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Assignment Title: Critically Appraised Topic- Can paramedics safely reduce shoulder dislocations in the pre-hospital setting?

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Can paramedics safely reduce shoulder dislocations in the pre-hospital setting

PICO: In patients with shoulder dislocations, is prehospital reduction by paramedics safe and effective? (therapy question)

Background

The shoulder is the most frequently dislocated joint in the body (Bath & Lord, 2009). Delay to reduction has been associated with muscle spasm, difficult reduction, neurological and vascular injury (Bokor-Billmann et al., 2015; Helfen, Ockert, Pozder, Regauer, & Haasters, 2016). Prehospital reduction is not commonly performed by paramedics outside of a wilderness setting due to the perceived need for radiography and procedural difficulty (Bath & Lord, 2009). Currently, there is a lack of high level evidence regarding the feasibility of prehospital shoulder reduction and there is no standardised prehospital treatment guideline (Bath & Lord, 2009; Shah, Chhaniyara, Wallace, & Hodgson, 2016). This CAT aims to assess the current research around shoulder reduction by paramedics and inform future research efforts to develop evidence-based protocols.

Search Strategy

A literature search was conducted using the following medical electronic databases: PubMed, CINAHL Complete, Medline Ovid, and Embase. The following keywords were used: (shoulder) AND (dislocat* OR reduc* OR relocat*) AND (pre-hospital OR prehospital OR paramed* OR medic). Results were limited to full-text articles published in English between the years 2009-2019. A hand search was also completed to identify any relevant articles that were missed in the initial electronic search.

Search Outcome

There were 86 studies located in the search, of which 33 were duplicates, leaving 53 studies for abstract review. Seven full-text articles were reviewed and five studies were considered relevant for this CAT. The search yielded three prospective case studies and two literature reviews. *Figure 1* displays the breakdown of the studies located in the search.

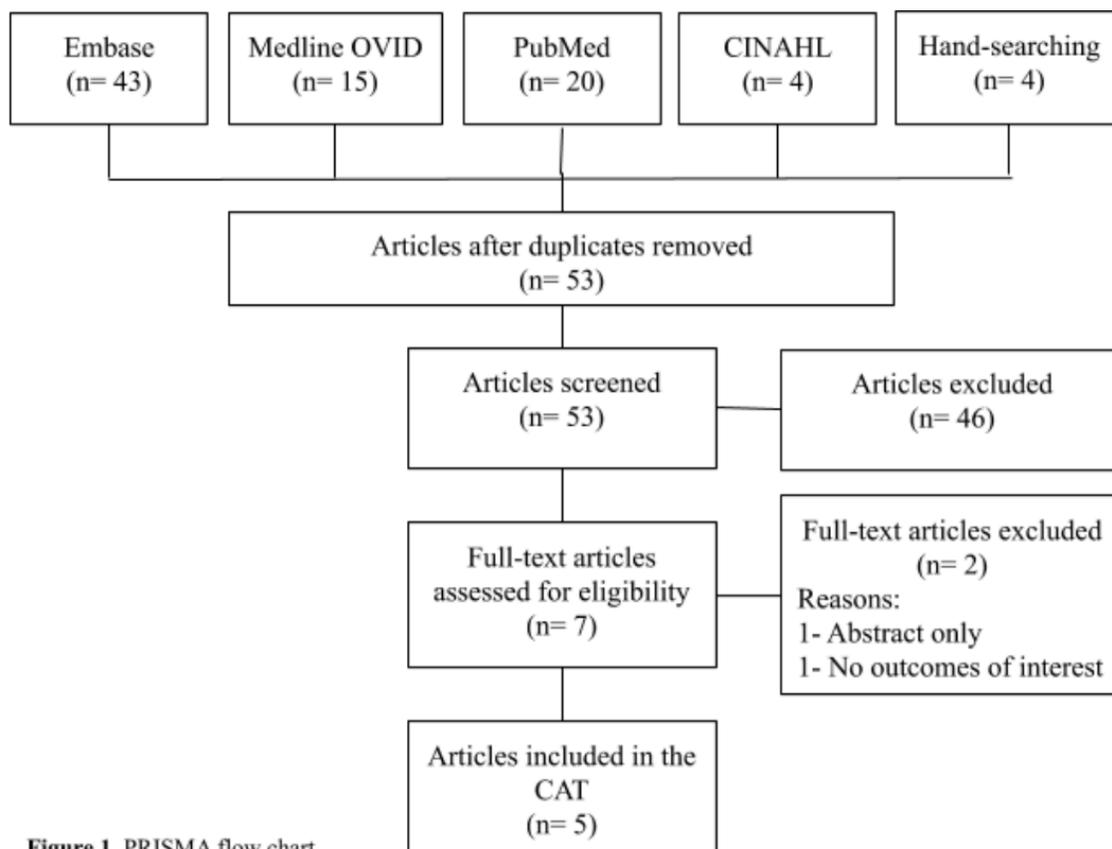


Figure 1. PRISMA flow chart

Study Results/Analysis

Author & year	Population	Study design & sample size	Impact Factor	Main findings	Strengths & limitations	Level of Evidence
Siebenburger et al. (2018)	Patients of a rescue helicopter or ambulance service with clinically evident joint dislocation aged ≥ 16 yrs	Prospective study of 118 patients	1.781	<ul style="list-style-type: none"> - The skill of the practitioner is more important than the choice of reduction method - 70% (n= 14) of prehospital shoulder reductions were successful - There was no correlation between pain score and successful reduction - Multiple attempts at reduction should be avoided - This study supports prehospital reduction especially in cases of neurological deficit 	<p>Strengths</p> <ul style="list-style-type: none"> + Thorough method described in detail + Inclusion criteria clearly stated + A range of patient parameters were measured + Data was analysed for statistical significance + No imputation of missing data <p>Weaknesses</p> <ul style="list-style-type: none"> - Excludes patients ≤ 16 years compromising generalisability - Not randomised and no control group - The study was conducted in Germany & Austria where emergency physicians are most commonly surgeons and anesthetists - Does not define 'successful reduction'- end-points unknown e.g. range of movement, reduction in pain score, 	4

					<p>neurovascularly sound.</p> <ul style="list-style-type: none"> - Only 27.9% (n = 33) of the investigated cases were shoulder dislocations and reduction was attempted in only 60% (n= 20) of these cases i.e. small sample size - Journal Impact Factor is low 	
Helfen et al. (2016)	Prehospital treated patients with shoulder dislocation aged ≥ 16 yrs	Prospective study of 70 patients	1.781	<ul style="list-style-type: none"> - 20% of shoulder dislocations were recurrent injuries - The skill of the practitioner is more important than the choice of reduction method - There were n= 7 cases of neurological pathology before reduction, which all declined after reduction - More than 2 reduction attempts was significantly less effective (p <0.002) - Spatial difficulties and duration of a reduction method may influence prehospital reduction - Prehospital reduction did not affect hospital arrival time 	<p>Strengths</p> <ul style="list-style-type: none"> + Thorough method described in detail + Inclusion criteria clearly stated + Sample size is large (n= 70) and representative of other studies i.e. gender distribution, mean age and recurrent dislocation rate + A range of patient parameters were measured + Data was analysed for statistical significance + No imputation of missing data + Review of the literature strengthens discussion <p>Weaknesses</p> <ul style="list-style-type: none"> - Excludes patients ≤ 16 years compromising generalisability - Not randomised and no control 	4

					<p>group</p> <ul style="list-style-type: none"> - Data is becoming outdated (2011-2012) - The study was conducted in Germany & Austria where emergency physicians are most commonly surgeons and anesthetists - Does not define 'successful reduction'- end-points unknown e.g. range of movement, reduction in pain score, neurovascularly sound. - States that there were n= 47 (66.6%) attempts at reduction but does not state treatment effect i.e. how many reductions were successful - Journal Impact Factor is low 	
Shah et al. (2016)	N/A	Literature review	Unavailable	<ul style="list-style-type: none"> - History, mechanism of injury and physical examination assist in determination of the need for prehospital reduction - Prehospital relocation should only be attempted if there exists a low index of suspicion of fracture - The reduction procedure 	<p>Strengths</p> <ul style="list-style-type: none"> + Appropriate databases were included + Results address a range of shoulder dislocation subtypes and reduction methods to more accurately represent the research question <p>Weaknesses</p>	5

				becomes more difficult with time due to muscle spasm	<ul style="list-style-type: none"> - Does not state the number of articles included in the review - Initial search returned no relevant results - Inclusion/exclusion criteria not defined - Date parameters of included studies not defined- from reference list many of the studies appear to be more than two decades old - Method not described in sufficient detail - Refers to patients that are athletes, compromising generalisability - Does not state who performs the reduction- may not reflect the ability of paramedics to reduce a shoulder dislocation - Journal Impact Factor is unavailable 	
Bokor-Billmann et al. (2015)	Patients with physician diagnosed acute anterior shoulder dislocation in a wilderness	Prospective study of 39 patients	1.45	<ul style="list-style-type: none"> - The proposed reduction method was deemed safe and effective - Reduction was successful in n= 39 (100%) of cases - There were no pre- or post-procedure complications 	<p>Strengths</p> <ul style="list-style-type: none"> + Thorough method described in detail + Inclusion and exclusion criteria clearly stated + Sample is representative of other studies i.e. gender 	4

	setting			<ul style="list-style-type: none"> - The proposed reduction method required only one person, no specific equipment and was performed with very little pain for the patient 	<ul style="list-style-type: none"> distribution and mean age + A range of patient parameters were measured + Clearly defines ‘successful’ and ‘unsuccessful’ reduction with end points + Patient follow up was completed at six months providing information on long-term complications <p>Weaknesses</p> <ul style="list-style-type: none"> - Excludes patients ≤ 16 years of age and patients with recurrent dislocation, compromising generalisability - Not randomised and no control group - Reductions were performed by physicians compromising transferability to paramedics - Journal Impact Factor is low 	
Bath and Lord (2009)	N/A	Literature review	Unavailable	<ul style="list-style-type: none"> - There is a perceived need for radiography and technical difficulty of prehospital reduction - The development of a high sensitivity decision-supported algorithm for identifying 	<p>Strengths</p> <ul style="list-style-type: none"> + Appropriate databases were used + Method described in sufficient detail <p>Weaknesses</p>	5

				<p>indication for reduction prior to radiography</p> <ul style="list-style-type: none"> - NSW ambulance ECP's have reported several cases of successful reduction - One study found that despite fracture, all cases were successfully reduced in a closed method in ED 	<ul style="list-style-type: none"> - Does not state the number of articles included in the review - Initial search returned no relevant prehospital based studies, and so the literature reviewed is mostly ED based literature - Published in 2009 so becoming out dated - Journal Impact Factor is unavailable 	
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Comments

There is a small body of evidence to support prehospital shoulder reduction, especially in cases of neurological compromise. There were no studies that reported complications following prehospital reduction, suggesting it is safe when performed on the right patients. The development and use of a decision-supported algorithm to identify contraindications for prehospital reduction will facilitate the introduction of a clear reduction protocol in the prehospital setting (Bath & Lord, 2009). Limiting factors of prehospital reduction include spatial difficulties, the perceived need for radiography and difficulty of the procedure (Bath & Lord, 2009; Helfen et al., 2016).

Consideration for practice

There is a significant lack of quality evidence regarding shoulder reduction by paramedics. The existing literature regarding shoulder reduction is mostly hospital based. The evidence for the feasibility and safety of reduction when performed by paramedics is promising and presents a trend between success and the experience of the practitioner. Current data provides evidence to support the benefits of prehospital reduction, such as reduced time to reduction, relief from pain, and reduced neurovascular deficits. However, there remains a need for further research especially randomised controlled trials to accurately determine the potential risks and benefits to the patient, and to inform the development of standardised, evidence-based, prehospital treatment guidelines.

Clinical bottom line

There is not enough high-quality evidence to support a change of clinical practice guidelines to incorporate shoulder reduction by paramedics at this time.

Appendix

Figure 2. Levels of evidence (LOE) (Parambil, 2016).

Strength	Level	Design	Randomization	Control
High	Level 1	Randomized control trial (RCT)	Yes	Yes
		Meta-analysis of RCT with homogeneous results	No	
	Level 2	Prospective comparative study (therapeutic)	No	Yes
		Meta-analysis of Level 2 studies or Level 1 studies with inconsistent results	No	
	Level 3	Retrospective Cohort Study	No	Yes
		Case-control Study	No	Yes
		Meta-analysis of Level 3 studies	No	
	Level 4	Case Series	No	No
		Level 5		
Low		Case Report	No	No
		Expert Opinion	No	No
		Personal Observation	No	No

References

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