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Course Code: 2820MED

Course Name: Trauma and Environmental Conditions in Paramedic Practice

Due Date: 14/09/2020 **Assessment Item # :** 2

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Course Tutor: Dr Alex (Sandy) MacQuarrie

Course Convenor: Dr Alex (Sandy) MacQuarrie

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Student Number: s5023641

Student Name: Matt Jeffery

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Examiner's Comments:

Name: Matt Jeffery

Title: Paramedics can safely reduce dislocations in the prehospital setting

Word Count: 1496 (Excluding titles and references)

Title

Paramedics can safely reduce dislocations in the prehospital setting

Overview

The shoulder is the most frequently dislocated joint, resulting in widespread research of reduction methods and complications, however there is little evidence on the safety and effectiveness of prehospital reduction (Helfen et al., 2016; Shah et al., 2017). Dislocations occur in active individuals and may result in decreased perfusion due to axillary artery involvement and nerve lesions (Helfen et al., 2016). Therefore, the ability for paramedics to reduce shoulder dislocations prehospitally has the potential to avoid muscular spasm, reduce pain and improve neurological outcomes (Bokor-Billmann et al., 2015).

Clinical scenario

You are called code 2 to a skier that has fallen on his right shoulder and has been transported to base by ski patrol. On examination you diagnose an isolated shoulder dislocation. The patient is in significant pain, cannot move his arm, and asks you to reduce the dislocation. Due to current clinical practice guidelines you are unable to attempt reduction and transport the patient down the rough dirt road to the emergency department (ED) 30 minutes' away. On arrival the physician struggles to reduce the shoulder, due to increased muscular spasm, and the patient requires sedation to facilitate reduction.

PICO (Patient, Intervention, Comparator, Outcome) Question

In patients with shoulder dislocations, does prehospital paramedic reduction provide safe and effective outcomes?

Search Strategy

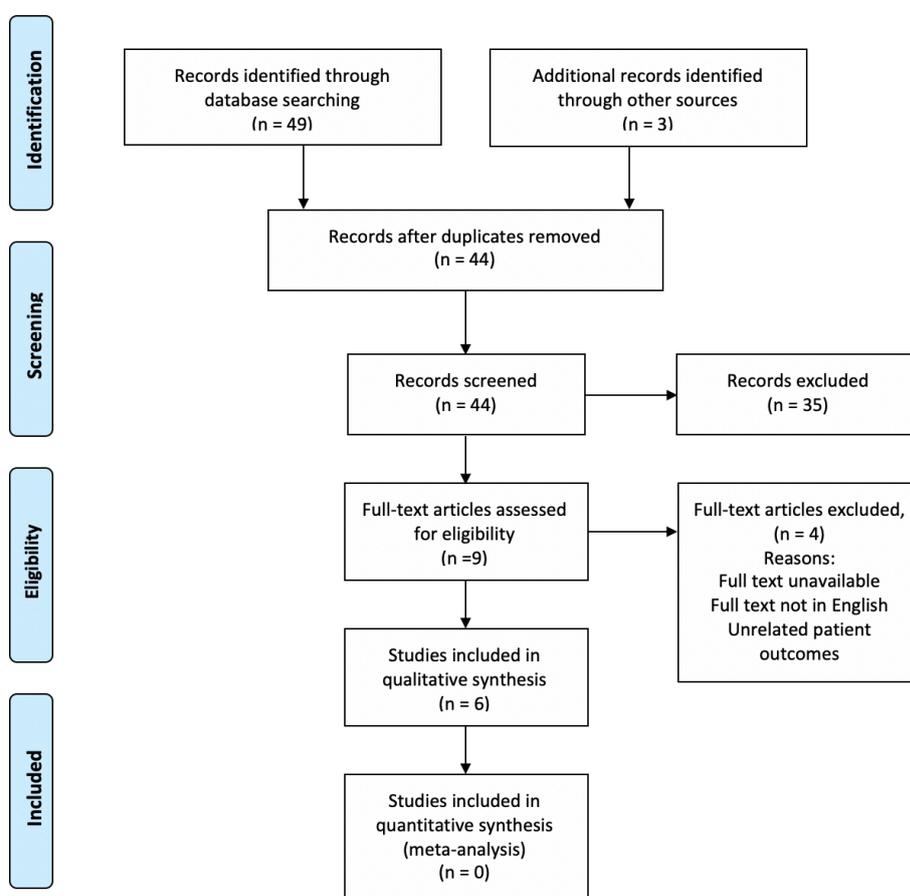
A search was conducted of the medical databases; CINAHL, Cochrane Library and Medline Ovid (September 2015 – September 2020). The search terms used were: ((shoulder or humerus) and (dislocation or reduction or reduce or relocate or relocation) and

(prehospital* or pre-hospital or "out of hospital" or out-of-hospital or ambulance* or EMS or "emergency medical services" or paramedic* or medic)). The Wilderness and Environmental Medicine Journal was hand searched due to its high likelihood of containing relevant literature, as well as the reference lists of included articles.

Search Results and Analysis

Figure 1

Prisma flow diagram of the location of suitable articles



Note. Adapted from: Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The Prisma Group. (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLOS Medicine*, 6(7), e1000097.

<https://doi.org/10.1371/journal.pmed.1000097>

Table 1*Summary and analysis of search results*

Author, Date	Study Population & Intervening Clinician	Study Design Location Level of Evidence	Findings	Strengths (+)/Limitations (-)
(Bokor-Billmann et al., 2015)	-Wilderness activity participants -Acute anterior shoulder dislocations -No concurrent fractures. -Age >16 Volunteer rescue physicians	Prospective observational cohort study of 39 patients Germany and France Level 3	-Reduction was achieved in all patients -First attempt reduction success rate: 95% -Second attempt reduction success rate: 5% -Comparable to ED success rate: 70-96% -Median time to reduction: 6.1 minutes -No sedation or analgesia was given prior to reduction -Physicians received 3 hours training prior to enrolment -Patient relaxation lead to improved reduction success -No complications were reported before or after attempts	(+) Original study (+) Conducted over 5-year period (+) Included a 6 month follow up consult for long term complications (+) Clear statement of hypothesis, population, inclusion and exclusion criteria (+) Clear criteria for successful reduction (-) Results cannot be generalised to non-physician responders (-) Medium sample size of 39 patients detracts from statistical relevance (-) Large sample of young men due to injury epidemiology (-) Other reduction techniques were not compared (-) Diagnosis and successful reduction confirmed by signs and symptoms, not radiography (-) No randomisation, blinding or control group to avoid or minimise systematic bias
(Fennelly et al., 2020)	-Acute anterior shoulder dislocations -No pre-existing instability	Systematic Review United	-<1% of patients aged <30 sustain a concurrent fracture -First attempt success rate: 54-95% -All 4 authors supported prehospital reduction if the	(+) Uses 4 studies of high-quality evidence (+) Provides a quantitative comparison on success rates and outcomes of 4 studies

	-Prehospital	Kingdom	provider is adequately trained -No acute complications observed	(-) Small sample size
	Not specified	Level 2	-Shoulder reduction improved neurological complications -Risk of concomitant fractures greatest in patients aged >40 -Pre reduction radiographs are of minimal benefit in the presence of strong clinical diagnosis of shoulder dislocation -Any signs of fractures contraindicate reduction attempts -There is no preferred technique -Neurological deficit does not contraindicate reduction attempts -With correct judgement reduction of anterior shoulder dislocations is appropriate in young active patients	(-) No evidence of long-term outcomes (-) Minimal analysis on benefits of pre-hospital vs in hospital (-) No level 1 evidence could be found (-) Population did not include elderly or sedentary
(Helfen et al., 2016)	-Prehospital -Age >16 -Shoulder dislocation Emergency physicians	Prospective, multi-centre cohort study of 70 patients 16 pre-hospital rescue stations in Germany & Austria Level 3	- Neurological pathologies occur in 10% of patients -All 7 patients with neurological pathologies were successfully reduced - 46% of patients required analgesia -No acute perfusion or neurological complications occurred after reduction -Scapular manipulation method recommended -Prehospital reduction is feasible for not only surgeons -Maximum recommended number of attempts is 2 -No clear contraindications for emergency physicians to attempt prehospital reduction -Reduction is not recommended for elderly patients	(+) Original, multi-centre study (+) Large and representative study size with adequate gender and age distribution (+) Clear method and hypothesis detailing inclusion criteria and population (+) Pain relief drugs used (Fentanyl, Midazolam and Ketamine) are currently used by Australian paramedics (+) Statistical comparisons and analysis of the data were made (-) Reduction by physicians cannot be generalised to paramedics (-) Excludes patients age <16 (-) Conducted in Germany and Austria where there are no paramedic services, only prehospital physicians (-) No radiological confirmation of

				shoulder reductions (-) Does not state number or percentage of successful reductions (-) No randomisation or blinding to avoid or minimise systematic bias
(Shah et al., 2017)	-Prehospital 'pitch-side' -Shoulder dislocation Physicians	Literature Review United Kingdom Level 3	-2 epidemiological patient cohorts: young/athletic and old/frail -Posterior dislocations require closed reduction and imaging -Anterior dislocation can be reduced prehospitally -Earlier attempts result in easier reduction due to decreased muscle spasm and resistance -Techniques recommended: Stimson and Spaso -Past histories of dislocation often result in self relocation -Any patient with suspected fracture should be referred for x-ray without attempting relocation -Cease attempt if relocation causes pain	(+) Externally peer reviewed (+) Provides a systematic clinical practice guideline for prehospital shoulder management (-) Poorly described method (-) No PRISMA outline of review process (-) No appraisal of review strengths and limitations (-) Use of physicians cannot be generalised to paramedics (-) Limited scope of study – pitch side (-) Generalises literature from in-hospital studies as applicable to the prehospital setting
(Siebenbürger et al., 2018)	-Prehospital -Shoulder, patella and ankle joint dislocations -Age >16 Emergency physicians	Prospective cohort study of 118 patients 16 pre-hospital rescue stations in Germany & Austria Level 3	-Correlation between skill level and specialty of clinicians and successful reductions -Authors support preclinical reduction, especially with neurological deficit -Reduction does not result in vascular-hypoperfusion complications -Multiple reduction attempts should be avoided -Pain relief did not improve pain or success rates -1 st time reduction success rate: 60%	(+) Original multi-centre study (+) Explicitly described method (+) Thorough statistical analysis of quantitative data (+) Success confirmed by radiography (-) Small sample size of 33 shoulder dislocations (-) Conducted in Germany and Austria where there are no paramedic services, only prehospital physicians (-) No randomisation, blinding or control to avoid or minimise systematic bias

Note. Levels of evidence were graded using the 2011 Oxford Centre for Evidence Based Medicine guidelines (Howick et al., 2011).

Comments

- Prehospital reductions of anterior shoulder dislocations resulted in no acute complications across all studies.
- All authors supported the prehospital reduction of shoulder dislocations by those suitably educated and qualified.
- There is no evidence behind the perceived need to rule out fractures with radiography prior to reduction in young, active patients.
- Prehospital reduction is comparable to the emergency department with first attempt success rates between 72.3% and 94.9%.
- There are various techniques that may work to facilitate prehospital reduction, the major concern was not having access to diagnostic x-ray.

Consider: Should clinical practice be altered?

There is a limited body of evidence available that supports prehospital shoulder reduction through clinicians who are well educated in shoulder anatomy and have a high suspicion for fractures. Multiple studies reviewed prehospital physician reductions in locations where there is no paramedicine system, therefore they cannot be generalised to paramedic practice due to discrepancies in education and scope of practice. The evidence supports two attempts at reducing the dislocation, due to improved neurological and vascular outcomes and no incidences of complications. Various reduction techniques were used, with no strong evidence for the safety and effectiveness of any technique in particular. The following are suggested indications and contraindications.

Indications:

- Anterior shoulder dislocation characterised by:
 - Anteriorly palpable humeral head
 - Abnormal shoulder contour 'stepping'
 - Arm abducted and externally rotated

- Patient under 40 years of age
- Patient is active and healthy

Contraindications:

- Suspected concomitant fractures
- Physiologically unstable
- Uncooperative or ALOC patient
- Previous reduction complications
- Comorbid osteoporotic conditions

Clinical bottom line

There is sufficient evidence to show that after a thorough physical assessment, radiography is not always required before shoulder relocation and therefore it can be safely achieved prehospitally.

This evidence suggests that a randomised controlled clinical trial of shoulder reductions by paramedics is safe and warranted. Following the results of which, the PICO question could be answered, and a transition to practice made.

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