

# SUPPLEMENTARY MATERIAL

**Supplementary Table 1.** Publications identified from the primary literature search.

Author and title	Publication year	Country	Study type	Study details
<b>Observational patient assessment</b>				
<b>Boccard <i>et al.</i> [7]</b> Pain management in adult patients in emergency care units in France in 2010	2011	France	Observational, multicenter study	HCP assessment of patient pain and subsequent management in the ED (n=1,352).
<b>Butti <i>et al.</i> [20]</b> Evaluation of the effectiveness and efficacy of the triage emergency department nursing protocol for the management of pain	2017	Italy	Prospective, observational study	The impact of a triage protocol on time to analgesia and patient satisfaction was assessed in individuals attending the ED with moderate-to-severe pain not requiring surgical intervention (n=382; 55% had trauma pain).
<b>Carreira <i>et al.</i> [18]</b> How pain is treated in an emergency department in a central hospital? A prospective study	2012	Portugal	Prospective, observational study	Analysis of the type of analgesia, time to analgesia prescription and time to analgesia administration were recorded for patients presenting with acute pain at the ED (n=420).
<b>Kone <i>et al.</i> [59]</b> Impact of a pilot team on patients' pain reduction and satisfaction in an emergency department: a before-and-after observational study	2016	France	Cross-sectional, patient survey	Assessment of the impact of a pain management protocol through the use of two patient surveys on pain reduction and patient satisfaction.

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<b>Marinangeli <i>et al.</i> [30]</b> Acute pain and availability of analgesia in the prehospital emergency setting in Italy: a problem to be solved	2009	Italy	Observational, patient cohort study	HCP assessment of patient pain in pre-hospital settings and questionnaire on the availability of analgesics in ambulances.
<b>Mura <i>et al.</i> [10]</b> Prospective study on prevalence, intensity, type and therapy of acute pain in a second-level urban emergency department	2017	Italy	Prospective, observational study	Assessment of the prevalence and intensity of pain in patients attending a hospital ED (n=2,838; pain due to traumatic events in 40%).
<b>Oberholzer <i>et al.</i> [12]</b> Factors influencing quality of pain management in a physician staffed helicopter emergency medical service	2017	Switzerland	Retrospective observational study	Analysis of modifiable factors that influence analgesia in patients with moderate/severe pain receiving prehospital emergency treatment (n=778; pain due to trauma in 69%).
<b>Vidouris <i>et al.</i> [15]</b> To block or not to block? The utilisation of regional anaesthesia on the trauma list in a London major trauma centre	2016	United Kingdom	Prospective observational study	Audit of the use of regional anesthesia in trauma patients attending a hospital ED (n=51).
<b>Randomized controlled trial</b>				
<b>Coffey <i>et al.</i> [36]</b> STOP!: a randomised, double-blind, placebo-controlled study of the efficacy and safety of methoxyflurane for the treatment of acute pain	2014	United Kingdom	Double-blind, placebo-controlled trial	Investigation of the efficacy and safety of low-dose methoxyflurane vs placebo in adults and adolescents with moderate pain due to minor trauma (n=298).

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<b>Coffey <i>et al.</i> [37]</b> Methoxyflurane analgesia in adult patients in the emergency department: a subgroup analysis of a randomized, double-blind, placebo-controlled study (STOP!)	2016	United Kingdom	Double-blind, placebo-controlled trial	Investigation of the efficacy and safety of low-dose methoxyflurane vs placebo in adults (subanalysis) with moderate pain due to minor trauma (n=204).
<b>Coffey <i>et al.</i> [39]</b> The duration of methoxyflurane analgesia in adult patients in the emergency department: a sub-analysis of STOP!, a randomised, double-blind, placebo-controlled study	2017	United Kingdom	Double-blind, placebo-controlled trial	Investigation of the duration of pain control provided by low-dose methoxyflurane vs placebo in adults (subanalysis) with moderate pain due to minor trauma (n=203).
<b>Dissmann <i>et al.</i> [38]</b> Global medication performance and safety of methoxyflurane analgesia in adult patients with contusions and lacerations treated in the emergency department	2017	United Kingdom	Double-blind, placebo-controlled trial	Investigation of the efficacy and safety of low-dose methoxyflurane vs placebo in adults (subanalysis) with moderate pain due to contusions and lacerations (n=60).
<b>Ridderikhof <i>et al.</i> [22]</b> Acetaminophen or nonsteroidal anti-inflammatory drugs in acute musculoskeletal trauma: a multicenter, double-blind randomized clinical trial	2018	The Netherlands	Prospective, double-blind, randomized study	Comparison of acetaminophen, diclofenac and combination therapy for pain associated with minor musculoskeletal trauma (n=282).
<b>Literature review</b>				

Author and title	Publication year	Country	Study type	Study details
<b>Andrade et al. [27]</b> Safety of metamizole: a systematic review of the literature	2016	Germany	Systematic literature review	Systematic review of adverse outcomes associated with metamizole (22 studies across a range of settings).
<b>Berben et al. [3]</b> Prevalence and relief of pain in trauma patients in emergency medical services	2011	Netherlands	Retrospective, document review	Assessment of the prevalence of pain in pre-hospital emergency settings (n=1,407).
<b>Blair et al. [35]</b> Methoxyflurane inhalation vapour in trauma pain: a profile of its use in the EU	2017	Europe	Literature review	Commentary review of the efficacy, safety and current clinical positioning of methoxyflurane.
<b>Dayan et al. [33]</b> Analgesic use of inhaled methoxyflurane: evaluation of its potential nephrotoxicity	2016	United Kingdom	Literature review	Commentary review of the renal safety profile of low-dose methoxyflurane
<b>Keene et al. [28]</b> Acute pain management in trauma	2011	United Kingdom	Literature review	Commentary review of the epidemiology of trauma pain and methods for administering pain relief in emergency settings.
<b>Parker et al. [5]</b> Management of pain in pre-hospital settings	2015	United Kingdom	Literature review	Commentary review of methods of assessing trauma pain and the undertreatment of pain in emergency settings.
<b>Porter et al. [34]</b> Management of trauma pain in the emergency setting: low dose methoxyflurane or nitrous oxide? A systematic review and indirect treatment comparison	2018	United Kingdom	Literature review	Systematic review comparing the efficacy and safety of methoxyflurane and N <sub>2</sub> O for acute trauma pain in emergency settings (2 studies).

Author and title	Publication year	Country	Study type	Study details
<b>Roberts <i>et al.</i> [48]</b> Paracetamol: not as safe as we thought? A systematic literature review of observational studies	2016	United Kingdom	Literature review	Systematic review of the safety of paracetamol based on observational studies across a range of settings (8 studies).
<b>Patient chart review</b>				
<b>Dale <i>et al.</i> [11]</b> Assessment of pain in a Norwegian emergency department	2015	Norway	Patient record review	Analysis of data on initial assessment and treatment of trauma pain patients in the ED (n=764).
<b>Dilworth <i>et al.</i> [62]</b> Management of acute pain in adults attending an emergency department: a closed loop audit	2017	Ireland	Patient record review	Evaluation of analgesia administration in accordance with Royal College of Emergency Medicine Guidelines, and the impact of a subsequent awareness campaign on pain management within a single ED (n≤64).
<b>Friesgaard <i>et al.</i> [41]</b> Efficacy and safety of intravenous fentanyl administered by ambulance personnel	2016	Denmark	Patient record review	Review of patient medical charts treated with IV fentanyl for pain in the ambulance (n=2,348).
<b>Karwowski-Soulie <i>et al.</i> [4]</b> Pain in an emergency department: an audit	2006	France	Prospective, cohort review	Assessment of patient pain intensity at arrival and discharge from the ED (n=726).
<b>Hebsgaard <i>et al.</i> [31]</b> Assessment of acute pain in trauma: a retrospective prehospital evaluation	2016	Denmark	Patient record review	Assessment of analgesic use in trauma patients attending a mobile emergency care unit (n=985).

Author and title	Publication year	Country	Study type	Study details
<b>Scharonow <i>et al.</i> [66]</b> Project for the introduction of prehospital analgesia with fentanyl and morphine administered by specially trained paramedics in a rural service area of Germany	2017	Germany	Patient record review	Audit of emergency medical service call-out data documenting the safety and efficacy of prehospital opioid administration (n=77; 69% had trauma pain).
<b>Singh <i>et al.</i> [16]</b> Audit of fascia iliaca blocks for hip fracture patients in Sunderland A&E	2017	United Kingdom	Patient record review	Audit of the proportion of hip fracture patients receiving fascia iliaca blocks over a 6-month period (National Hip Fracture Database).
<b>Xia <i>et al.</i> [60]</b> Pre-hospital pain relief treatment in patients with musculoskeletal injuries experiencing moderate to severe pain in medical emergencies	2017	Belgium, France, Germany, Italy, Spain, Sweden (and Australia)	Patient chart review	Assessment of pain relief treatments, timelines and outcomes associated with paramedic care (n=856).
<b>Guideline</b>				
<b>Tamches <i>et al.</i> [19]</b> Acute pain in adults admitted to the emergency room: development and implementation of abbreviated guidelines	2007	Switzerland	Local guideline	Development and implementation of a clinical practice guideline for treating acute pain in the ED.
<b>HCP questionnaire</b>				
<b>Berben <i>et al.</i> [53]</b> Facilitators and barriers in pain management for trauma patients in the chain of emergency care	2012	Netherlands	HCP interviews	Qualitative interviews (n=10) and focus groups (n=5) of HCPs working in ambulances and EDs to discuss the management of patients with trauma pain in emergency settings.

ED, emergency department; HCP, healthcare professional; IV, intravenous

**Supplementary Table 2.** Publications identified from the grey literature search.

Author and title	Publication year	Country	Study type	Study details
<b>Literature review</b>				
<b>Hansen <i>et al.</i> [45]</b> Limited evidence for intranasal fentanyl in the emergency department and the prehospital setting: a systematic review	2013	Denmark	Systematic literature review	Review of studies (n=12) assessing the use of IN fentanyl in the pre-hospital and ED settings.
<b>Jasiecka <i>et al.</i> [26]</b> Pharmacological characteristics of metamizole	2014	Poland	Literature review	Commentary style review of literature reporting on the pharmacokinetics, mechanism of action and clinical applications of metamizole.
<b>Jonkman <i>et al.</i> [32]</b> Ketamine for pain	2017	The Netherlands	Literature review	Review of narrative and systematic reviews (n=29) assessing the safety and efficacy of ketamine across a range of settings.
<b>Kotter <i>et al.</i> [25]</b> Metamizole-associated adverse events: a systematic review and meta-analysis	2015	Germany	Systematic literature review and meta-analysis	Review of studies (n=79) assessing the safety of metamizole compared with placebo and other analgesics, across a range of settings.
<b>Martini <i>et al.</i> [67]</b> Pharmacokinetic–pharmacodynamic modeling in acute and chronic pain: an overview of the recent literature	2011	The Netherlands	Literature review	Analysis of literature on the pharmacokinetics of analgesia and how this can affect pain management strategies for acute and chronic pain.
<b>Pergolizzi <i>et al.</i> [29]</b> Tramadol/paracetamol fixed-dose combination in the treatment of moderate to severe pain	2012	The Netherlands, France, UK, Switzerland, Spain, Ireland (and US)	Expert opinion review	Review of the literature and report from a consensus meeting of pain management experts.
<b>Observational patient assessment</b>				



Author and title	Publication year	Country	Study type	Study details
<b>Steiner <i>et al.</i> [61]</b> Performance of the Manchester Triage System in adult medical emergency patients: a prospective cohort study	2016	Switzerland	Prospective, observational study	Regression model analysis of patients triaged in the ED (n=2,407) to determine treatment priority.
<b>Stephan <i>et al.</i> [14]</b> Pain in the emergency department: adherence to an implemented treatment protocol	2010	Switzerland	Prospective, patient chart review	Review of patient charts (n=337) to determine adherence to the pain management protocol in the ED.
<b>Van Woerden <i>et al.</i> [9]</b> Increased analgesia administration in emergency medicine after implementation of revised guidelines	2016	The Netherlands	Prospective, patient cohort study	Review of patient's (n=2,107) pain scores prior to and post-implementation of a revised guideline for pain management in the ED.
<b>Randomized, controlled trial</b>				
<b>Ducasse <i>et al.</i> [23]</b> Nitrous oxide for early analgesia in the emergency setting: a randomized, double blind multicenter prehospital trial	2013	France	Prospective, double-blind, randomized study	Assessment of the efficacy of N <sub>2</sub> O in the treatment of patients with acute trauma pain in the ED (n=60).
<b>Patient information webpage</b>				
<b>NHS Choices [21]</b> NSAIDs	2016	United Kingdom	Website	Patient information website detailing the types and side effects of NSAIDs.
<b>NHS Choices [47]</b> Paracetamol for adults	2014	United Kingdom	Website	Patient information website detailing the types and side effects of paracetamol.
<b>Guideline</b>				
<b>The College of Emergency Medicine [8]</b> Management of pain in adults	2014	UK	Local guideline	Recommendations for assessing pain and administering analgesia in the ED

ED, emergency department; HCP, healthcare professional; IN, intranasal; NSAID, nonsteroidal anti-inflammatory