Journal report – květen 2024

OBSAH

PREHOSPITAL CARE

– clinical trials & RCT

1: Schlosser PD, Matthews B, Sanderson PM, Donohue A, Hayes S. **Effects of Augmented Reality-Based Remote Mentoring on Task Performance and Communication: A Simulation Study in the Context of Emergency Medical Services.** Telemed J E Health. 2024 May;30(5):1470-1478. doi: 10.1089/tmj.2023.0379. Epub 2024 Jan 12. PMID: 38215270.

PREHOSPITAL CARE

– systematic review & meta-analysis

1: Kolaparambil Varghese LJ, Völlering JJ, De Robertis E, Hinkelbein J, Schmitz J, Warnecke T. **Efficacy of endotracheal intubation in helicopter cabin vs. ground: a systematic review and meta-analysis.** Scand J Trauma Resusc Emerg Med. 2024 May 10;32(1):40. doi: 10.1186/s13049-024-01213-1. PMID: 38730289; PMCID: PMC11084009.

2: Dong J, Ma Y, Chen Y, Guo J, Zhang T, Yang T, Zhang H, Yan F, Han L. **Prevalence and influencing factors of patient delay in stroke patients: a systematic review and meta-analysis.** Neurosurg Rev. 2024 May 3;47(1):202. doi: 10.1007/s10143-024-02436-7. PMID: 38700541.

3: Lingawi S, Hutton J, Khalili M, Shadgan B, Christenson J, Grunau B, Kuo C. **Cardiorespiratory Sensors and Their Implications for Out-of-Hospital Cardiac Arrest Detection: A Systematic Review.** Ann Biomed Eng. 2024 May;52(5):1136-1158. doi: 10.1007/s10439-024-03442-y. Epub 2024 Feb 15. PMID: 38358559.

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PREHOSPITAL CARE

– clinical trials & RCT –

1. Telemed J E Health. 2024 May;30(5):1470-1478. doi: 10.1089/tmj.2023.0379. Epub 2024 Jan 12.

Effects of Augmented Reality-Based Remote Mentoring on Task Performance and Communication: A Simulation Study in the Context of Emergency Medical Services.

Schlosser PD(1), Matthews B(1), Sanderson PM(1)(2)(3), Donohue A(4)(5), Hayes S(6).

Background: Augmented reality head-worn displays (HWDs) may enable efficient remote support in the prehospital environment due to their hand-free operability, their "see-what-I-see" features, and their ability to superimpose digital content over the environment. Methods: In this simulation-based randomized controlled study, a remote mentor used either a phone or HWD to instruct 23 physicians on how to insert a Multi-Lumen Access Catheter into a mannequin. In the phone condition, information could be exchanged only verbally. In the HWD condition, the mentor could additionally see the participant's first-person view and show reference images. We hypothesized that participants who received instructions via the HWD would achieve better procedural performance (lower task completion times, fewer errors advancing the catheter) and exhibit different communication patterns than participants who received instructions via phone. Results: The HWD did not significantly reduce task completion times or errors during catheter advancement. However, by analyzing the frequency of communication events with a Poisson regression, we could demonstrate that with the HWD, the mentor had to request situation reports less often ($p < 0.001$) but provided more instructions ($p = 0.004$) and more feedback ($p = 0.008$). As a possible consequence, participants in the HWD condition rated their workload as lower than participants who used a phone to communicate ($p = 0.45$). Conclusion: The study demonstrates that HWD-based telemedicine systems can be rated positively by physicians, can benefit communication, and can provide more opportunities for the detection of clinical errors.

DOI: 10.1089/tmj.2023.0379
PMID: 38215270 [Indexed for MEDLINE]

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PREHOSPITAL CARE

– systematic review & meta-analysis –

1. Scand J Trauma Resusc Emerg Med. 2024 May 10;32(1):40. doi: 10.1186/s13049-024-01213-1.

Efficacy of endotracheal intubation in helicopter cabin vs. ground: a systematic review and meta-analysis.

Kolaparambil Varghese LJ(1)(2), Völlering JJ(3), De Robertis E(4), Hinkelbein J(5)(6), Schmitz J(7)(8), Warnecke T(9).

BACKGROUND: Pre-hospital endotracheal intubation (ETI) is a sophisticated procedure with a comparatively high failure rate. Especially, ETI in confined spaces may result in higher difficulty, longer times, and a higher failure rate. This study analyses if Helicopter Emergency Medical Services (HEMS) intubation (time-to) success are influenced by noise, light, and restricted space in comparison to ground intubation. Available literature reporting these parameters was very limited, thus the reported differences between ETI in helicopter vs. ground by confronting parameters such as time to secure airway, first pass success rate and Cormack-Lehane Score were analysed.

METHODS: A systematic review and meta-analysis were conducted using PUBMED, EMBASE, Cochrane Library, and Ovid on October 15th, 2022. The database search provided 2322 studies and 6 studies met inclusion and quality criteria. The research was registered with the International Prospective Register of Systematic Reviews (CRD42022361793).

RESULTS: A total of six studies were selected and analysed as part of the systematic review and meta-analysis. The first pass success rate of ETI was more likely to fail in the helicopter setting as compared to the ground (82,4% vs. 87,3%), but the final success rate was similar between the two settings (96,8% vs. 97,8%). The success rate of intubation in literature was reported higher in physician-staffed HEMS than in paramedic-staffed HEMS. The impact of aircraft type and location inside the vehicle on intubation success rates was inconclusive across studies. The meta-analysis revealed inconsistent results for the mean duration of intubation, with one study reporting shorter intubation times in helicopters (13,0s vs.15,5s), another reporting no significant differences (16,5s vs. 16,8s), and a third reporting longer intubation times in helicopters (16,1s vs. 15,0s).

CONCLUSION: Further research is needed to assess the impact of environmental factors on the quality of ETI on HEMS. While the success rate of endotracheal intubation in helicopters vs. on the ground is not significantly different, the duration and time to secure the airway, and Cormack-Lehane Score may be influenced by environmental factors. However, the limited number of studies reporting on these factors highlights the need for further research in this area.

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PMID: 38730289 [Indexed for MEDLINE]

Journal report – květen 2024

2. Neurosurg Rev. 2024 May 3;47(1):202. doi: 10.1007/s10143-024-02436-7.
Prevalence and influencing factors of patient delay in stroke patients: a systematic review and meta-analysis.
Dong J(1), Ma Y(2)(3), Chen Y(1), Guo J(1), Zhang T(1), Yang T(1), Zhang H(4), Yan F(1), Han L(5)(6).

PURPOSE: Determine the prevalence and influencing factors of patient delay in stroke patients and explore variation in prevalence by country and delayed time.
METHODS: PubMed, The Cochrane Library, Embase, Web of Science, China National Knowledge Infrastructure (CNKI), Chinese Biomedical Database (CBM), Weipu database, and Wanfang database were comprehensively searched for observational studies from inception to April, 2023. The pooled prevalence, odds ratio (OR), and 95% confidence intervals (CI) were calculated with Stata 16.0 software.
RESULTS: In total, 2721 articles were screened and data from 70 studies involving 85,468 subjects were used in meta-analysis. The pooled prevalence of patient delay in stroke patients was 59% (95% CI, 0.54-0.64). The estimates of pooled prevalence calculated for African, Asian, and European patient delay in stroke patients were 55% (0.29-0.81), 61% (0.56-0.66), and 49% (0.34-0.64).According to the patient delay time, the prevalence of 6 h, 5 h, 4.5 h, 3.5 h, 3 h and 2 h were 54% (0.47-0.61), 73% (0.61-0.86), 60% (0.49-0.71), 81% (0.68-0.93), 52% (0.42-0.62), 63% (0.19-1.07). Distance from the place of onset to the hospital > 10 km [OR=2.49, 95%CI (1.92, 3.24)], having medical insurance [OR = 0.45, 95%CI (0.26,0.80)], lack of stroke-related knowledge [OR = 1.56, 95%CI (1.08,2.26)], education level below junior high school [OR = 1.69, 95%CI (1.22,2.36)], non-emergency medical services (Non-EMS) [OR = 2.10, 95%CI (1.49,2.97)], living in rural areas [OR = 1.54, 95%CI (1.15,2.07)], disturbance of consciousness [OR = 0.60, 95%CI (0.39,0.93)], history of atrial fibrillation [OR = 0.53, 95%CI (0.47,0.59)], age ≥ 65 years [OR = 1.18, 95%CI (1.02,1.37)], National institutes of health stroke scale (NIHSS) ≤ 4 points [OR= 2.26, 95%CI (1.06,4.79)]were factors for patient delay in stroke patients.
CONCLUSIONS: The prevalence of patient delay in stroke patients is high, we should pay attention to the influencing factors of patient delay in stroke patients and provide a theoretical basis for shortening the treatment time of stroke patients.

DOI: 10.1007/s10143-024-02436-7
PMID: 38700541 [Indexed for MEDLINE]

Journal report – květen 2024

3. Ann Biomed Eng. 2024 May;52(5):1136-1158. doi: 10.1007/s10439-024-03442-y. Epub 2024 Feb 15.

Cardiorespiratory Sensors and Their Implications for Out-of-Hospital Cardiac Arrest Detection: A Systematic Review.

Lingawi S(#)(1)(2)(3), Hutton J(#)(4)(5)(6)(7), Khalili M(#)(4)(8)(6)(7), Shadgan B(4)(9)(10)(11), Christenson J(4)(5)(6)(7), Grunau B(4)(5)(6)(7), Kuo C(4)(9)(8).

Out-of-hospital cardiac arrest (OHCA) is a major health problem, with a poor survival rate of 2-11%. For the roughly 75% of OHCAs that are unwitnessed, survival is approximately 2-4.4%, as there are no bystanders present to provide life-saving interventions and alert Emergency Medical Services. Sensor technologies may reduce the number of unwitnessed OHCAs through automated detection of OHCA-associated physiological changes. However, no technologies are widely available for OHCA detection. This review identifies research and commercial technologies developed for cardiopulmonary monitoring that may be best suited for use in the context of OHCA, and provides recommendations for technology development, testing, and implementation. We conducted a systematic review of published studies along with a search of grey literature to identify technologies that were able to provide cardiopulmonary monitoring, and could be used to detect OHCA. We searched MEDLINE, EMBASE, Web of Science, and Engineering Village using MeSH keywords. Following inclusion, we summarized trends and findings from included studies. Our searches retrieved 6945 unique publications between January, 1950 and May, 2023. 90 studies met the inclusion criteria. In addition, our grey literature search identified 26 commercial technologies. Among included technologies, 52% utilized electrocardiography (ECG) and 40% utilized photoplethysmography (PPG) sensors. Most wearable devices were multi-modal (59%), utilizing more than one sensor simultaneously. Most included devices were wearable technologies (84%), with chest patches (22%), wrist-worn devices (18%), and garments (14%) being the most prevalent. ECG and PPG sensors are heavily utilized in devices for cardiopulmonary monitoring that could be adapted to OHCA detection. Developers seeking to rapidly develop methods for OHCA detection should focus on using ECG- and/or PPG-based multimodal systems as these are most prevalent in existing devices. However, novel sensor technology development could overcome limitations in existing sensors and could serve as potential additions to or replacements for ECG- and PPG-based devices.

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