Journal report – září 2024

OBSAH

1: Demandt JPA, Koks A, Sagel D, Haest R, Heijmen E, Thijssen E, El Farissi M, Eerdekens R, van der Harst P, van 't Veer M, Dekker L, Tonino P, Vlaar PJ. **External validation of the preHEART score and comparison with current clinical risk scores for prehospital risk assessment in patients with suspected NSTE-ACS.** Emerg Med J. 2024 Sep 25;41(10):610-616. doi: 10.1136/emermed-2023-213866. PMID: 39074964.

2: Eliakundu AL, Bloom JE, Ball J, Nehme E, Okyere D, Heritier S, Voskoboinik A, Dawson L, Cox S, Anderson D, Burrell A, Pilcher D, Chew DP, Kaye D, Nehme Z, Stub D. **Prehospital factors predicting mortality in patients with shock: state-wide linkage study.** Open Heart. 2024 Sep 30;11(2):e002799. doi: 10.1136/openhrt-2024-002799. PMID: 39349049.

PREHOSPITAL CARE

– systematic review & meta-analysis

1: Wilkinson-Stokes M, Tew M, Yap CYL, Crellin D, Gerdtz M. **The Economic Impact of Community Paramedics Within Emergency Medical Services: A Systematic Review.** Appl Health Econ Health Policy. 2024 Sep;22(5):665-684. doi: 10.1007/s40258-024-00902-3. Epub 2024 Jul 17. PMID: 39017994; PMCID: PMC11339145.

2: Enomoto Y, Tsutsumi Y, Kido T, Nagatomo K, Tsuchiya A, Inoue Y. **Association between helicopter medical services for pediatric trauma patients and mortality: Systematic review and meta-analysis.** Am J Emerg Med. 2024 Sep 10;85:196-201. doi: 10.1016/j.ajem.2024.09.015. Epub ahead of print. PMID: 39278027.

3: Hyldmo PK, Rehn M, Dahl Friesgaard K, Rognås L, Raatiniemi L, Kurola J, Larsen R, Kongstad P, Sandberg M, Magnusson V, Vist GE. **Inhaled analgesics for the treatment of prehospital acute pain-A systematic review**. Acta Anaesthesiol Scand. 2024 Sep 26. doi: 10.1111/aas.14527. Epub ahead of print. PMID: 39327650.

Journal report – září 2024

PREHOSPITAL CARE

– clinical trials & RCT & multicenter study –

1. Emerg Med J. 2024 Sep 25;41(10):610-616. doi: 10.1136/emermed-2023-213866.

External validation of the preHEART score and comparison with current clinical risk scores for prehospital risk assessment in patients with suspected NSTE-ACS.

Demandt JPA(1), Koks A(2), Sagel D(3), Haest R(4), Heijmen E(5), Thijssen E(6), El Farissi M(1), Eerdekens R(1), van der Harst P(7), van 't Veer M(1), Dekker L(1)(8), Tonino P(1)(8), Vlaar PJ(9).

BACKGROUND: Emergency Medical Services (EMS) studies have shown that prehospital risk stratification and triage decisions in patients with suspected non-ST-elevation acute coronary syndrome (NSTE-ACS) can be improved using clinical risk scores with point-of-care (POC) troponin. In current EMS studies, three different clinical risk scores are used in patients suspected of NSTE-ACS: the prehospital History, ECG, Age, Risk and Troponin (preHEART) score, History, ECG, Age, Risk and Troponin (HEART) score and Troponin-only Manchester Acute Coronary Syndromes (T-MACS). The preHEART score lacks external validation and there exists no prospective comparative analysis of the different risk scores within the prehospital setting. The aim of this analysis is to externally validate the preHEART score and compare the diagnostic performance of the these three clinical risk scores and POC-troponin.

METHODS: Prespecified analysis from a prospective, multicentre, cohort study in patients with suspected NSTE-ACS who were transported to an ED between April 2021 and December 2022 in the Netherlands. Risk stratification is performed by EMS personnel using preHEART, HEART, T-MACS and POC-troponin. The primary end point was the hospital diagnosis of NSTE-ACS. The diagnostic performance was expressed as area under the receiver operating characteristic (AUROC), sensitivity, specificity, negative predictive value (NPV) and positive predictive value (PPV).

RESULTS: A total of 823 patients were included for external validation of the preHEART score, final hospital diagnosis of NSTE-ACS was made in 29% (n=235). The preHEART score classified 27% as low risk, with a sensitivity of 92.8% (95% CI 88.7 to 95.7) and NPV of 92.3% (95% CI 88.3 to 95.1). The preHEART classified 9% of the patients as high risk, with a specificity of 98.5% (95% CI 97.1 to 99.3) and PPV of 87.7% (95% CI 78.3 to 93.4). Data for comparing clinical risk scores and POC-troponin were available in 316 patients. No difference was found between the preHEART score and HEART score (AUROC 0.83 (95% CI 0.78 to 0.87) vs AUROC 0.80 (95% CI 0.74 to 0.85), p=0.19), and both were superior compared with T-MACS (AUROC 0.72 (95% CI 0.66 to 0.79), p≤0.001 and p=0.03, respectively) and POC-troponin measurement alone (AUROC 0.71 (95% CI 0.64 to 0.78), p<0.001 and p=0.01, respectively).

CONCLUSION: On external validation, the preHEART demonstrates good overall diagnostic performance as a prehospital risk stratification tool. Both the preHEART and HEART scores have better overall diagnostic performance compared with T-MACS and sole POC-troponin measurement. These data support the implementation of clinical risk scores in prehospital clinical pathways. TRIAL REGISTRATION NUMBER: NCT05243485.

DOI: 10.1136/emermed-2023-213866

PMID: 39074964 [Indexed for MEDLINE]

2. Open Heart. 2024 Sep 30;11(2):e002799. doi: 10.1136/openhrt-2024-002799.

Prehospital factors predicting mortality in patients with shock: state-wide linkage study.

Eliakundu AL(1)(2)(3), Bloom JE(1)(2)(3)(4), Ball J(1)(3)(4), Nehme E(3)(5), Okyere D(1)(3), Heritier S(1), Voskoboinik A(2)(4), Dawson L(1)(3)(6), Cox S(3), Anderson D(2)(7)(8), Burrell A(5)(9), Pilcher D(5)(9), Chew DP(10)(11), Kaye D(2)(4), Nehme Z(3)(12), Stub D(13)(2)(3)(4).

BACKGROUND: Patients with shock treated by emergency medical services (EMS) have high morbidity and mortality. Knowledge of prehospital factors predicting outcomes in patients with shock remains limited. We aimed to describe the prehospital predictors of mortality in patients with non-traumatic shock transported to hospital by EMS.

METHOD: This is a retrospective cohort study of consecutive ambulance attendances for non-traumatic shock in Victoria, Australia (January 2015-June 2019) linked with government-held administrative data (emergency, admissions and mortality records). Predictors of 30-day mortality were assessed using Cox proportional regressions. The primary outcome was 30-day all-cause mortality.

RESULTS: Overall, 21 334 patients with non-traumatic shock (median age 69 years, 54.8% female) were successfully linked with state administrative records. Among this cohort, 9 149 (43%) patients died within 30-days. Compared with survivors, non-survivors had a longer median on-scene time: 60 (35-98) versus 30 (19-50), p <0.001. Non-survivors were more likely to be older (median age in years: 74 (61-84) vs 65 (47-78), p<0.001), had prehospital cardiac arrest requiring cardiopulmonary resuscitation (adjusted HR (aHR)=6.26, 95% CI 5.87, 6.69) and had prehospital intubation (aHR=1.07, CI 1.00, 1.14). Reduced 30-day mortality was associated with administration of epinephrine (aHR=0.66, CI 0.62, 0.71) and systolic blood pressures above 80 mm Hg in the prehospital setting.

CONCLUSION: The 30-day mortality from non-traumatic shock is high at 43%. Independent predictors of mortality included age, prehospital cardiac arrest and endotracheal intubation. Interventions that target reversible causes of short-term mortality in patients with non-traumatic shock are a high priority.

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PMID: 39349049 [Indexed for MEDLINE]

Journal report – září 2024

PREHOSPITAL CARE

– systematic review & meta-analysis –

1. Appl Health Econ Health Policy. 2024 Sep;22(5):665-684. doi: 10.1007/s40258-024-00902-3. Epub 2024 Jul 17.

The Economic Impact of Community Paramedics Within Emergency Medical Services: A Systematic Review.

Wilkinson-Stokes M(1), Tew M(2), Yap CYL(3), Crellin D(3), Gerdtz M(3).

BACKGROUND AND OBJECTIVE: Globally, emergency medical services (EMSs) report that their demand is dominated by non-emergency (such as urgent and primary care) requests. Appropriately managing these is a major challenge for EMSs, with one mechanism employed being specialist community paramedics. This review guides policy by evaluating the economic impact of specialist community paramedic models from a healthcare system perspective.

METHODS: A multidisciplinary team (health economics, emergency care, paramedicine, nursing) was formed, and a protocol registered on PROSPERO (CRD42023397840) and published open access. Eligible studies included experimental and analytical observational study designs of economic evaluation outcomes of patients requesting EMSs via an emergency telephone line ('000', '111', '999', '911' or equivalent) responded to by specialist community paramedics, compared to patients attended by usual care (i.e. standard paramedics). A three-stage systematic search was performed, including Peer Review of Electronic Search Strategies (PRESS) and Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA). Two independent reviewers extracted and verified 51 unique characteristics from 11 studies, costs were inflated and converted, and outcomes were synthesised with comparisons by model, population, education and reliability of findings.

RESULTS: Eleven studies (n = 7136 intervention group) met the criteria. These included one cost-utility analysis (measuring both costs and consequences), four costing studies (measuring cost only) and six cohort studies (measuring consequences only). Quality was measured using Joanna Briggs Institute tools, and was moderate for ten studies, and low for one. Models included autonomous paramedics (six studies, n = 4132 intervention), physician oversight (three studies, n = 932 intervention) and/or special populations (five studies, n = 3004 intervention). Twenty-one outcomes were reported. Models unanimously reduced emergency department (ED) transportation by 14-78% (higher quality studies reduced emergency department transportation by 50-54%, n = 2639 intervention, $p < 0.001$), and costs were reduced by AU$338-1227 per attendance in four studies (n = 2962). One study performed an economic evaluation (n = 1549), finding both that the costs were reduced by AU$454 per attendance (although not statistically significant), and consequently that the intervention dominated with a > 95% chance of the model being cost effective at the UK incremental cost-effectiveness ratio threshold.

CONCLUSIONS: Community paramedic roles within EMSs reduced ED transportation by approximately half. However, the rate was highly variable owing to structural (such as local

policies) and stochastic (such as the patient's medical condition) factors. As models unanimously reduced ED transportation-a major contributor to costs-they in turn lead to net healthcare system savings, provided there is sufficient demand to outweigh model costs and generate net savings. However, all models shift costs from EDs to EMSs, and therefore appropriate redistribution of benefits may be necessary to incentivise EMS investment. Policymakers for EMSs could consider negotiating with their health department, local ED or insurers to introduce a rebate for successful community paramedic non-ED-transportations. Following this, geographical areas with suitable non-emergency demand could be identified, and community paramedic models introduced and tested with a prospective economic evaluation or, where this is not feasible, with sufficient data collection to enable a post hoc analysis.

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2. Am J Emerg Med. 2024 Sep 10;85:196-201. doi: 10.1016/j.ajem.2024.09.015.

Association between helicopter medical services for pediatric trauma patients and mortality: Systematic review and meta-analysis.

Enomoto Y(1), Tsutsumi Y(2), Kido T(3), Nagatomo K(4), Tsuchiya A(5), Inoue Y(4).

BACKGROUND: Helicopter emergency medical services (HEMS) have become widespread around the world. However, previous studies of the influence of HEMS on mortality were limited to adult patients only and showed inconsistent and heterogeneous results. This study aimed to examine the association between HEMS and mortality among pediatric emergencies compared to ground emergency medical service (GEMS).

METHODS: We searched relevant databases (MEDLINE, EMBASE, The Cochrane Central Register of Controlled Trials) and included articles in any language. The most recent search was on January 4th, 2024. We included prospective observational cohort studies or clinical trials that compared HEMS with GEMS in pediatric patients. We excluded any study that did not compare two or more groups of participants. Two pairs of researchers blindly screened studies and evaluated risk of bias using the Risk of Bias in Nonrandomized Studies of Interventions tool. We conducted this systematic review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement. Data were extracted by four independent reviewers. We calculated the odds ratio using the random-effects model. The primary outcome was mortality.

RESULTS: Our search strategy yielded 1454 results. Of these, seven observational studies met our eligibility criteria; no RCT met the criteria. All studies targeted trauma patients only. HEMS was associated with lower mortality (Odds ratio 0.66, 95 % CI 0.59 to 0.74). Inconsistency

between trials was determined to be low due to low heterogeneity (I2 = 0 %). In a subgroup analysis conducted with and without physicians on the HEMS staff, we found no significant differences (I2 = 0 %, p = 0.71).

CONCLUSION: Our systematic review and meta-analysis, which was limited to trauma pediatric trauma patients, revealed that HEMS deployment correlated with decreased mortality. Further research is necessary to more effectively measure the potential influence and applicability of HEMS for pediatric emergencies.

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PMID: 39278027

3. Acta Anaesthesiol Scand. 2024 Sep 26. doi: 10.1111/aas.14527.

Inhaled analgesics for the treatment of prehospital acute pain-A systematic review.

Hyldmo PK(1)(2), Rehn M(3)(4)(5), Dahl Friesgaard K(6)(7)(8), Rognås L(9)(10)(11), Raatiniemi L(12)(13), Kurola J(14)(15), Larsen R(16), Kongstad P(17)(18)(19), Sandberg M(4), Magnusson V(20), Vist GE(21).

BACKGROUND: Many prehospital emergency patients receive suboptimal treatment for their moderate to severe pain. Various factors may contribute. We aim to systematically review literature pertaining to prehospital emergency adult patients with acute pain and the pain-reducing effects, adverse events (AEs), and safety issues associated with inhaled analgetic agents compared with other prehospital analgesic agents.

METHODS: As part of an initiative from the Scandinavian Society of Anaesthesia and Intensive Care Medicine, we conducted a systematic review (PROSPERO CRD42018114399), applying the PRISMA guidelines, Grading of Recommendations Assessment, Development, and Evaluation (GRADE), and Cochrane methods, searching the Cochrane Library, Epistemonikos, Centre for Reviews and Dissemination, PubMed, and EMBASE databases (updated March 2024). Inclusion criteria were the use of inhaled analgesic agents in adult patients with acute pain in the prehospital emergency care setting. All steps were performed by minimum of two individual researchers. The primary outcome was pain reduction; secondary outcomes were speed of onset, duration of effect, and relevant AEs.

RESULTS: We included seven studies (56,535 patients in total) that compared inhaled agents (methoxyflurane [MF] and nitrous oxide [N2O]) to other drugs or placebo. Study designs were randomized controlled trial (1; n = 60), randomized non-blinded study (1; n = 343), and randomized open-label study (1; n = 270). The remaining were prospective or retrospective observational studies. The evidence according to GRADE was of low or very low quality. No combined meta-analysis was possible. N2O may reduce pain compared to placebo, but not compared to intravenous (IV) paracetamol, and may be less effective compared to morphine

and MF. MF may reduce pain compared to paracetamol, ketoprofen, tramadol, and fentanyl. Both agents may be associated with marked but primarily mild AEs.

CONCLUSION: We found low-quality evidence suggesting that both MF and N2O are safe and may have a role in the management of pain in the prehospital setting. There is low-quality evidence to support MF as a short-acting single analgesic or as a bridge to IV access and the administration of other analgesics. There may be occupational health issues regarding the prehospital use of N2O.

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