

randomisation and the funding of prehospital critical care for OHCA.

Method We aimed to answer the following questions: What are stakeholders' priorities for prehospital research? What are stakeholders' views on randomisation of prehospital critical care? How do stakeholders consider allocation of resources in prehospital care? We undertook a qualitative framework analysis of interviews and focus group with five key stakeholder groups: patients and public, air ambulance charities, ambulance service commissioners, prehospital researchers and prehospital critical care providers.

Results Despite sharing a common appreciation of the concepts of scientific enquiry, fairness, and beneficence, the five relevant stakeholder groups displayed divergent views of research and funding strategies regarding the intervention of prehospital critical care for the condition of OHCA. The reasons for this divergence could largely be explained through the different personal experiences and situational contexts of each stakeholder group. Many aspects of the strategies suggested by the stakeholder groups only partially aligned with principles of traditional evidence-based medicine, but were held with strong conviction.

Conclusion Analysis of the views of five stakeholder groups regarding research and the funding of prehospital critical care for OHCA revealed shared values, but a variety of different strategies to achieve these. This knowledge can help researchers in similar fields in the planning and presentation of their research, to maximise impact on decision making.

Conflict of interest Johannes von Vopelius-Feldt and Jonathan Bengner work as prehospital physicians with the Great Western Air Ambulance.

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10 SYSTEMATIC REVIEW OF THE EFFECTIVENESS OF PREHOSPITAL CRITICAL CARE FOLLOWING OUT-OF-HOSPITAL CARDIAC ARREST

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Aim Improving survival after out-of-hospital cardiac arrest (OHCA) is a priority for modern emergency medical services (EMS) and prehospital research. Advanced life support (ALS) is now the standard of care in most EMS. In some EMS, prehospital critical care providers are also dispatched to attend OHCA. This systematic review presents the evidence for prehospital critical care for OHCA, when compared to standard ALS care.

Method We searched the following electronic databases: PubMed, Embase, CINAHL Plus and AMED (via EBSCO), Cochrane Database of Systematic Reviews, DARE, Cochrane Central Register of Controlled Trials, NHS Economic Evaluation Database, NIHR Health Technology Assessment Database, Google Scholar and ClinicalTrials.gov. Search terms related to

cardiac arrest and prehospital critical care. All studies that compared patient-centred outcomes between prehospital critical care and ALS for OHCA were included.

Results The review identified six full text publications that matched the inclusion criteria, all of which are observational studies. Three studies showed no benefit from prehospital critical care but were underpowered with sample sizes of 1028 to 1851. The other three publications showed benefit from prehospital critical care delivered by physicians. However, an imbalance of prognostic factors and hospital treatment in these studies systematically favoured the prehospital critical care group.

Conclusion Current evidence to support prehospital critical care for OHCA is limited by the logistic difficulties of undertaking high quality research in this area. Further research needs an appropriate sample size with adjustments for confounding factors in observational research design.

Conflict of interest Johannes von Vopelius-Feldt and Jonathan Bengner work as prehospital critical care physicians with the Great Western Air Ambulance.

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11 QUALITY OF BYSTANDER CPR BY LAY FIRST RESPONDERS: TRAINING VERSUS REAL-WORLD USE OF A NOVEL CPR FEEDBACK DEVICE IN SINGAPORE

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Aim Data on the quality of lay person CPR during emergencies are sparse. We present compression quality data derived from use of a novel CPR feedback device during actual cases prior to ambulance arrival.

Method The credit-card sized CPRcard™ device provided visual indication of compression depth and rate in real-time, and stored the data. Median rate, depth; proportion within targets (100–120/minute; depth:4–6 cm); and flow-time were used to determined compression quality. Bystanders' emergency performances were compared to their training performances.

Results Median depth during emergencies vs trainings was 39 mm (95% CI: 30 to 49 mm, p=0.028) vs 55 mm (95% CI: 50 to 57 mm, p=0.028); and median rates were 114 cpm (95% CI: 109 to 120 cpm, p=0.104) vs 109 cpm (95% CI: 105 to 112 cpm, p=0.104). Of total emergency vs training delivered compressions, 6% (95% CI: 0% to 49%, p=0.008) vs 63% (95% CI: 56 to 90%, p=0.008) were within target depth; 54% (95% CI: 32% to 79%, p=0.028) vs 94% (95% CI: 81 to 97%, p=0.028) were within target rate. Of the lay bystanders' during emergencies vs trainings, 4 (50%, p=0.398) vs 5 (71%, p=0.398) met both compression and depth targets. Emergency vs training compression flow-time was 95% (95% CI: 85% to 99%, p=0.099) vs 100% (95% CI: 96 to 100%, p=0.099), respectively. Lay bystanders overall reported positive experience using the card but some

expressed reluctance to compress deeply for fear of harming the victims.

Conclusion Training compressions were better quality. The results show the quality of chest compressions delivered by lay bystanders in actual cases, and highlights depth as an area of concern that could improve with training enhancement.

Conflict of interest None

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12

EXPLAINING VARIATION IN RATES OF NON-TRANSPORT BETWEEN EMERGENCY AMBULANCE SERVICES

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Aim In England in 2017 ambulance services responded to around 11 million calls. Half of patients were not transported to hospital. 11% received telephone advice only and 38% were discharged at scene. For the ten large regional ambulance services, rates of calls ending in telephone advice varied between 5% and 17%. Rates of discharge at scene varied between 23% and 51%. The aim was to explain variation in non-conveyance rates between ambulance services

Method A sequential mixed methods study: a qualitative interview study of managers and paramedics (totalling 49 interviews) followed by analysis of one month of routine data from each ambulance service (6 15 618 calls).

Results Interviewees identified factors they perceived affected non-transport. Rates of discharge at scene were associated with patient-level factors e.g. age, deprivation and skill level of attending crew. However, variation between ambulance services remained after adjustment for patient-level factors. Variation was explained by ambulance service-level factors: % of calls attended by paramedics with extended skills (odds ratio 1.05 (95% CI: 1.04 to 1.07)), the perception of ambulance service staff that paramedics with extended skills were established and valued within the workforce (odds ratio 1.84 (1.45, 2.33), and the perception of ambulance service staff that senior management was risk averse regarding non-conveyance within an ambulance service (odds ratio 0.78 (0.63, 0.98)).

Conclusion Ambulance service management can take actions to reduce a variation in practice.

Conflict of interest None

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13

A NOVEL APPROACH TO HIGH PERFORMANCE CARDIOPULMONARY RESUSCITATION EDUCATION IN A DANISH AMBULANCE SERVICE

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Aim Out of hospital cardiac arrest (OHCA) is a medical emergency where immediate treatment with cardiopulmonary resuscitation (CPR) are known to be paramount for survival. For professionals, international guidelines recommend high-performance CPR (HP-CPR) along with advanced life support. Currently, HP-CPR is not formally taught nor implemented in Denmark. This study evaluates a novel approach to HP-CPR education in a Danish ambulance service.

Method A two-day intensive course consisting of theoretical presentations and practical supervised workshops was planned and completed. Pre- and post-course, all participants completed a CPR cycle on a mannequin measuring data on CPR performance followed by a multiple-choice test and a self-efficacy questionnaire. The primary outcome was before and after evaluation of individual non-technical skills within resuscitation, the secondary outcome was before and after evaluation of technical skills through CPR performance.

Results In total, 23 EMS providers completed the course. Individual self-efficacy in resuscitation capabilities increased from a mean (SD) 8,09 (0,80) to 9,3 (0,59) ($p < 0,001$) on a 0–10 score with 0 being inadequate. Resuscitation knowledge improved from a mean (SD) of 76,77% (14,4) to 90,89% (4,9) ($p < 0,002$). CPR performance improved from a mean (SD) 85,52% (23,7) to 92,70% (13) ($p = 0,126$).

Conclusion This study suggests that our novel approach to HP-CPR education is advantageous as we found a significant increase in self-efficacy and CPR knowledge along with a non-significant increase in CPR performance. Future studies should investigate whether Danish HP-CPR trained EMS providers improve 30 day survival in real-life OHCA.

Conflict of interest None

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14

THE USE OF PREHOSPITAL 12-LEAD ELECTROCARDIOGRAMS IN ACUTE STROKE PATIENTS

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AIM Emergency medical services (EMS) play a vital role in the recognition, management and transportation of acute stroke patients. UK guidelines recommend clinicians consider performing a prehospital 12-lead electrocardiogram (PHECG) in patients with suspected stroke, but this recommendation is based on expert consensus, rather than robust evidence. The aim of this study was to investigate the association between PHECG and modified Rankin scale (mRS). Secondary outcomes included in-hospital mortality, EMS and in-hospital time intervals and rates of thrombolysis received.

Method A multicentre retrospective cohort study was undertaken. The data collection period spanned from 29/12/2013 – 30/01/2017. Participants were identified through secondary analysis of hospital data routinely collected as part of the Sentinel Stroke National Audit Programme (SSNAP) and linked to EMS clinical records (PCRs) via EMS incident number.

Results PHECG was performed in 558 (48%) of study patients. PHECG was associated with an increase in mRS (aOR 1.44, 95% CI: 1.14 to 1.82, $p = 0.002$) and in-hospital mortality (aOR 2.07, 95% CI: 1.42 to 3.00, $p = 0.0001$). There was no association between PHECG and administration of thrombolysis (aOR 0.92, 95% CI: 0.65 to 1.30, $p = 0.63$). Patients who had a PHECG recorded spent longer under the care of EMS (median 49 vs 43 min, $p = 0.007$). No difference in times to receiving brain scan (Median 28 with PHECG vs 29 min no PHECG, $p = 0.14$) or thrombolysis (median 46 min vs 48 min, $p = 0.82$) were observed.

Conclusion This is the first study of its kind to investigate the association between PHECG and functional outcome in stroke patients attended by EMS. Although there are limitations in