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OUT-OF-HOSPITAL CARDIAC ARREST AS A MANDATORY REPORTABLE DISEASE – FIRST EXPERIENCES FROM NORWAY

^{1,2}J Kramer-Johansen*, ²I Tjelmeland, ³J Langørgen, ⁴E Søreide. ¹Oslo University Hospital, Oslo, Norway; ²University of Oslo, Oslo, Norway; ³Haukeland University Hospital, Bergen, Norway; ⁴Stavanger University Hospital, Stavanger, Norway

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Aim Survival after cardiac arrest (CA) depends on the time-critical interventions summarised in the chain of survival – identification and alarming, cardiopulmonary resuscitation (CPR), defibrillation (if appropriate), and standardised post-arrest care. Voluntary, population based CA-registries have indicated significant improvements in survival associated with improved performance. Systematic improvement is based on repeated cycles of; measure to identify weakness, interventions to improve, and measure again to verify changes and effects. Strengthening CA-registries by making CA a mandatory reportable disease enables implementation.

Methods Norway has a population of ~5.2 million. The Norwegian Cardiac Arrest Registry (NorCAR) restarted in 2013 with mandatory reporting in collaboration with Norwegian Cardiovascular Disease Registry. We measured “coverage” as the percentage of the Norwegian population served by the reporting EMS, and report incidence and survival rates per 100 000 person-years.

Results Out of the 19 EMS health trusts in Norway, the number reporting to NorCAR (coverage) increased from 8 (47%) in 2013, to 17 (92%) in 2015, and by 2017 all EMS health trust are reporting. Incidence rates of ambulance-treated CA have increased: 41, 44, 48, and 51. Thirty-day survival rates from all-cause out-of-hospital CA in 2013, 2014, and 2015 were: 7.7 (19%), 5.9 (14%), 7.3 (15%), respectively. For first 2/3 of 2016 numbers are 6.8 (13%).

Conclusion Establishing mandatory reporting is valuable when creating a population based registry. Regional variations inspire further work to improve reporting and quality. Close involvement of the local registrars and feeding back the results to local EMS are our main strategies.

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HELICOPTER EMERGENCY MEDICAL SERVICES IN MAJOR INCIDENT MANAGEMENT: NATIONAL NORWEGIAN CROSS-SECTIONAL SURVEY

^{1,2,3}AS Johnsen*, ^{1,2,4}SJM Sollid, ^{1,5}T Vigerust, ^{1,5}M Jystad, ^{1,2,3}M Rehn. ¹Department of Research and Development, Norwegian Air Ambulance Foundation, Drøbak, Norway; ²Department of Health Studies, University of Stavanger, Stavanger, Norway; ³Department of Anaesthesiology, Oslo University Hospital, Oslo, Norway; ⁴Norway Air Ambulance Department, Oslo University Hospital, Oslo, Norway; ⁵Norwegian Air Ambulance Ltd, Lørenskog/Dombås Base, Lørenskog/Dombås, Norway

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Aim Helicopter Emergency Medical Services (HEMS) and Search and Rescue (SAR) helicopters are highly specialised, sparse resources that are used in major incidents (MI) to transport medical personnel to the scene for triage, treatment and transport.¹ We aimed to collect data on experiences from Norwegian HEMS/SAR from the last five years to identify potential areas of improvement in preparedness for and management of MI.

Methods All Norwegian HEMS/SAR personnel were invited to participate in a cross-sectional survey. They were presented with questions regarding basic demographic data, experience from real incidents and training and equipment.

Results Of 329 invited, 229 (70%) responded. Rescue paramedics and pilots had experience from a median of three MI, doctors had experience from a median of one. Road traffic incidents were most common (n=61, 48%), blunt trauma the dominating injury (n=51, 59%). HEMS/SAR crewmembers mainly contributed with triage, treatment and transport. Multiple helicopters attended 83% of the incidents. Own or other HEMS/SAR unit coordinated on-scene helicopters in 71% of MI, only 41% of the pilots had guidelines for coordination. Communication with participating agencies was described as bad prior to arrival, but good to excellent on-scene. Among SAR pilots, 80% (n=20) reported lack of equipment for situational awareness, but only 9% (n=3) among the HEMS pilots. More interdisciplinary exercises were desirable.

Conclusion HEMS/SAR crewmembers have infrequent exposure to MI management. Communication remains a challenge. Training on frequent scenarios with other agencies is called for.

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CITIZENS' UTILISATION AND SATISFACTION WITH A NOVEL ORGANISATIONAL STRUCTURE OF PREHOSPITAL ACCESS TO HOSPITAL CARE

^{1,2}H Gamst-Jensen*, ¹N Blomberg, ¹F Folke, ¹F Lippert. ¹Emergency Medical Services Copenhagen, Ballerup, Denmark; ²The National Institute for Public Health, University of Southern Denmark, Copenhagen, Denmark

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Aim The ambulance service (EMS) and out-of-hours service (OOH) of Capital Region of Copenhagen (EMS Copenhagen) was united January 1st 2014, featuring only two phone numbers to call in case of acute illness or injury: 112 for life threatening conditions, and 1813 for non-urgent conditions. All prehospital access to in-hospital acute care is pre-assessed and guided to the nearest appropriate hospital with least waiting time (capacity controlling). The aim of this study was to describe citizens' utilisation and satisfaction with the Copenhagen-Model (CM).

Methods Data was delivered by the Emergency Departments (ED) database and the internal database for EMS Copenhagen. Utilization-analysis of OOH and ED components before (2013) and after (2014–2015) implementation of the new structure was examined. Satisfaction-analysis with the CM was evaluated by an external facility April 1st to October 1st (2171 questionnaires – response-rate 36%).

Results The OOH service (1.8 million inhabitants) receives approx. 265 calls/1000 citizens annually. The introduction of the CM resulted in a decrease of contacts to the ED – 5 66 606 contacts in 2013 to 5 16 738 and 4 97 389 contacts in 2014 and 2015, respectively ($p < 0.05$). Capacity controlling showed that citizens referred to ED for emergency triage had an average time from call to treatment-start of 62 min (non-urgent 93 min). Approx. 93% of callers to the OOH had a good-very good experience with the service.

Conclusion EMS capacity controlling for non-urgent conditions showed a significant decrease in ED contacts, and has proven successful with 93% of callers having a good-very good experience with the service.

Conflict of interest None declared.

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25 MACHINE LEARNING – A NOVEL APPROACH TO INCREASE RECOGNITION OF OUT OF HOSPITAL CARDIAC ARREST DURING CALLS TO EMERGENCY MEDICAL DISPATCH CENTRES

^{1,2}NF Blomberg*, ^{1,2}F Folke, ^{1,2}TP Møller, ^{1,2}F Lippert. ¹Emergency Medical Services Copenhagen, Ballerup, Denmark; ²University of Copenhagen, Denmark

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Aim The chance of surviving Out of Hospital Cardiac Arrest (OHCA) is highly correlated with medical dispatchers' recognition of the condition during emergency calls. The median sensitivity for OHCA recognition across studies is around 70%. (1) This leaves room for improvement. A novel approach is to improve recognition of OHCA by applying Machine Learning directly on the call-dialogue. The aim of the study is to investigate if recognition can be increased by use of Machine Learning.

Methods Our study used 489 emergency calls regarding OHCA received at the Emergency medical Dispatch Centre Copenhagen (EMDC) in 2013 and a control group of 571 non-OHCA calls. All calls were transcribed and then divided into two datasets, one for training the machine learning model (275 OHCA-calls, 361 non-OHCA calls), and one for testing the model. The Machine Learning model automatically detected patterns and predictive word contexts in relation to

OHCA/non-OHCA. The model identified words associated with OHCA, and was able to determine whether a call was regarded as OHCA.

Results The Machine Learning model reached a sensitivity of 95.3% on 214 transcribed OHCA-calls (204 true positive/10 false negative) and a control group of 210 non-OHCA calls. Specificity for the Machine Learning model was 99.0%.

Conclusion These early results show that a Machine Learning model based on neural networks has potential to improve recognition of OHCA. The results are thought-provoking and invites to further research.

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26 SYSTEMATIC INFLUENCES OF THE IMPLEMENTATION OF A COMPREHENSIVE 24/7-TELEMEDICINE SYSTEM INTO EMERGENCY MEDICAL SERVICE

^{1,2}SK Beckers*, ¹S Bergrath, ¹F Hirsch, ^{1,2}M Felzen, ¹R Rossaint. ¹Department of Anaesthesiology, University Hospital Aachen, RWTH Aachen University; ²Medical Direction, Emergency Medical Service, City of Aachen, Germany

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Aim Demographic changes, decreasing availability of general practitioners, and at least regional shortage of qualified emergency medical service (EMS) physicians led to increasing arrival times and quality problems. Telemedical solutions could help to solve some of the problems.

Methods Overall safety and feasibility of prehospital telemedically guided care was already proven in two research projects from 2007 to 2013.^{1–3} Their results led to implementation of a multifunctional mobile telemedicine system in the city of Aachen, Germany. From 04/2014 to 03/2015 all ambulances were equipped with a telemedicine system connected to a teleconsultation centre staffed with anesthesiologists experienced in emergency care. Audio, real-time vital data, 12-lead-ECG, picture transmission, and video streaming from ambulances was accomplished with encrypted and parallelized transmission using. Mission numbers prior and after implementation were compared to evaluate systematic influence.

Results From 04/2014 to 06/2016 overall 4.901 EMS missions were supported and guided telemedically: $n = 4.151$ emergency missions (85%) and $n = 750$ (15%) inter-hospital transfers. Prior to implementation (04/2013–03/2014) 17.305 solely ambulance missions (68.7%) and 7.882 ambulance plus EMS physician unit missions were performed (31.3%). After implementation (04/2015–03/2016) 20.102 ambulance missions (76%) and 6.360 ambulance plus EMS physician missions (24%) were conducted which revealed a significant difference between both phases, $p < 0.0001$.

Conclusion The implementation of a telemedicine system into routine care led to a significant decrease in conventional on-scene physician missions as well as to an overall decrease in physician guided EMS cases. Therefore, the approach can be judged resource optimising and holds a potential for economic