said they agreed to what was suggested by paramedics because they trusted them. None of the respondents had any concerns about receiving an injection near the area of injury.

They explained everything – the situation and the reason why, you know, did I want to try this and all this. I was glad to see them come in. It was perfect. I couldn't wish for better (Patient 78)

Regaining independence

Respondents' memories of ongoing treatment in hospital were inconsistent. Some reported they received further pain relief while waiting for surgery. One remembered receiving oral medication from a nurse because she felt unwell and nauseous for a time. No other patient recalled any side effects from the pain relief they were given. All said they had surgery on their injured hip within a few days of admission and generally stayed in hospital for between a week and fortnight. They recalled being encouraged to start walking within a day or 2 days after their surgery. Five respondents were discharged directly to their homes and two were moved to a rehabilitation hospital before discharge. They were keen to leave hospital because they wanted to start resuming normal life and recover the quality, which they measured in mobility, independence and undertaking social activities. None of them had fully regained their mobility when interviewed although most felt they were making progress towards recovery. Several respondents said they had fallen in the past, without

obvious injury, or had other health conditions which they managed.

Sustaining a hip fracture had a major impact on respondents' physical and emotional well-being. Many said their confidence had been affected following their injury. They felt nervous or unsafe while walking and used a stick or Zimmer frame for support.

I've got to hold onto my Zimmer frame...I call it my friend, for the minute, but one day it will go...I'm frightened you see, just in case I fall over again and do my hip in again (Patient 41)

Several respondents had been very active before their fall and they found their reduced mobility was unwellcome. They said they felt frustrated by the change. Family had provided extra support and some reported having received home-based care and aids such as handrails in their homes. They said they measured their progress by achievements such as walking to the car and climbing the stairs. The accident disrupted other healthcare such as delaying cataract surgery.

DISCUSSION

Summary of findings

Patients had little or no memory of being offered, consenting to or receiving FICB from a paramedic to manage pain associated with hip fracture. They recalled the reassuring and calm manner and high quality of care given by paramedics. They had expected and wished for pain relief as part of their prehospital care and experienced relief when this was given. They accepted FICB, injected in the hip area, without question. Partial and confused memory characterised their experience of subsequent hospital care until surgery. All respondents continued to have limited mobility following discharge from hospital.

Strengths and limitations

As in any qualitative study, patients who were unwilling or unable to take part in these interviews may have had a different perspective on the acceptability of FICB and also other experiences of prehospital care and pain management. This was a small sample, limiting us to study acceptability of FICB to selected patients. However, there was strong consistency across respondents' experiences of treatment for hip fracture. This was an older cohort and their poor recall may have been due in part to their age and possible frailty and also to the time since the injury. Patients' ability to recall pain is known to be variable.⁴⁵ However, the sample is typical of the older population with capacity who experience hip fracture and require prehospital care and conveyance to hospital. One respondent was a carer but also exhibited poor recall of the treatment provided by paramedics, perhaps owing to the stress of the emergency event. The only male respondent was the only one to remember FICB and clearly consent to it. This study does not consider whether men and women in

this age group have different criteria for acceptability of an injection in the groin area.

Another strength of this study is the broad perspective which our multidisciplinary team brought, in particular to analysis and the whole study generally. Our qualitative analysis team comprised two researchers, a patient and a paramedic. Our qualitative work within this feasibility study enabled us to inform future research by exploring implementation issues.⁴¹

Implications for practice

This is the first study investigating prehospital administration of FICB from the perspective of patients presenting with suspected hip fracture. We believe it may also be the first study reporting patient experience of any other nerve block for pain management. Patients' perspectives are vital when exploring use of new techniques for delivering health and social care.⁴⁶ Qualitative methods enable in-depth investigation of patients' views and experiences to provide a good understanding of how innovations in health technology and delivery can affect patients and also any unforeseen negative consequences.⁴⁷ We found that hip fracture patients had very limited memory of their care and treatment and wanted to regain mobility and independence after surgery for their injury. The quality of care, reassurance and administration of pain management was more important to patients than the mechanism of delivering the intervention. Patient experience of prehospital care is known to be enhanced by the manner in which they are treated, so that emotional and social needs are attended to alongside physical ones⁴⁸ and patients feel reassured.⁴⁹ Effective communication by paramedics reduces fear and enhances psychological well-being. Intonation and manner, suggesting kindness, is a priority for patients receiving emergency care. Managing the distress of family members in a thoughtful and considered way also contributes to the patient's positive experience of prehospital care.⁵⁰ In addition, patient satisfaction increases when paramedics are able to resolve the problem and meet the patient's expectations of care.⁵¹ Effective pain management, which is a patient priority in hip fracture and other traumatic emergencies,¹⁷ is therefore of high importance.⁵²

Implications for research

Patients' lack of memory of emergency care illustrates the challenges of ensuring high ethical standards when seeking consent from patients to take part in research about prehospital care. In this study, we gained ethical approval to seek consent to participation in research more than a week after the emergency event. We judged that truly informed consent to participate in research cannot be given in the emotional and distressing circumstances of physical trauma because it adds to the burden experienced by patients and carers.⁵³ Around 10 days later, we followed normal research consent processes when patients were visited by a research nurse who discussed the study and provided written materials. Research ethics

committees consider that this approach is less stressful and gives more time for potential participants to consider taking part in research.^{54–56} Gaining consent from patients to participate in prehospital research must recognise the cognitive effect of emergency care.⁵⁷ Patients' inability to remember the emergency clearly reinforces the argument that they are unable to give truly informed consent when experiencing the emotional and physical trauma of a crisis. This is particularly relevant for older patients, in considerable pain, likely to be frail and possibly experiencing cognitive confusion. But we report that a carer, the daughter of an older patient, also experienced poor recall, highlighting the disruptive nature of trauma for people of any age. Our experience contributes to the debates about ethical standards in prehospital research.

Interpretation and further research

This study suggests that patients with suspected hip fracture prioritise effective and reassuring care from a paramedic and also resuming normal life after hospital treatment. FICB is a safe and effective pain management for hip fracture in hospital allowing reduced morphine administration and potentially fewer side effects.^{20 23 58 59} It can also be administered by paramedics at the scene of injury although evidence of effectiveness in this setting is lacking.^{19 29 30 58} The RAPID study has demonstrated that paramedics are willing and able to administer FICB to patients with suspected hip fracture before ambulance transport to hospital.⁶⁰ This study did not raise any concerns about the acceptability of FICB to patients and families for managing prehospital trauma. Our interview findings that patients have limited memory of prehospital treatment helps us to understand the challenges of recording outcomes about pain experience. Results also indicate patient priorities concerning regaining normal home life and independence.^{61 62}

Further research is now needed to assess safety, clinical and cost effectiveness of this intervention, including patients' length of hospital stay, satisfaction with care and subsequent health-related quality of life. Having demonstrated that a randomised trial of FICB is feasible and met our predefined progression criteria¹⁹ we propose a fully powered multi-centre randomised controlled trial. This will provide an opportunity to evaluate whether FICB is clinically effective and safe for patients and is cost effective for the NHS. This reflects the wider NHS strategy to provide the right care to the patient and improve the effectiveness and efficiency of patient journeys to and through hospital.⁶³

Acknowledgements We thank the patients and their families who took part in interviews about their experiences and all the paramedics who volunteered to take part in RAPID. We thank the members of the trial steering committee: Chris Foy (Chair and Statistician, Gloucestershire Hospitals NHS R&D Service); Tim Coats (Professor of Emergency Medicine, University of Leicester); Matt Costa (Professor of Orthopaedic Trauma Surgery, Oxford University and John Radcliffe Hospital); Philip Bell (Lay Member) and Graham McLelland (Research Paramedic, North East Ambulance Service). We also thank Emma Baker and Carys Evans for their hard work as project administrators throughout this feasibility study.

Contributors BAE drafted the manuscript with editorial input from all authors—AB, JJ, GF, SF, KG, SJ, LK, AK, ML, IP, NR, ACS, ITR, AW, HS. BAE led qualitative analysis with JJ, SJ and LK. The research idea was conceived and developed by NR, IP and SF, with methodological advice from GF, HS and ITR. All authors read and approved the final manuscript.

Funding Health and Care Research Wales, part of the Welsh Government, funded RAPID through their Research for Patient and Public Benefit (RfPPB) stream (1003).

Patient consent for publication Not required.

Ethics approval We gained ethical approval from the Wales Research Ethics Committee 6 (reference 15/WA/0439). All respondents gave informed consent in writing to participate in this study.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iDs

Bridie Angela Evans <http://orcid.org/0000-0003-0293-0888>

Alan Watkins <http://orcid.org/0000-0003-3804-1943>

REFERENCES

- Moran CG, Wenn RT, Sikand M, *et al.* Early mortality after hip fracture: is delay before surgery important? *J Bone Joint Surg Am* 2005;87:483–9.
- Simunovic N, Devereaux PJ, Sprague S, *et al.* Effect of early surgery after hip fracture on mortality and complications: systematic review and meta-analysis. *CMAJ* 2010;182:1609–16.
- National Institute for Health and Care Excellence. Hip fracture: the management of hip fracture in adults (NICE clinical guideline 124) 2017.
- Royal College of Physicians. *National hip fracture database annual report 2018*. London: RCP, 2018.
- Hannan EL, Magaziner J, Wang JJ, *et al.* Mortality and locomotion 6 months after hospitalization for hip fracture: risk factors and risk-adjusted hospital outcomes. *JAMA* 2001;285:2736–42.
- Mundi S, Pindiprolu B, Simunovic N, *et al.* Similar mortality rates in hip fracture patients over the past 31 years. *Acta Orthop* 2014;85:54–9.
- Callear J, Shah K. Analgesia in hip fractures. do fascia-iliac blocks make any difference? *BMJ Qual Improv Rep* 2016;5.
- Friedman SM, Mendelson DA. Epidemiology of fragility fractures. *Clin Geriatr Med* 2014;30:175–81.
- Healthcare Quality Improvement Partnership. National hip fracture database 2015.
- Herron J, Hutchinson R, Lecky F, *et al.* The impact of age on major orthopaedic trauma: an analysis of the United Kingdom trauma audit research network database. *Bone Joint J* 2017;99-B:1677–80.
- Holdgate A, Shepherd SA, Huckson S. Patterns of analgesia for fractured neck of femur in Australian emergency departments. *Emerg Med Australas* 2010;22:3–8.
- Association of Ambulance Chief Executives & Joint Royal Colleges Ambulance Liaison Committee. *UK ambulance services clinical practice guidelines*. Class Publishing, Bridgwater, 2013.
- Chaudet A, Bouhours G, Rineau E, *et al.* Impact of preoperative continuous femoral blockades on morphine consumption and morphine side effects in hip-fracture patients: a randomized, placebo-controlled study. *Anaesth Crit Care Pain Med* 2016;35:37–43.
- Abou-Setta AM, Beaupre LA, Rashiq S, *et al.* Comparative effectiveness of pain management interventions for hip fracture: a systematic review. *Ann Intern Med* 2011;155:234–45.
- Sahota O, Rowlands M, Bradley J, *et al.* Femoral nerve block intervention in neck of femur fracture (FINOF): study protocol for a randomized controlled trial. *Trials* 2014;15:189.
- McEachin CC, McDermott JT, Swor R. Few emergency medical services patients with lower-extremity fractures receive prehospital analgesia. *Prehosp Emerg Care* 2002;6:406–10.
- Simpson PM, Bendall JC, Tiedemann A, *et al.* Provision of out-of-hospital analgesia to older fallers with suspected fractures: above

- PAR, but opportunities for improvement exist. *Acad Emerg Med* 2013;20:761–8.
- 18 Vassiliadis J, Hitos K, Hill CT. Factors influencing prehospital and emergency department analgesia administration to patients with femoral neck fractures. *Emerg Med* 2002;14:261–6.
 - 19 Jones JK, Evans BA, Fegan G, *et al.* Rapid analgesia for prehospital hip disruption (rapid): findings from a randomised feasibility study. *Pilot Feasibility Stud* 2019;5.
 - 20 Lees D, Harrison WD, Ankers T, *et al.* Fascia iliaca compartment block for hip fractures: experience of integrating a new protocol across two Hospital sites. *Eur J Emerg Med* 2014;0000000000000167.
 - 21 Godoy Monzón D, Vazquez J, Jauregui JR, *et al.* Pain treatment in post-traumatic hip fracture in the elderly: regional block vs. systemic non-steroidal analgesics. *Int J Emerg Med* 2010;3:321–5.
 - 22 Høgh A, Dremstrup L, Jensen SS, *et al.* Fascia iliaca compartment block performed by junior registrars as a supplement to pre-operative analgesia for patients with hip fracture. *Strategies Trauma Limb Reconstr* 2008;3:65–70.
 - 23 Mouzopoulos G, Vasiliadis G, Lasanianos N, *et al.* Fascia iliaca block prophylaxis for hip fracture patients at risk for delirium: a randomized placebo-controlled study. *J Orthop Traumatol* 2009;10:127–33.
 - 24 Obideyi A, Srikantharajah I, Grigg L, *et al.* Nurse administered fascia iliaca compartment block for pre-operative pain relief in adult fractured neck of femur. *Acute Pain* 2008;10:145–9.
 - 25 Randall A, Grigg L, Obideyi A, *et al.* Fascia iliaca compartment block: a nurse-led initiative for preoperative pain management in patients with a fractured neck of femur. *J Orthopaedic Nurs* 2008;12:69–74.
 - 26 Rashid A, Beswick E, Fitton L, *et al.* Regional analgesia in the emergency department for hip fractures: survey of current UK practice and its impact on developing the service in a teaching hospital. *Eur J Anaesthesiol* 2012;29:125–26.
 - 27 Rawal N, Allvin R. Acute pain services in Europe: a 17-nation survey of 105 hospitals. The EuroPain acute pain Working Party. *Eur J Anaesthesiol* 1998;15:354–63.
 - 28 Association of Anaesthetists of Great Britain and Ireland. *Fascia Iliaca blocks and Non-physician practitioners*. London: AAGNI, 2013. <http://www.aagbi.org/sites/default/files/Fascia%20Iliaca%20statement%2022JAN2013.pdf>. (Accessed 7 March 2018).
 - 29 Dochez E, van Geffen GJ, Bruhn J, *et al.* Prehospital administered fascia iliaca compartment block by emergency medical service nurses, a feasibility study. *Scand J Trauma Resusc Emerg Med* 2014;22:38.
 - 30 McRae PJ, Bendall JC, Madigan V, *et al.* Paramedic-performed FICB for femoral fractures. *J Emerg Med* 2015;48:581–9.
 - 31 Bulger JK, Brown A, Evans BA, *et al.* Rapid analgesia for prehospital hip disruption (rapid): protocol for feasibility study of randomised controlled trial. *Pilot Feasibility Stud* 2017;3.
 - 32 Jakopovic D, Falk A-C, Lindström V. Ambulance personnel's experience of pain management for patients with a suspected hip fracture: a qualitative study. *Int Emerg Nurs* 2015;23:244–9.
 - 33 Friesgaard KD, Christensen EF, Kirkegaard H, *et al.* Prehospital intravenous fentanyl to patients with hip fracture: an observational cohort study of risk factors for analgesic non-treatment. *Scand J Trauma Resusc Emerg Med* 2017;25:5.
 - 34 Rainer TH, Jacobs P, Ng YC, *et al.* Cost effectiveness analysis of intravenous ketorolac and morphine for treating pain after limb injury: double blind randomised controlled trial. *BMJ* 2000;321:1247–51.
 - 35 Craig M, Jeavons R, Probert J, *et al.* Randomised comparison of intravenous paracetamol and intravenous morphine for acute traumatic limb pain in the emergency department. *Emerg Med J* 2012;29:37–9.
 - 36 Daniels AH, Daiello LA, Lareau CR, *et al.* Preoperative cognitive impairment and psychological distress in hospitalized elderly hip fracture patients. *Am J Orthop* 2014;43:E146–52.
 - 37 Robinson S, Vollmer C. Undermedication for pain and precipitation of delirium. *Medsurg Nurs* 2010;19:79–83. quiz 4.
 - 38 Morrison RS, Magaziner J, Gilbert M, *et al.* Relationship between pain and opioid analgesics on the development of delirium following hip fracture. *J Gerontol A Biol Sci Med Sci* 2003;58:M76–81.
 - 39 Adunsky A, Levy R, Mizrahi E, *et al.* Exposure to opioid analgesia in cognitively impaired and delirious elderly hip fracture patients. *Arch Gerontol Geriatr* 2002;35:245–51.
 - 40 Marcantonio ER, Flacker JM, Michaels M, *et al.* Delirium is independently associated with poor functional recovery after hip fracture. *J Am Geriatr Soc* 2000;48:618–24.
 - 41 O'Cathain A, Hoddinott P, Lewin S, *et al.* Maximising the impact of qualitative research in feasibility studies for randomised controlled trials: guidance for researchers. *Pilot Feasibility Stud* 2015;1.
 - 42 Keen L, Bulger JK, Rees N, *et al.* Use of scratchcards for allocation concealment in a prehospital randomised controlled trial. *Emerg Med J* 2018;35.
 - 43 Ziebland S, McPherson A. Making sense of qualitative data analysis: an introduction with illustrations from DIPEx (personal experiences of health and illness). *Med Educ* 2006;40:405–14.
 - 44 Evans BA, Bedson E, Bell P, *et al.* Involving service users in trials: developing a standard operating procedure. *Trials* 2013;14:219.
 - 45 Abdulla A, Adams N, Bone M, *et al.* Guidance on the management of pain in older people. *Age Ageing* 2013;42:i1–57.
 - 46 Crawford MJ, Rutter D, Manley C, *et al.* Systematic review of involving patients in the planning and development of health care. *BMJ* 2002;325:1263.
 - 47 Pope C, van Royen P, Baker R. Qualitative methods in research on healthcare quality. *Qual Saf Health Care* 2002;11:148–52.
 - 48 Togher FJ, Davy Z, Siriwardena AN. Patients' and ambulance service clinicians' experiences of prehospital care for acute myocardial infarction and stroke: a qualitative study. *Emerg Med J* 2013;30:942–8.
 - 49 Togher FJ, O'Cathain A, Phung V-H, *et al.* Reassurance as a key outcome valued by emergency ambulance service users: a qualitative interview study. *Health Expect* 2015;18:2951–61.
 - 50 Togher FJ, Davy Z, Siriwardena AN. A qualitative study myocardial infarction and stroke: experiences of prehospital care for acute patients' and ambulance service clinicians. *Emerg Med J* 2012;8.
 - 51 García-Alfranca F, Puig A, Galup C, *et al.* Patient satisfaction with pre-hospital emergency services. A qualitative study comparing professionals' and patients' views. *Int J Environ Res Public Health* 2018;15:2333.
 - 52 Aronsson K, Björkdahl I, Wireklint Sundström B. Prehospital emergency care for patients with suspected hip fractures after falling - older patients' experiences. *J Clin Nurs* 2014;23:3115–23.
 - 53 Council GM. Good practice in research and consent to research 2013.
 - 54 Snooks HA, Anthony R, Chatters R, *et al.* Support and assessment for fall emergency referrals (safer) 2: a cluster randomised trial and systematic review of clinical effectiveness and cost-effectiveness of new protocols for emergency ambulance paramedics to assess older people following a fall with referral to community-based care when appropriate. *Health Technol Assess* 2017;21:1–218.
 - 55 Moore C, Bulger J, Morgan M, *et al.* Prehospital recognition and antibiotics for 999 patients with sepsis: protocol for a feasibility study. *Pilot Feasibility Stud* 2018;4.
 - 56 Snooks HA, Carter B, Dale J, *et al.* Support and assessment for fall emergency referrals (safer) 1: cluster randomised trial of computerised clinical decision support for paramedics. *PLoS One* 2014;9:e106436.
 - 57 Armstrong S, Langlois A, Lapidou D, *et al.* Assessment of consent models as an ethical consideration in the conduct of prehospital ambulance randomised controlled clinical trials: a systematic review. *BMC Med Res Methodol* 2017;17:142.
 - 58 Foss NB, Kristensen BB, Bundgaard M, *et al.* Fascia iliaca compartment blockade for acute pain control in hip fracture patients: a randomized, placebo-controlled trial. *Anesthesiology* 2007;106:773–8.
 - 59 Groot L, Dijkman LM, Simons MP, *et al.* Single fascia iliaca compartment block is safe and effective for emergency pain relief in hip-fracture patients. *West J Emerg Med* 2015;16:1188–93.
 - 60 Evans BA, Brown A, Bulger JB, *et al.* Paramedics' experiences of administering Fascia Iliaca Compartment Block to patients in South Wales with suspected hip fracture at the scene of injury: results of focus groups. *BMJ Open* 2018.
 - 61 Jones J, Sim TF, Hughes J. Pain assessment of elderly patients with cognitive impairment in the emergency department: implications for pain Management-A narrative review of current practices. *Pharmacy* 2017;5.
 - 62 Fox R, Goberman-Hill R, Swinkels A, *et al.* Recovery from extracapsular hip fractures. A longitudinal qualitative study of patients' experiences. Paper presented to 6th Fragility Fracture Network, Malmö, 2017, 2017. Available: https://www.researchgate.net/publication/319130854_Recovery_from_extracapsular_hip_fractures_A_longitudinal_qualitative_study_of_patients_experiences [Accessed 25 Feb 2019].
 - 63 NHS England. Safer, faster, better: good practice in delivering urgent and emergency care. A guide for local health and social care communities, 2015. Available: <https://improvement.nhs.uk/documents/701/Safer-Faster-Better.pdf> [Accessed 5 Jan 2017].