The predictors, barriers and facilitators to effective management of acute pain in children by ambulance services: A systematic mixed studies review

Gregory Whitley*, Pippa Hemingway, Graham Law, Ffion Curtis, Arwel Jones, A.Niroshan Siriwardena

***Gwhitley@Lincoln.ac.uk**

Introduction

Pain is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage".[1] Considering that access to pain management is a fundamental human right[2] prehospital pain management in children is poor.[3] This is despite effective pain management being recently identified as a main quality outcome measure for ambulance services.[4] A recent United Kingdom study found that of injured children who reported pain (n=7483), 38.8% received no treatment.[5] One Australian study[6] found that more than half (55%) of children with severe pain (verbal numeric rating scale 8–10) did not receive any analgesia. Without effective pain treatment, children are at risk of adverse consequences including posttraumatic stress disorder[7] and altered pain perception.[8]

The aim of this systematic mixed studies review was to identify predictors, barriers and facilitators to effective management of acute pain in children by ambulance services.

Methods

A segregated systematic mixed studies review[9] was performed. We searched from inception to 01-Aug-2019: MEDLINE, CINAHL, PsycINFO, EMBASE, Web of Science Core Collection and Scopus. Empirical quantitative, qualitative and multi-methods studies of children under 18 years, their relatives or EMS staff were eligible. The outcome measure for quantitative studies was "effective pain management" (pain score reduction ≥2 out of 11). Two authors independently performed screening and selection, quality assessment, data extraction and quantitative synthesis. Three authors performed thematic synthesis.[10] After the separate quantitative and qualitative syntheses, meta-integration was performed. Quantitative and qualitative data address different aspects of a target phenomenon therefore they cannot confirm or refute each other, instead their complementarity was assessed.[9] GRADE and CERQual were used to determine the confidence in cumulative evidence.

Results

From 3526 articles screened, 70 were selected for full text review, with 7 quantitative and 5 qualitative studies included. Considerable heterogeneity precluded meta-analysis. Predictors of effective pain management included: "child sex (male)", "child age (younger)", "type of pain (traumatic)" and "analgesia (administered)", see Table 1.

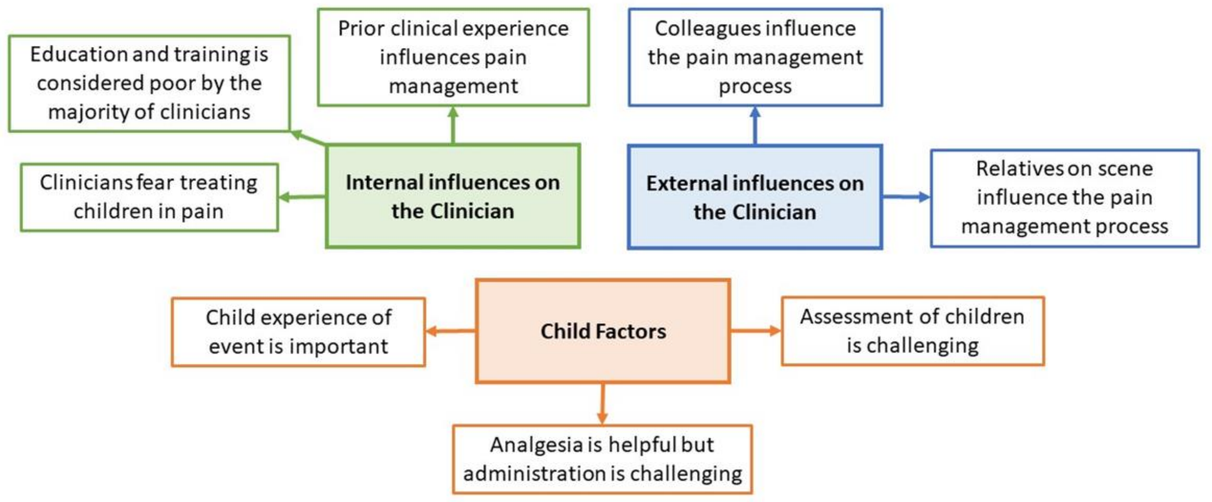
Table 1: Predictors of Effective Pain Management

Predictors (Odds of achieving effective* pain reduction)	Study: Bendall 2011[11] AOR (95% CI)	Jennings 2015[12]** AOR (95% CI)	Lord 2017[13]** AOR (95% CI)
Child Sex			
Male	1.42 (1.19–1.71)	1.1 (1.0-1.3)	
Child Age			
5-9 years (compared to 10-15)	1.33 (1.00–1.75)		
10-14 years (compared to 0-4)		0.5 (0.4-0.6)	
>9 years (compared to <3 years)			0.49 (0.23-1.06)
Type of Pain			
Abdominal Pain/Problems (compared to trauma)	0.69 (0.50-0.96)#		
Musculoskeletal (compared to medical)		1.7 (1.5-1.9)	
Cardiac (compared to musculoskeletal)			0.22 (0.08-0.60)
Analgesia			
Any analgesic (compared to no analgesia)		6.6 (5.9-7.3)	

*Bendall 2011 (reduction ≥30%), Jennings 2015 & Lord 2017 (reduction ≥2/11)
**Jennings 2015 & Lord 2017 used the same base dataset, therefore the predictor "child sex" was excluded for Lord 2017.
#Unadjusted odds ratio, AOR – Adjusted Odds Ratio

Barriers and facilitators included internal (fear, clinical experience, education and training) and external (relatives, colleagues) influences on the clinician along with child factors (child's experience of event, pain assessment and management) as seen in Figure 1:

Figure 1: Thematic Synthesis (Barriers & Facilitators)



Meta-integration produced complementary; "type of pain (traumatic)" and "analgesia (administered)", conflicting; "child age (younger)", and unexplained "child sex (male)" findings.

Confidence in the cumulative evidence was deemed low: further research is likely to change the conclusions. This was due to the low-quality (observational) design of the studies informing the quantitative findings and minor concerns regarding the methodological limitations and relevance of the studies informing the qualitative findings.

Conclusion

To improve pre-hospital pain management in children, efforts to facilitate analgesia administration should take priority, perhaps utilising the intranasal route. The culture of treating traumatic pain more readily than medical pain should also be addressed. Further research is recommended to explore the child's perspective, investigate the conflicting data around "child age" and unexplained data around "child sex" and to improve the confidence in cumulative evidence.

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iD ORCID

@gregwhitley7

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