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Postersession IV

Abstract 2
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Titel Systematic rhythm analysis of automated external defibrillators reveals a high proportion of shockable rhythm

Introduction
There is little information about systematic downloading and rhythm analyses of data retrieved from Automated External Defibrillators (AEDs) that have been deployed by untrained laypersons during out-of-hospital cardiac arrest (OHCA). We sought to describe our experience with systematic downloading of deployed AEDs. The primary analysis was the comparison between the proportion of shockable rhythm from AEDs used by laypersons and the corresponding proportion recorded by the Emergency Medical Services (EMS) on arrival. Secondary endpoints were return of spontaneous circulation and 1-month rate of survival with minimal neurological impairment (cerebral performance category scale 1).

Methods
In a 20-month, prospective, observational study, we collected data on OHCA in the Capital Region of Denmark (population 1.7 million) where an AED was deployed prior to EMS arrival. The AEDs were brought to the emergency medical dispatch centre for data downloading and rhythm analysis. The EMS rhythm analyses were obtained from the Danish Cardiac Arrest Register between 2001 and 2010. Only patients with OHCA of presumed cardiac origin were included. The arrest was presumed to be of cardiac origin if it was not caused by trauma, exanguination, drowning, intoxication, hypoxia or other obvious non-cardiac causes. A sample of 120 cardiac arrests would allow us to detect a difference in shockable rhythms between initial EMS and AED rhythm analyses from 25% to 50% with a statistical power of at least 80% at the 5% significance level.

Results
A total of 121 AEDs were deployed, of which 91 cases were OHCA with presumed cardiac origin. The prevalence of initial shockable rhythm was 55.0% (95% CI [44.7-64.8%]). This was significantly greater than the corresponding proportion recorded by the EMS (27.6%, 95% CI [27.0-28.3%], p<0.0001). Shockable arrests were significantly more likely to be witnessed (92% vs. 34%, p<0.0001), occur during exercise (28% vs. 2%, p=0.001) and have a higher bystander CPR rate (98% vs. 85%, p=0.04) compared to non-shockable arrests (Table 1). More patients with initial shockable rhythm achieved return of spontaneous circulation upon hospital arrival (88% vs. 7%, p<0.0001) and had higher 30-day survival rate (72% vs. 5%, p<0.0001). There was no difference in EMS response time between shockable and non-shockable arrests (median, 5.7 min vs. 6.7 min, p=0.22).

Conclusions
In conclusion, AEDs used by laypersons revealed a higher proportion of shockable rhythms compared to the EMS rhythm analyses.

| Table 1 Out-of-hospital cardiac arrest with deployment of automated external defibrillators by laypersons |
|--------------------------------------------------|------------------|-----------------|-----------------|-----------------|
| | OHCA with initial shockable rhythm (N=50) | OHCA with initial non-shockable rhythm (N=41) | p-Value |
| Age, years [25-75%] | 66 [59-77] | 68 [53-81] | 0.94 |
| Male sex, no. | 39 (78) | 24 (59) | 0.07 |
| Bystander witnessed | 46 (92) | 14 (34) | <0.0001 |
| Bystander CPR | 49 (98) | 35 (85) | 0.04 |
| Time | | | 0.27 |
| 8 AM to 4 PM | 31 (62) | 22 (54) | |
| 4 PM to 12 PM | 15 (30) | 11 (27) | |
| 12 AM to 8 AM | 4 (8) | 8 (19) | |
| Activity | | | <0.0001 |
| During exercise | 14 (28) | 1 (2) | |
| Mild physical activity | 19 (38) | 12 (29) | |
| Sedentary activity | 12 (24) | 11 (27) | |
| Not described | 5 (10) | 17 (42) | |
| Location | | | <0.0001 |
| Residential | 5 (10) | 16 (39) | |
| Non-public (companies etc.) | 12 (24) | 2 (5) | |
| Sports facility | 14 (28) | 1 (3) | |
| Public (other) | 13 (26) | 5 (12) | |
| Not described in medical records | 5 (10) | 17 (41) | |
| EMS response time*, min [25-75%] | 5.7 [3.6-8.3] | 6.7 [4.4-9.2] | 0.22 |

Data are frequencies (%) unless otherwise indicated. OHCA, out-of-hospital cardiac arrest; CPR, cardiopulmonary resuscitation; EMS, emergency medical services; BLS, basic life support; ALS, advanced life support.
*Time from dispatch to arrival on scene.
Abstract 3

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Titel Prognostic implication of out-of-hospital cardiac arrest in patients with cardiogenic shock and acute myocardial infarction

Objectives

To compare outcome in patients with acute myocardial infarction (MI) and cardiogenic shock (CS) presenting with and without out-of-hospital cardiac arrest (OHCA).

Background

Despite general improvement in outcome after acute MI, CS remains a leading cause of death in acute MI patients with a high 30-day mortality rate. [1,2,3] OHCA on top of cardiogenic shock may further increase mortality in these patients resulting in premature withdrawal of supportive therapy, but this is not known.

Methods

In a retrospective study from 2008 - 2013, 248 consecutive patients admitted alive to a tertiary centre with the diagnosis of CS and acute MI were enrolled.

Results

118 (48%) presented with OHCA and 130 (52%) without (non-OHCA patients). Mean lactate level at admission was significantly higher in OHCA patients compared with non-OCHA patients (9 mmol/l (SD 6) vs. 6 mmol/l (SD 4) p<0.0001). Co-morbidities were more prevalent in the non-OHCA group. By univariate analysis age (Hazard ratio (HR)= 1.02 [CI 1.00-1.03], p=0.01) and lactate at admission (HR= 1.06 [CI 1.03-1.09], p<0.001), but not OHCA (HR= 1.1 [CI 0.8-1.4], p=0.58) was associated with mortality. In multivariate analysis, only age (HR =1.02 [CI 1.01-1.04], p=0.003) and lactate level at admission (HR=1.06 [1.03-1.09], p<0.001) were independent predictors of mortality. One-week mortality was 63% in the OHCA group and 56% in the non-OHCA group, p=0.77.

Conclusion

OHCA is not an independent predictor of mortality in patients with acute MI complicated by cardiogenic shock. This should encourage active intensive treatment of CS patients regardless of OHCA.

References


Abstract 4
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Medforfattere Morten Hylander Møller, Lars hyldborg Lundstrøm

Titel Characteristics and mortality in emergency abdominal surgery: a cohort study.

Background
Emergency abdominal surgery is common, but with few outcome data. We aimed to determine the 30-day mortality rate in a consecutive Danish population-based cohort.

Method
A total of 4920 adult patients undergoing emergency laparotomy or laparoscopic surgery, from January 1, 2009, to December 31, 2010, in 13 Danish gastrointestinal surgery departments were included. We excluded patients undergoing appendectomy or negative diagnostic laparoscopy. The surgical procedure codes were retrieved from The National Patient Register (NPR) and matched to data from the Danish Anaesthesia Database (DAD) by the civil registry number. Surgical priority (emergency or planned) and ASA score were registered from the DAD perioperatively. Chalsons co-morbidity index score was calculated from hospital discharge ICD-10 diagnostic codes registered from 2004 until the index operation. The primary outcome measure, all-cause 30-day mortality, was retrieved from the Danish Civil Registration system.

Results
We retrieved 14,719 procedures codes of which 93.4% were matched to DAD perioperative data (table 1). In all, 4920 patients were eligible for inclusion. The 30-day mortality rate was 18.0% (C.I. 16.9 – 19.1). A total of 65.9% of the patients were above 60 years. A total of 69.4% of the patients had one or more co-existing diseases (Charlsons index score 1 or above). Furthermore 47.5% had severe systemic disease pre-operatively (ASA score 3 or above) with an associated 30-day mortality rate of 31.7 (C.I. 29.8 – 33.6).

Conclusion
Emergency abdominal surgery has a high 30-day mortality rate. This high-risk group comprises patients of advanced age and with significant co-existent diseases.

<table>
<thead>
<tr>
<th>Table 1: Flow-chart of study cohort selection</th>
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<tbody>
<tr>
<td>14,719 procedures retrieved from The NPR*</td>
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<tr>
<td>┌──────────┐</td>
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<tr>
<td>│ 13,744 procedures</td>
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<td>│ ┌──────────┐</td>
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<tr>
<td>│ │ 8,233 planned procedures were excluded</td>
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<td>│ │ ┌──────────┐</td>
</tr>
<tr>
<td>│ │ │ 5,511 procedures</td>
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<tr>
<td>│ │ │ │ 573 emergency procedures other than the first were excluded</td>
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<td>│ │ │ │ ┐──────────┐</td>
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<tr>
<td>│ │ │ │ │ 4,938 procedures</td>
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<td>│ │ │ │ │ ┌──────────┐</td>
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<tr>
<td>│ │ │ │ │ │ 18 emergency procedures on emigrated patients were excluded</td>
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<tr>
<td>│ │ │ │ │ │ ┐──────────┐</td>
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<tr>
<td>│ │ │ │ │ │ │ 4,920 procedures</td>
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<tr>
<td>│ │ │ │ │ │ │ 975 procedures with no match in DAD were excluded</td>
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<td>│ │ │ │ │ │ ┐──────────┐</td>
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<td>│ │ │ │ │ │ │ 13,744 procedures</td>
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<td>│ │ │ │ │ │ ┐──────────┐</td>
</tr>
<tr>
<td>│ │ │ │ │ │ │ 14,719 procedures retrieved from The NPR*</td>
</tr>
</tbody>
</table>

* In all 13 healthcare centres contributed to the cohort: Herlev Hospital, Rigshospitalet, Hvidovre Hospital, Bispebjerg Hospital, Glostrup Hospital, Hospital of North Zealand (1. Jan 2010 - 31. Dec. 2010), Nykøbing Falster Hospital, Naestved Hospital, Horsens Hospital, Vejle Hospital, Randers Hospital (1. Jan. 2009 - 31. Mar. 2010), Kolding Hospital and Thy-Mors Hospital.
Background
The use of point-of-care ultrasound in evaluation of critically ill patients has increased rapidly in recent years. Common causes of critical illness and shock include pulmonary embolism and hypoxia. Pulmonary embolism causes pressure overload and dilatation of the right side of the heart, resulting in D-shaping of the left ventricle (Goldhaber 2002). This has been regarded almost as a patognomonic ultrasonic finding in pulmonary embolism. Prolonged respiratory failure causes hypoxia and thereby pulmonary vasoconstriction (Zapol & Snider 1977). This may result in right-sided dilatation and a small D-shaped left ventricle similar to findings in pulmonary embolism. Hence, respiratory failure may represent a differential diagnosis in critically ill patients with ultrasonic evidence of left ventricular D-shaping.

Methods
19 piglets (13 apnoea group, 6 controls) were anesthetized and submitted to mechanical ventilation. An arterial line and a pulmonary artery catheter were inserted for invasive measurements. Normocapnia and normoxia was achieved. After baseline readings, ventilation was ceased and the intubation tube was blocked (apnoea group) until cardiac arrest. Invasive measurements and ultrasonic cine loops of the parasternal short axis view were obtained every 30 seconds. Offline analyses of cine loops were performed blinded from the time point of acquisition. D-shape of the left ventricle was assessed using the eccentricity index, defined as the ratio between two inner perpendicular radii of which one is perpendicular to the interventricular septum. An eccentricity index of 1 is considered a normal circular shaped left ventricle whereas septal flattening and D-shape of the left ventricle would lead to an increase in the eccentricity index.

Results
The ultrasonic appearance of the left ventricle changed shortly after the apnoea-induced hypoxia commenced. Within the first two minutes, the RV dilated and the interventricular septum shifted towards the left side creating a D-shaped left ventricle. The increase of eccentricity index from 1.14 (1.09 – 1.32) at baseline to 1.9 (1.46 – 2.64) at 1.5 minutes consolidates these observations. After the initial changes, the RV dilatation and concomitant septal flattening partially withdrew for a short time before a second phase of RV dilatation commenced. Again, these changes are sustained by the changes in eccentricity index (figure 2). Invasive measurements are shown in figure 2.

Discussion
Hypoxia caused a D-shaping of the left ventricle identical to the one seen in pulmonary embolism. Although completed in piglets, this study suggests that hypoxia should be considered as a causal mechanism in critically ill patients with D-shaping of the left ventricle, but further clinical studies are needed.

Conclusion
Prolonged hypoxia causes dilatation of the right ventricle, and a small D-shaped the left ventricle in piglets.
Introduktion
De fleste hospitaler har retningslinjer for, hvornår man kan tilkalde anæstesipersonale til PVK-anlæggelse. På Sygehus Vendsyssel er gældende retningslinje, at PVK-anlæggelse først forsøges af plejepersonale, dernæst læge, og derefter kan anæstesipersonale tilkaldes. Dette gælder i princippet, uanset hvor svær PVK-anlæggelsen forventes at være.
Vi har udviklet en ny PVK-guideline, som inddeler patienter og fagpersoner i 4 matchende kategorier efter hhv. sværhedsgrad og erfaringsniveau. Samtidig angives nyttige håndgreb samt retningslinjer for tilkaldelse af mere erfarent personale. Se Figur 1.

Hypotese: at implementering af den nye PVK-guideline inkl. 30 min. gruppeundervisning kan optimere muligheden for, at PVK-anlæggelse lykkes i første forsøg og dermed minimere antal gange patienter stikkes samt involvering af andre faggrupper.

Metoder

Resultater
Før PVK-guidelinens gældende var 57(63,3%) plejepersoner selv forsøg på at anlægge PVK, mens det efter PVK-guidelinens var 81(81,8%). Heraf lykedes det i første forsøg for hhv. 38(66,7%) og 66(81,2%) plejepersoner – en signifikant stigning i succesrate. For de resterende patienter blev der fra start tilkaldet anden faggruppe – et behov der faldt signifikant fra 33(36,7%) til 18(18,1%) patienter. Samlet behov for at involvere anden faggruppe faldt signifikant fra 44(48,9%) til 25(25,3%) patienter. Det gennemsnitlige antal stik var 1,40 (+/-0,87) og 1,22 (+/-0,53) hhv. før og efter, uden signifikant forskel. Se Tabel 1.

Diskussion
Resultaterne skyldes formentlig primært de 30 min. undervisning i succesoptimerende håndgreb, idet data viser, at gældende retningslinjer inden den nye PVK-guideline ikke blev fulgt, eftersom der blev tilkaldt anden faggruppe initialt til PVK-anlæggelsen for 36,7% af de 90 patien-
Derfor kan der ikke entydigt konkluderes på effekten af de 4 matchende kategorier i den nye guideline. Der måltes ikke på behandlingsforsinkelse, men denne minimeres formentlig med den nye PVK-guideline, idet der ses et fald i behov for tilkald af anden faggruppe.

**Konklusion**

Undervisning af plejepersonale som led i ny PVK-guideline forbedrede succersrate og minimerede behovet for tilkald af andre faggrupper, men ændrede ikke antal stik for patienterne signifikant. Videre undersøgelser: større studie på afdeling som følger gældende retningslinjer for PVK-anlæggelse samt behandlingsforsinkelse som effektmål. PVK-guidelinens kunne evt. supplere PVK-pakken.1


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### Tabel 1 Resultater

<table>
<thead>
<tr>
<th></th>
<th>For PVK-guideline (n = 90)</th>
<th>Efter PVK-guideline (n = 99)</th>
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</thead>
<tbody>
<tr>
<td>Antal af sygeplejersker/SSA2 der havde succes i første forsøg (succesrate i prosent)</td>
<td>38 (66,7%)</td>
<td>66 (81,5%)**</td>
</tr>
<tr>
<td>Antal patienter med 1 stik</td>
<td>69 (76,7%)</td>
<td>81 (81,8%)</td>
</tr>
<tr>
<td>Antal patienter med 2 stik</td>
<td>12 (13,3%)</td>
<td>15 (15,2%)</td>
</tr>
<tr>
<td>Antal patienter med 3 stik</td>
<td>5 (5,6%)</td>
<td>2 (2,0%)</td>
</tr>
<tr>
<td>Antal patienter med 4 stik</td>
<td>2 (2,2%)</td>
<td>1 (1,0%)</td>
</tr>
<tr>
<td>Antal patienter med 5 stik</td>
<td>2 (2,2%)</td>
<td>0</td>
</tr>
<tr>
<td>Gennemsnitligt antal stik pr. patient (SD)</td>
<td>1,40 (+/-0,87)</td>
<td>1,22 (+/-0,53)</td>
</tr>
<tr>
<td>Samlet antal patienter, hvor enten læge eller anæstesi tilkaldes til start</td>
<td>33 (36,7%)</td>
<td>18 (18,1%)***</td>
</tr>
<tr>
<td>Samlet antal patienter, hvor enten læge eller anæstesi tilkaldes til start eller senere</td>
<td>44 (48,9%)</td>
<td>25 (25,3%)***</td>
</tr>
</tbody>
</table>

**SSA = Social- og sundhedsassistent**

To-sidet signifikanttest er udført med z-test, men for gennemsnitligt antal stik pr. patient er anvendt t-test. *p-værdi < 0,05, ** p-værdi < 0,01, *** p-værdi < 0,001
Abstract J

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Titel  Medical students can easily acquire intraosseous cannulation skills

Introduction
In life-threatening emergencies with intravascular volume depletion, shock or even cardiac arrest, obtaining conventional intravascular access can be difficult due to peripheral vascular shutdown. Intraosseous (IO) access is recommended during resuscitation when conventional intravenous access is difficult and is a fast and safe method for administration of fluids, blood products and drugs. However, lack of training in the procedure may be a reason why the use of IO access is still limited in resuscitation. The aim of this study was to investigate if medical students could obtain competencies in OA access taught on a human cadaver course

Methods
Nineteen medical students (range 3th-12th semester) from the University of Copenhagen, all members of Students’ Society of Anaesthesiology and Traumatology, participated in the course. A modified Peyton’s four step approach was used for the hands-on training preceded by a short theoretical lesson. Following the course three observers evaluated performance during a procedure-specific OSCE using a checklist developed by the authors. Inter-observer agreement with Randolph’s free-marginal multirater kappa was compared to evaluate validity of the checklist.

Results
Fifteen students participated in the final OSCE. 11 students (73%) obtained the highest attainable points: 15. The median total score was 15 (range 12-15). There was no correlation between the failed items on the checklist for the 4 students who did not receive maximal points. The free-marginal kappa value was calculated to 0,7066 indicating substantial agreement between the observers.

Conclusion
This study has demonstrated that the fundamentals of safe IO-placement can be taught to medical students through a human cadaver course. Further studies are needed to validate the retention of the gained knowledge and different teaching modalities should be tested against each other. We suggest that the training in IO access could be a part of the curriculum at the universities to ensure highest standard of care in life-threatening situations.

Abstract K

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Medforfattere  Jakob Gjedsted, Erik Sloth, Jens Flensted Lassen og Hans Kirkegaard

Titel  The Cardiac Effects of Prolonged Hypothermia after Cardiac Arrest - (an ongoing study)

Background
In Denmark 3.500 out-of-hospital cardiac arrests (OHCA) occur every year. The 30-day mortality has over the last decade decreased from 95% to 90%. This improvement is believed to be primarily due to better pre-hospital treatment. There is evidence suggesting that mild therapeutic hypothermia (MTH) improves neurological outcome and survival after 6 months. The duration, target temperature and effects on the heart and circulation have, however, still not been fully investigated.

Design
This PhD study is a sub study in a Scandinavian randomized controlled multi center trial titled: “TTH48”, where resuscitated but still comatose OHCA patients are randomised to 24 versus 48 hours therapeutic hypothermia (33±1°C). Primary endpoint of the TTH48 trial is Cerebral Performance Category Scale after half a year. The PhD study includes patients from Aarhus and Stavanger University Hospitals during a two year period from Feb 2013 to March 2015. A power calculation has been made on our blood sample and echocardiography sub studies and estimates the need for 100 patients to be included in the PhD study. By Aug 2014, 71 patients have been included.

Methods & endpoints
The aim of this study is to evaluate the cardiac effects of prolonged MTH. Focusing on the cardiac protection and hemodynamics we have divided the PhD study into 3 sub studies:
*Study 1 studies the myocardial protection quantified by blood samples: Troponin T, CK-MB, CoPeptin, NT-proBNP and NT-proANP. Primary endpoint is Area Under Curve of Troponin T.

*Study 2 is based on Echocardiography. By evaluating the longitudinal movement of the mitral annular plan using Tissue Doppler we indirectly measure the salvage of the subendocardial layer of the heart which is the most vulnerable to ischemia. Primary endpoint is Systolic myocardial velocity during and after MTH.

*Study 3a studies the need for inotropes in the 24 versus 48 hours group. A cumulative vasopressor index is being calculated. This sub study has descriptive character.

*Study 3b studies the Incidence of arrhythmias in the 24 versus 48 hours group. This sub study also has descriptive character.

**Perspective**

Studies on mortality after OHCA suggest that 65% of the mortality is due to hypoxia-induced neurological damage. Mortality and morbidity due to cardiac failure is however not well described. Nobody has to our knowledge ever studied the Cardiac Effects during prolonged MTH. Global ischemia and reperfusion injuries occur in all organs. Describing the potentially cardiac protective effects on the heart is important since post-resuscitation cardiac failure is associated with significant morbidity and decrease in quality of life in the individual patient. This study will potentially supply information on the isolated cardiac effects of MTH and hopefully contribute to the needed update on the guidelines on MTH in post-resuscitation care.

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**Abstract O**

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*Afdeling* Klinik Anæstesi

*Hospital/institution* Aalborg Universitetets Hospital

*Medforfattere* René Christian Bleeg

*Titel* Arctic... A MedEvac challenge?

**Introduction**

The Royal Danish Armed Forces had the responsibility to perform an international Search and Rescue (SAR) exercise in a remote arctic area. This exercise was performed in Greenland.

**Aim of exercise**

The aim of the Search and Rescue Exercise (SAREX) Greenland Sea 2012 and 2013 was to exercise the SAR organisations of the 8 Arctic Nations in a real live exercise providing SAR cooperation training to all participants in a remote Arctic environment. In particularity of interest for the Anaesthesiologist, was the organization of the Medical Evacuation Squadron 690 (MedEvac SQN 690) from the Royal Danish Air Force, which is a unit manned mainly with Anaesthesiologists, Nurse Anaesthetists and EMT’s. MedEvac SQN 690 performs routinely aeromedical evacuation of intensive care patients from all over the world. The patients are mainly military personnel.

**Organization of MedEvac SQN 690**

It was decided to organize the participating personnel from 690 SQN into three teams.

1. Forward Air Evacuation Team, FAET (1 squad leader, 1 anaesthesiologist, 2 paramedics and 1 nurse anaesthetist)
2. Casualty Staging Unit, CSU (1 AEOO, 1 squad leader, 1 consultant anaesthesiologist, 2 flight medics (EMT) and 2 nurse anaesthetists)
3. AirEvac Team, AE (1 squad leader, 1 consultant anaesthesiologist, 2 flight medics and 2 nurse anaesthetists)

**Cooperation with Aalborg University Hospital**

SQN 690 has an excellent cooperation with the local Aalborg University Hospital, so therefore the national Hypothermia team, which is also available in national SAR rescue missions, was included in the AirEvac Team. The Hypothermia team consists of 1 Thorax surgeon and 1 nurse perfusionist.

**Conclusion**

It is necessary to continue the cooperation between nations to overcome the arctic challenge. Ressources and assets are essential and so are continues and joint excercises. Time is essential. Communication in remote arctic areas is technical difficult. Medical ground teams were understaffed, especially in the CSU. The structure / organisation within the 690 SQN with the 3 teams (FAET, CSU, AIREVAC) was ideal. There was an excellent team work with international relief organizations. The tested patient tagging system (Smart Tag®) was excellent.

**Perspectives**

We must deploy the expertise from other existing (military) units, e.g. parachute deployment into remote areas. We must seek to make our equipment interchangeable, multifunctional and compatible.