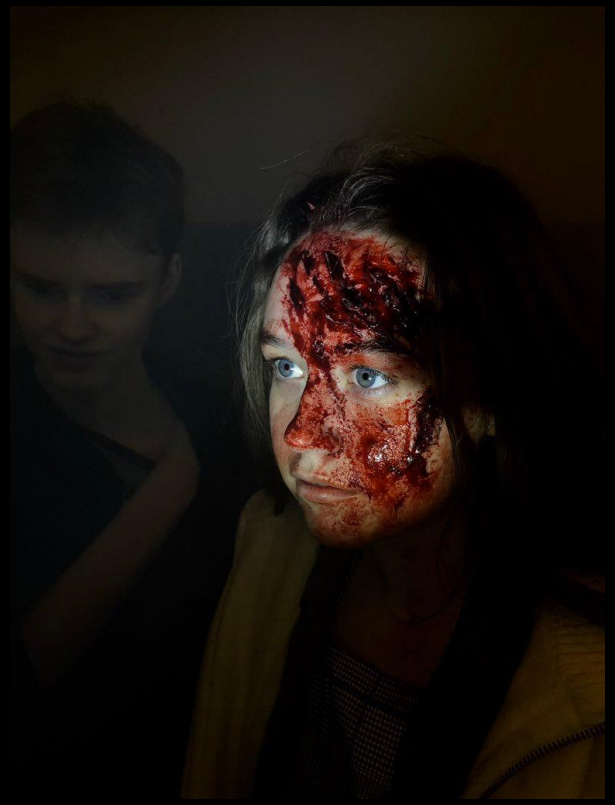
Uuendusi traumahaige käsitlusse 2019/01 ATACCilt

Sander Poks

Erakorraline meditsiin

IV aasta resident



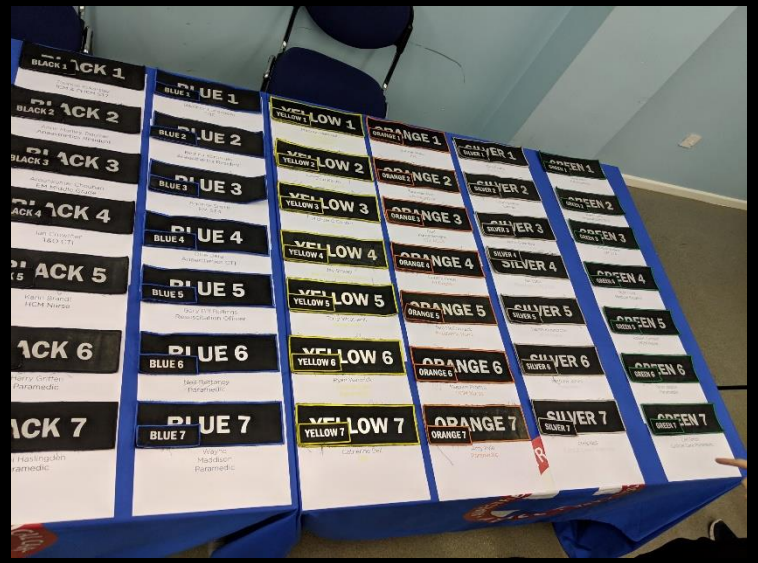
Anesthesia Trauma and Critical Care

- Kolmepäevane trauma simulatsioonikursus Inglismaal
- Ülimalt realistlikud simulatsioonid
- Kõige värskemad avaldatud uuringud ja ekspertarvamus
- Õppejõududeks traumaalased eksperdid üle maailma
- Tartu Ülikooli Sihtasutuse stipendium

ANAESTHESIA TRAUMA & CRITICAL CARE
ATACC
POLICE
POLICE
THE ATACC GROUP
EDUCATE | INNOVATE | OVERSEE

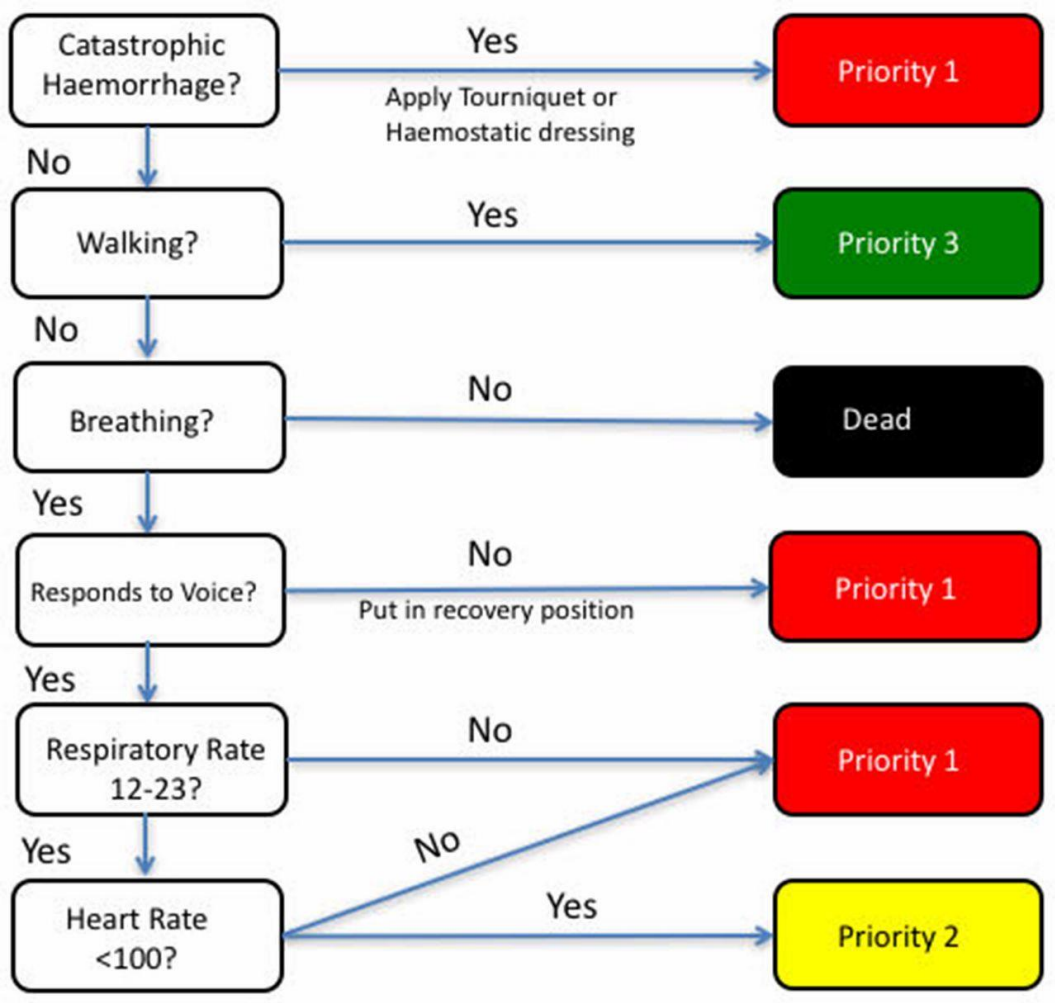
Formaat

- Töö 7 liikmelistes meeskondades
- Ühine varustus
- Juhtivliige vahetub situatsioonide vahel
- Situatsioonide vahel lühikesed teoorialoengud
- Situatsioonid
  - Esialgu mõned üksikkannatanud
  - Edasi peamiselt masskannatanusituatsioonid
    - Sündmuskohal
    - Ravipunktis
    - Transpordi käigus
    - EMOs



Esmane triaaž

- MPTT-24
  - hingamissagedus 12-23
  - pulsisagedus 100
  - täpsem kui START ja SIEVE



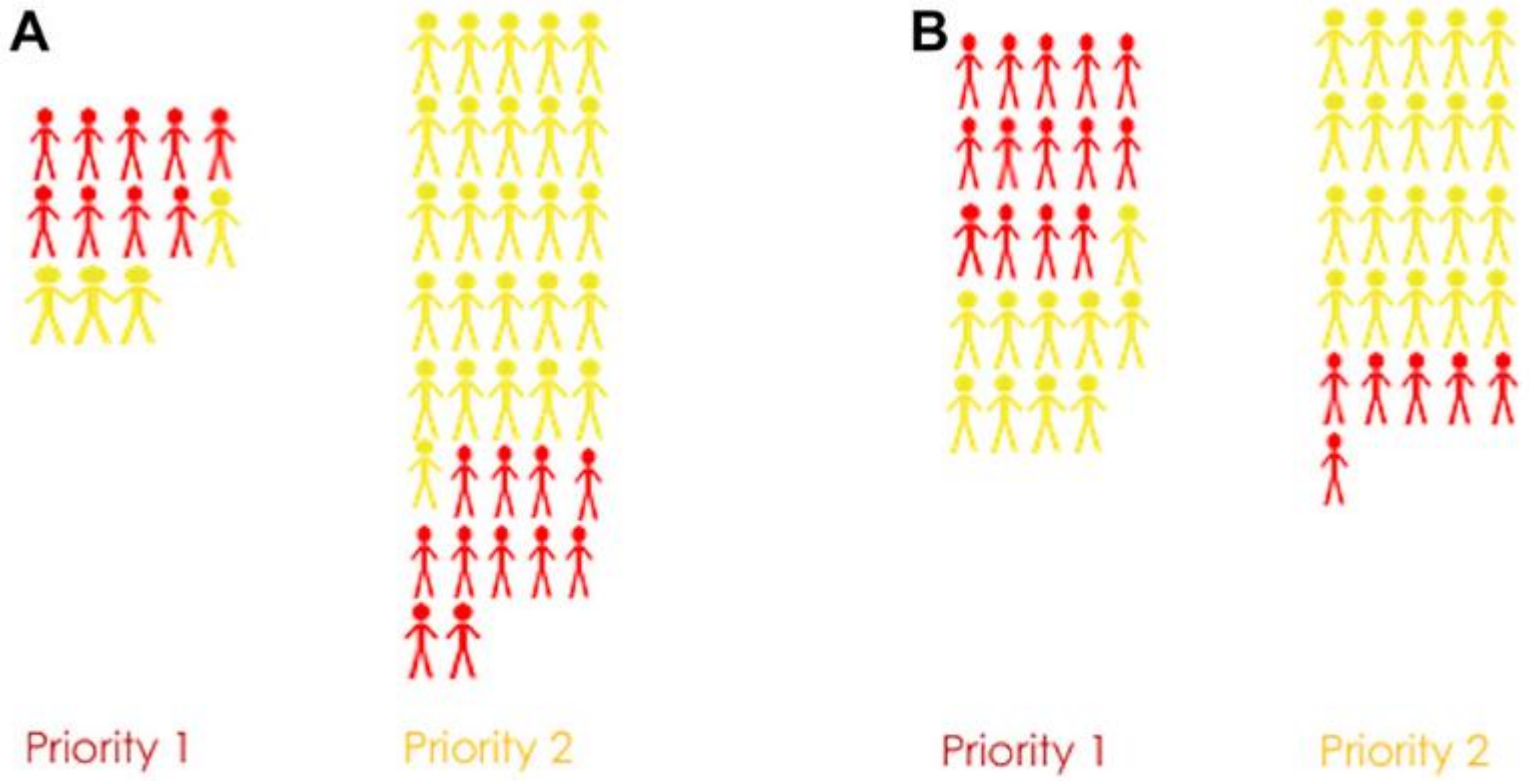


Figure 3 Comparison of under and overtriage rates between the Military Sieve (A) and Modified Physiological Triage Tool-24 (MPTT-24) (B).

Välised verejooksud

Väline verejooks

- **DDIT**
  - **D** – direct compression, otsene surve
  - **D** – more direct compression
    - eemalda kõik peale asetatud tampoonid/sidemed
    - fokuseeritud surve otse veritsuskohale
  - **I** – indirect pressure, kompresseeri proksimaalne soon
  - **T** – tourniquet – paigalda žgutt

Junktsionaalne verejooks

- Aksilla, kubemepiirkond
- Wound packing – haav sidet täis, seejärel surve
- Võimalusel kasuta hemostaatilist sidet

RSI ehk kiirinduktsioon

- Süstematiseeritud ja drillitud tegevus
- Teostab arstibrigaad, ettevalmistab juba esmasreageeriv brigaad
- 360 kraadi ligipääs
- Checklisti baasil kontrollitud varustus ja tingimused
- Apnoiline perioksügenisatsioon

RSI Check-List

Version Jan 2014

READ EVERY WORD AND WAIT FOR RESPONSE BEFORE MOVING TO NEXT LINE

What is indication for RSI ?	Response
PRE-OXYGENATE – Consider Nasal Prongs	**Check**
Oxygen cylinder more than 1/2 full or Wall source available	Check
Spare cylinder available under trolley	Check
Water's Circuit connected to Oxygen	Check
Face Mask, filter and End Tidal CO_2 Monitoring connected into circuit	Check
SUCTION working	**Check**
Hand-held back-up suction available	Check
BVM available	**Check**
Oropharyngeal & 2 nasopharygeal airways available	Check
LMA available if there is failure to intubate on 2nd attempt?	Check
Surgical airway kit available	Check
IV Running with access port connected	Check
2nd cannula in situ or IO available	Check
Drugs for Induction, what dose?	Response
Paralysing agent, what dose?	Response
What maintenance drugs are we using?	Response
Emergency drugs available?	Response
LARYNGOSCOPE working	**Check**
Back-up Laryngoscope working	Check
Bougie	Check
Tube size	Response
Alternate tube size	Response
Test tube cuffs	Check
Tube tie or tape	Check
Check Monitoring, what is the **O2 Saturation?**	Response
What is the **Blood Pressure?**	Response
What is the **Heart Rate?**	Response
Brief drug administrator	Briefing
Perform In-line immobiliser brief	Briefing
Perform Cricoid brief	Briefing
All listen for failed airway plan	Briefing
Optimise patient position	Ready
Check Complete	Proceed

BRIEF REPORT

CME

A Preprocedural Checklist Improves the Safety of Emergency Department Intubation of Trauma Patients

Kurt A. Smith, MD, Kevin High, RN, MPH, Sean P. Collins, MD, MSc, and Wesley H. Self, MD, MPH

Abstract

Objectives: Endotracheal intubation of trauma patients is a vital and high-risk procedure in the emergency department (ED). The hypothesis was that implementation of a standardized, preprocedural checklist would improve the safety of this procedure.

Methods: A preprocedural intubation checklist was developed and then implemented in a prospective pre-/postinterventional study in an academic trauma center ED. The proportions of trauma patients older than 16 years who experienced intubation-related complications during the 6 months before checklist implementation and 6 months after implementation were compared. Intubation-related complications included oxygen desaturation, emesis, esophageal intubation, hypotension, and cardiac arrest. Additional outcomes included time from paralysis to intubation and adherence to safety process measures.

Results: During the study, 141 trauma patients were intubated, including 76 in the prechecklist period and 65 in the postchecklist period. A lower proportion of patients experienced intubation-related complications in the postchecklist period (1.5%) than the prechecklist period (9.2%), representing a 7.7% (95% confidence interval = 0.5% to 14.8%) absolute risk reduction. Paralysis-to-intubation time was also lower in the postchecklist period (median = 82 seconds, interquartile range [IQR] = 68 to 101 seconds) compared to the prechecklist period (median = 94 seconds, IQR = 78 to 115 seconds; $p = 0.02$). Adherence to safety process measures also improved, with all safety measures performed in 69.2% in the postchecklist period compared to 17.1% before the checklist ($p < 0.01$).

Conclusions: Implementation of a preintubation checklist for ED intubation of trauma patients was associated with a reduction in intubation-related complications, decreased paralysis-to-intubation time, and improved adherence to recognized safety measures.

ACADEMIC EMERGENCY MEDICINE 2015;22:989–992 © 2015 by the Society for Academic Emergency Medicine

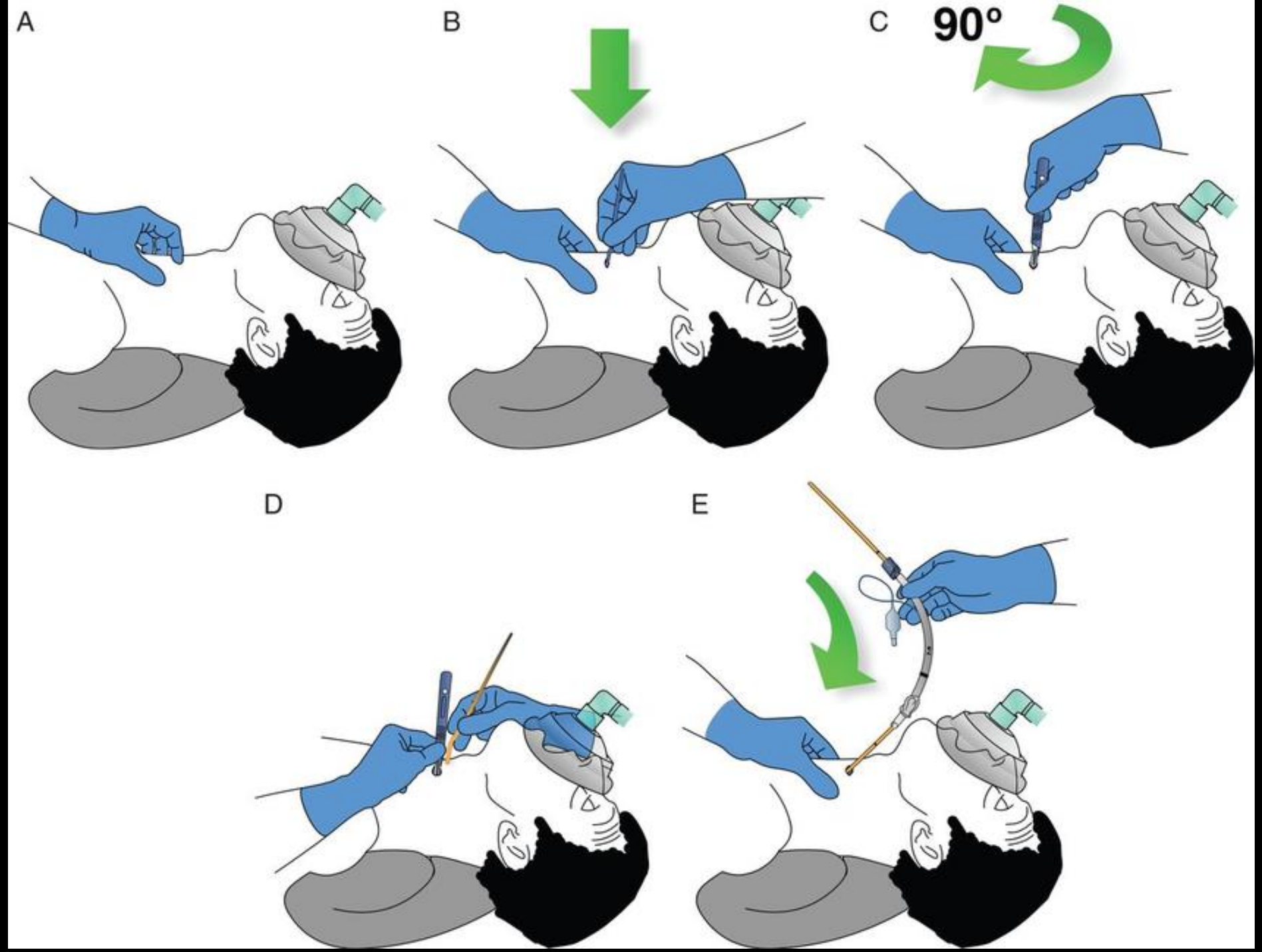
Table 1
Patient Outcomes During the Prechecklist and Postchecklist Periods

Outcome	Prechecklist Period (n = 76)	Postchecklist Period (n = 65)
Intubation-related complications		
Oxygen desaturation	6 (7.9)	1 (1.5)
Emesis	2 (2.3)	0
Esophageal intubation	0	0
Severe hypotension	2 (2.6)	0
Cardiac arrest	0	0
Any intubation-related complication	7 (9.2)	1 (1.5)
Median paralysis-to-intubation time (paralytic medication to tube confirmation), seconds (IQR)*	94 (78–115)	82 (68–101)
First-pass intubation success	60 (79)	56 (86)
All 15 predefined safety measures completed	13 (17)	45 (69)

Data are presented as n (%) unless otherwise noted.
IQR = interquartile range; RSI = rapid sequence intubation.
*Two patients intubated in the prechecklist period without the use of RSI medications were not included in this analysis.

Krikotüreotoomia

- Eelistavad kirurgilist tehnikat nõelkomplektidele
  - Suurem õnnestumise tõenäosus
  - Kinnitus, et oled õiges kohas
  - Vajab vähem spetsialiseeritud varustust
- Tehnika
  - Käsi anatoomiale - Laryngeal handshake
  - Skalpelliga horisontaalne torge, 90 kraadi pööre tera alla
  - Bužii läbi ava trahheasse – veendud samamoodi asetuses nagu suukaudsel
  - 6,0 suurus IT toru üle bužii
  - Kuna kaasneb oluline veritsus, siis protseduur toimub palpatsiooni kontrolli all, mitte visuaalse kontrolli all


A
B
C
90º
D
E

Ventilatsiooni probleemid

- Kui patsient tahab hingamiseks istuda, siis ära sunni teda lamama
  - Kopsuvigastus
  - Pingeline pneumotooraks/hemotooraks
  - Tamponaad
- Adekvaatne analgeesia käib ventilatsiooniprobleemide lahenduste hulka

Pleuraõõne dekompressioon

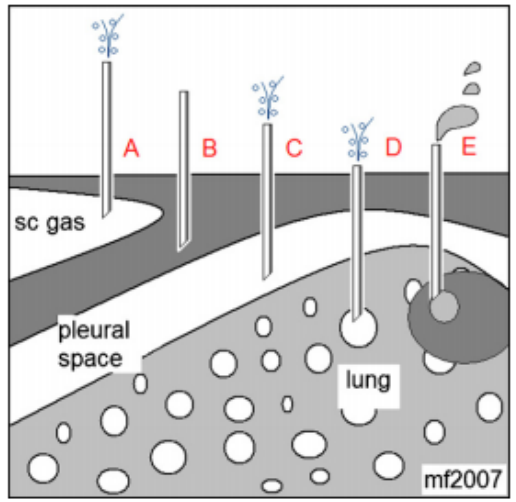


Fig. 2 Possible positions of needle thoracocentesis (NT): (A) False positive—as needle decompresses sub-cutaneous emphysema. (B) False negative—as needle does not reach pleural space. (C) Correct position of NT with decompression of tension pneumothorax. (D) False positive—with needle intrapulmonary in bulla or bronchial tree. If the tension pneumothorax is loculated due to pulmonary adhesions and missed by NT a false-negative result may occur with intra-pulmonary placement. (E) True negative—with needle in a major vessel or the heart. This may be mis-interpreted as a false positive for haemothorax. Only C will decompress a tension pneumothorax. A, B, D and E have all been associated with failure to decompress the pleural space and fatal outcomes.

- Nõeltorakotsentees on ebakindel meetod
- Sõrmtorakostoom alati eelistatud meetod
  - Suurem õnnestumise tõenäosus
  - Saad tagasisidet, kas kops tuleb näpu vastu, või mitte
  - Väiksem risk patsiendi kahjustamiseks

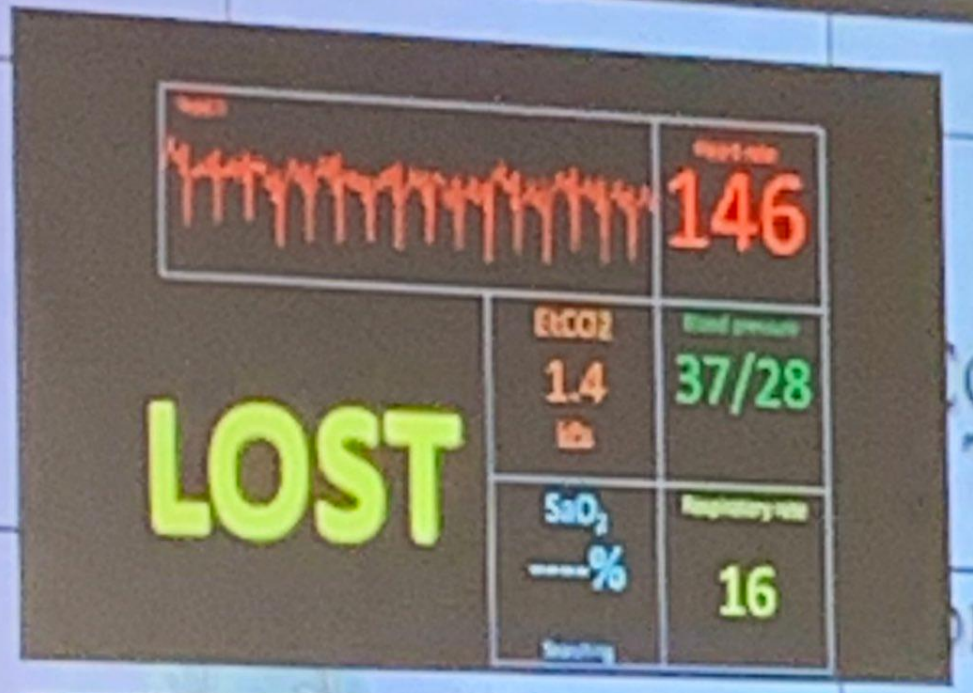
Pleuraõõne dekompressioon

- Kirurgilise võimekuse puudusel (õebrigaad) on nõeltorakotsenteesil oma koht – parem kui mitte midagi
- Arstibrigaadil sõrmtorakostoom esimene valik
- Pingeline pneumotooraks
  - Spontaanhingamisel patsiendil väljendub hüpoksilise hingamispuudulikkusena
    - surm üle hüpoksia
  - Juhitaval hingamisel väljendub šokina
    - surm üle obstruktsiivse šoki

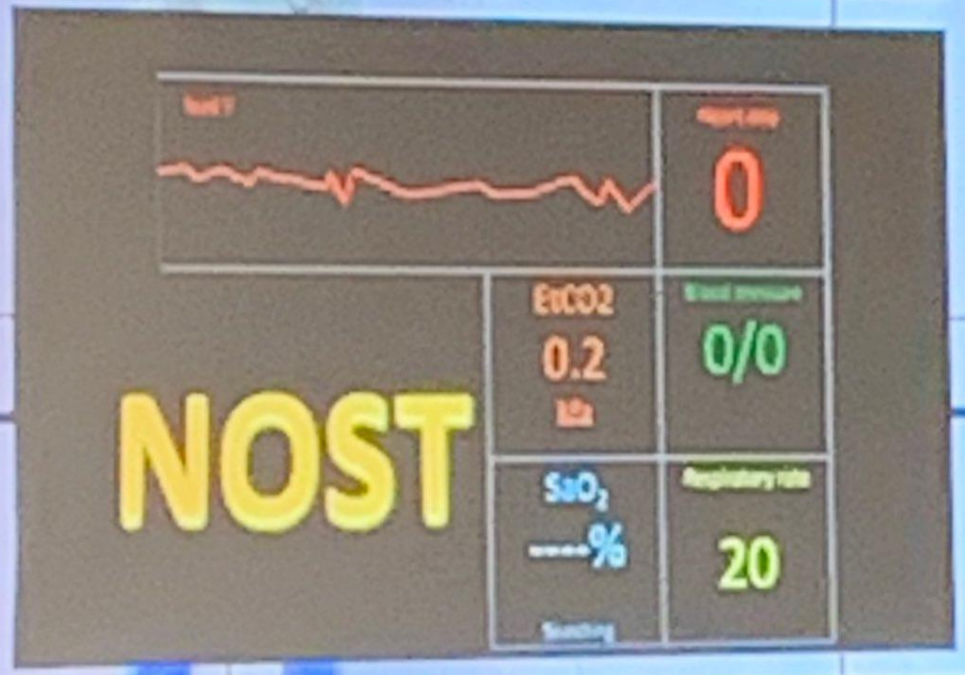
Traumaatiline südameseiskus

Traumaatiline südameseiskus

- TCA – Patsient on teadvuseta, ei hinga normaalselt, pulss pole palpeeritav
- Traumaatiline seiskuse puhul ei pruugi süda seista
- LOST (Low output state in trauma)
  - Tõeline südameseiskus - NOST – südamelihas ei kontraheeru, väljutus puudub täielikult
  - LOST – südamelihas kontraheerub, väljutus minimaalne, BP ~30 mmHg



- No palpable central pulse (TCA)
- Narrow complex tachycardia
- Ongoing cardiac output
- Low-Output State in Trauma



- No palpable central pulse (TCA)
- Brady-agonal / asystole
- No cardiac output
- No-Output State in Trauma

Traumaatiline südameseiskus

- Uus paradigma
  - Arvestatav osa nendest patsientidest on päästetavad
  - Elulemus traumaatilisest seiskusest valitud populatsioonides kuni 7,5%
  - Kohati parem elulemus kui mittetraumaatilisest seiskusest
  - Suurem tõenäosus intaktseks neuroloogiaks kui mittetraumaatilisel seiskusel

Traumaatiline südameseiskus

- Parem prognoos
  - Üksik torkevigastus
  - Asfüksia
  - Pingeline pneumotooraks/hemotooraks
  - Tamponaad
  - Elektritrauma
- Halvem prognoos
  - Isoleeritud peatrauma
  - Verest tühjaks jooksnud

Traumaatiline südameseiskus

- Enamasti ASY/PEA
- Klassikaline õpetus
  - 5 H-d ja 5 T-d
- Traumaseiskuse korral nendest olulised üksikud

H's of ACLS

Causes	Signs	Treatment
Hypovolemia	-Rapid heart rate -Narrow QRS -Blood loss	-Obtain IO/IV Access -Administer fluid/blood -Use fluid challenge
Hypoxia/ Hypoxemia	-Slow heart rate -Cyanosis	-Ensure airway is open -Ventilate -Ensure oxygen supply is adequate
Hydrogen Ion Excess (Acidosis)	-Low amplitude QRS complex	-Atriel blood gas -Provide adequate ventilations -Sodium bicarbonate (metabolic)
Hypokalemia/ Hyperkalemia	-Flattened T waves & a U wave (Hypokalemia) -Peaked T waves & a widened QRS (Hyperkalemia)	-Ventilate (respiratory) -Sodium bicarbonate (metabolic)
Hypothermia	-Shivering -Previous exposure to cold temperatures	-Active warming measures -Temperature should be above 30°C

T's of ACLS

Causes	Signs	Treatment
Tamponade (Cardiac)	-Rapid heart rate -Narrow QRS -JVD -No pulse -Muffled heart sounds	-Pericardiocentesis -Thoracotomy
Toxins	-Prolonged QT interval	-Based on overdose agent -Supportive care
Tension Pneumothorax	-Slow heart rate -Narrow QRS -Unequal breathing -JVD -Tracheal deviation	-Needle decompression -Insertion of a chest tube
Thrombosis (Pulmonary)	-Rapid heart rate -Narrow QRS -Shortness of breath -Decreased oxygen -Chest pain	-Embolectomy -Fibrinolytic therapy -Anticoagulant therapy
Thrombosis (Coronary)	-Abnormal ECG	-Angioplasty -Stent placement -Coronary bypass surgery

Traumaatiline südameseiskus

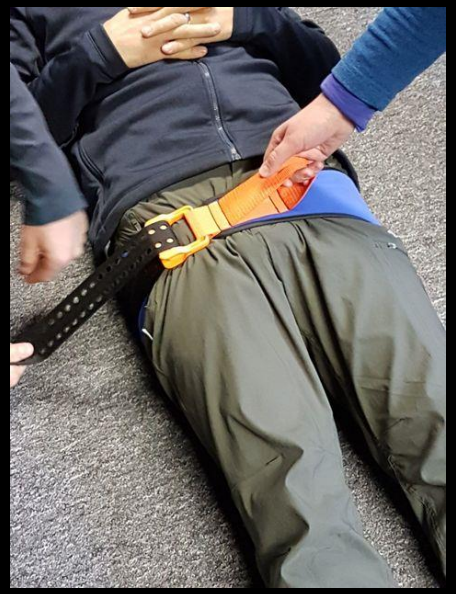
- **H**
- **O**
- **T**

Traumaatiline südameseiskus

- **H** – hüpovoleemia
- **O** – oksügenisatsioon
- **T** – tension pneumo/tamponaad

Traumaatiline südameseiskus

- **H** – Hüpovoleemia
  - Peata välised verejooksud
  - Lahasta vaagen
  - Reponeeri suured toruluud
  - Alusta transfusiooni, vere puudumisel infusiooni



Traumaatiline südameseiskus

- **O** – Oksügenisatsioon
  - Crash intubatsioon
  - Ventileeri 100% FiO2-ga

Traumaatiline südameseiskus

- **T** – tension pneumo, tamponaad
  - Mõlemapoolsed sõrmtorakostoomid
  - Nõeltorakotsentees ei välista TPTX!
  - Kui hemodünaamika ei parane, siis elustav torakotoomia
    - Ühenda lõiked clamshelliks, lõika sternum läbi
    - Ava perikardiõõs, väljuta tamponaad
    - Sule südamevigastused, suured kopsuvigastused
    - Lahtine südamemassaaž + aordi kompressioon
  - Kui taastad hemodünaamika siis anesteesia!

REVIEW

Emergency thoracotomy: "how to do it"

D Wise, G Davies, T Coats, D Lockey, J Hyde, A Good

Emerg Med J 2005;**22**:22–24. doi: 10.1136/emj.2003.012963

This paper describes a simple approach to emergency thoracotomy that can be used by a doctor in the prehospital environment and in the resuscitation room.

Cardiac arrest after penetrating chest trauma may be an indication for emergency thoracotomy. A successful outcome

(2) Time should not be wasted on full asepsis (that is, fully preparing the skin and surgically draping the patient) but a rapid application of skin preparation is appropriate.

(3) Using a scalpel and blunt forceps make bilateral 4 cm thoracostomies (breaching the intercostal muscles and parietal pleura) in the 5th intercostal space in the mid-axillary line—the same technique and

DISCUSSION

The procedure and equipment used to perform a thoracotomy in a cardiothoracic operating theatre is highly specialised. To

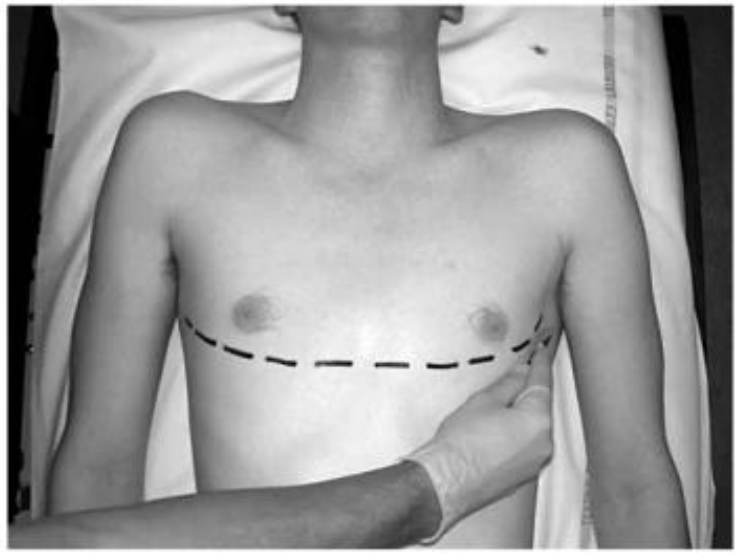
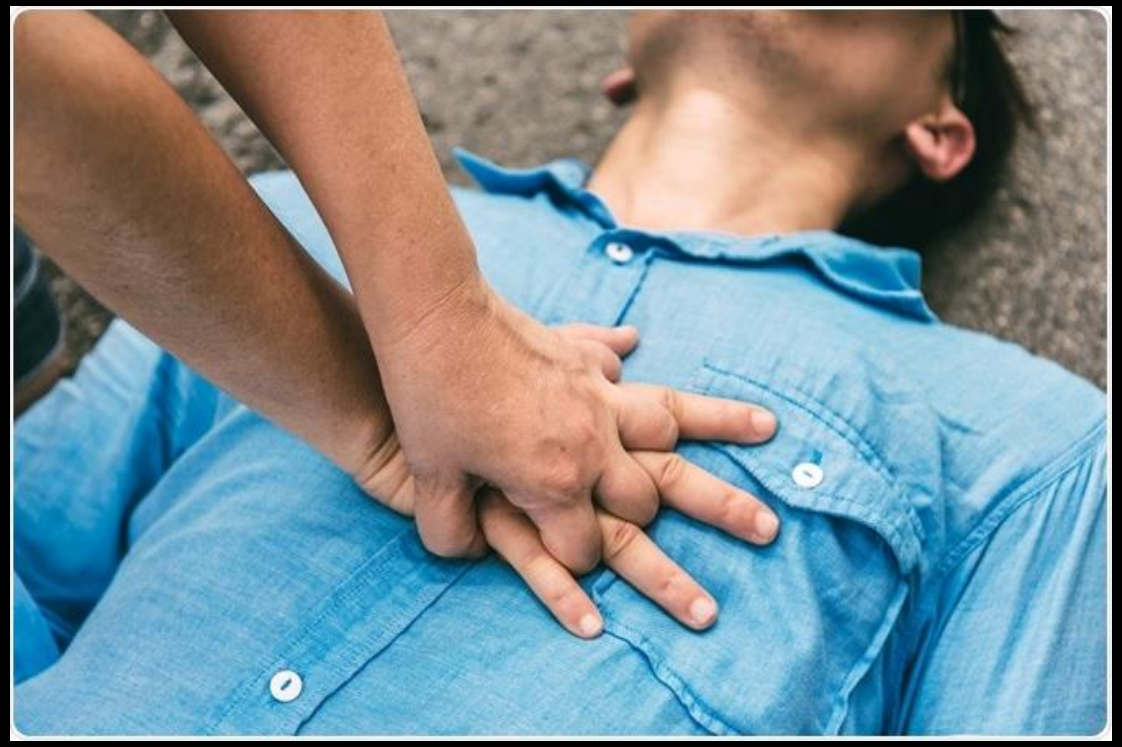


Figure 2 The clam shell incision.

Figure 3 Open chest. Rib spreaders in situ. Central heart. In this picture the pericardium has been displaced by internal cardiac massage and lies behind the heart. Gloved hand compressing the aorta.

Traumaatiline südameseiskus

- Mis on kaudse südamemassaaži roll?



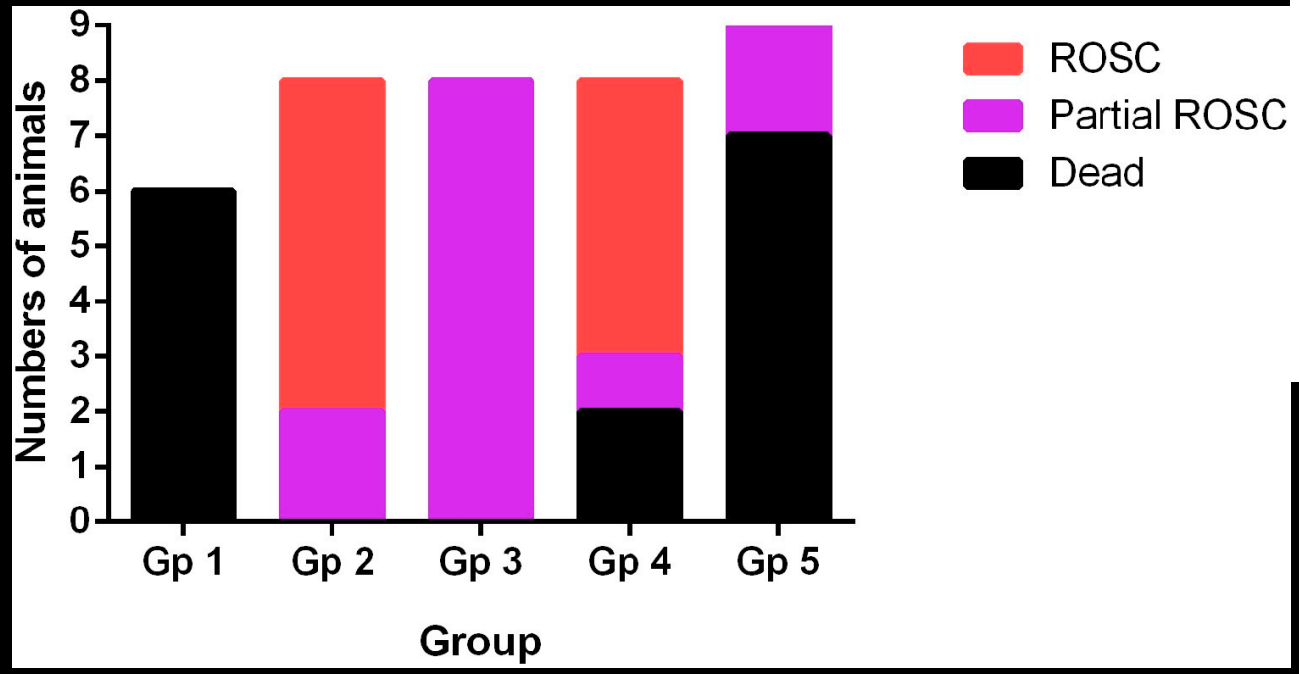
Traumaatiline südameseiskus

- Sigade mudel
- Anesteesia + standardiseeritud verejooks
- 5 gruppi
  - Ainult kaudne südamemassaaž (CCC)
  - Füsioloogiline
  - Füsioloogiline + CCC
  - Vereülekanne
  - Vereülekanne + CCC

Traumaatiline südameseiskus

- Sigade mudel
- Anesteesia + standardiseeritud verejooks
- Elulemus langevalt
  - Vereülekanne
  - Vereülekanne + CCC
  - Füsioloogiline
  - Füsioloogiline + CCC
  - CCC

1. CCC
2. täisveri
3. 0,9% NaCl
4. täisveri + CCC
5. 0,9% NaCl + CCC



ELSEVIER

Resuscitation
Volume 140, July 2019, Pages 37-42

Experimental paper

Closed chest compressions reduce survival in an animal model of haemorrhage-induced traumatic cardiac arrest

Sarah Watts [a], Jason E. Smith [b, c], Robert Gwyther [a], Emrys Kirkman [a]

Show more

https://doi.org/10.1016/j.resuscitation.2019.04.048

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Abstract

Closed chest compressions (CCC) are recommended for medical cardiac arrest, but there is little evidence to support their inclusion for traumatic cardiac arrest (TCA).

Traumaatiline südameseiskus

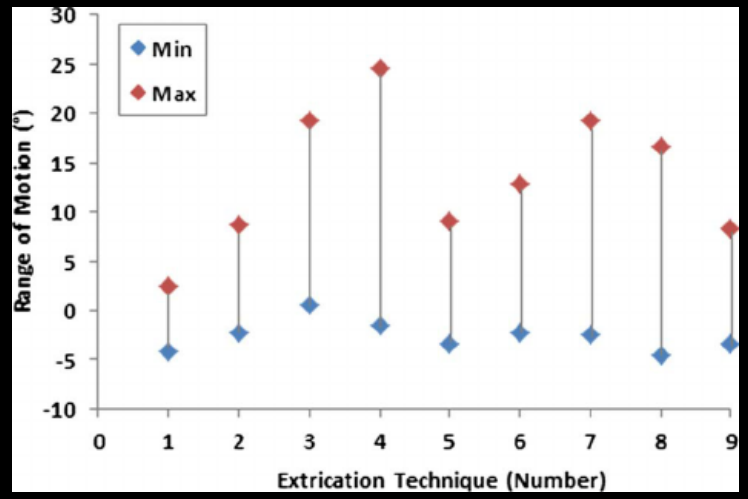
- Kaudsel südamemassaažil on koht, kui kahtlus on
  - hüpoksiast tingitud seiskusele
  - traumale eelnenud mittetraumaatiline seiskus
  - selge NOST (asüstoolia, VF) – ka siis pärast HOT-i lahendamist
- Kui neid ei kahtlusta, siis LOSTi korral võib olla pigem kahjulik
- Uuringuid veel vähe, aga paljud eksperdid deprioritiseerivad südamemassaaži TCA korral
- Adrenaliinil/vasopressoril ei ole TCA juures kohta

Extrication e. autost välja võtmine

Extrication

Extrication

- Patsient tuleb ise välja vs võetakse välja
- 4 korda vähem pea/kehatüve vahelist liikuvust, kui patsient ise väljub



Biomechanical analysis of spinal immobilisation during prehospital extrication: a proof of concept study

Mark Dixon,[1,2] Joseph O'Halloran,[3] Niamh M Cummins[1]

ABSTRACT

Background In most countries, road traffic collisions (RTCs) are the main cause of cervical spine injuries. There are several techniques in use for spinal immobilisation during prehospital extrication; however, the evidence for these is currently poor.

Objective The objective of this study is to establish which technique provides the minimal deviation of the cervical spine from the neutral inline position during the extrication of the RTC patient using biomechanical analysis techniques.

Methods A crew of two paramedics and four fire-fighter first responders extricated a simulated patient from a prepared motor vehicle using nine different extrication techniques. The patient was marked with biomechanical sensors and relative movement between the sensors was captured via high speed infrared motion analysis cameras. A 3D mathematical model was developed from the recorded movement.

Results Control measurements were taken from the patient during self-extrication and movement was recorded of 4.194° left of midline (LOM) to 2.408° right of midline (ROM) resulting in a total movement of 6.602°. The least deviation recorded during equipment aided extrication was movement of 3.365° LOM and 8.352° ROM resulting in a total movement of 11.717°. The most deviation recorded during equipment aided extrication was movement of 1.588° LOM and 24.498° ROM resulting in a total movement of 26.086°.

Conclusions Conventional extrication techniques record up to four times more cervical spine movement during extrication than controlled self-extrication. This proof of concept study demonstrates the need for further evaluation of current rescue techniques and the requirement to investigate the clinical and operational significance of such movement.

INTRODUCTION

Cervical spine injuries are devastating events that can lead to paralysis, disability, decreased quality of life and significant medical costs. It has been estimated that up to 20 000 cases of spinal cord injuries occur annually in Northern Europe and the USA.[1] In most countries, road traffic collisions (RTCs) are the main cause of cervical spine entrapment delays transport to definitive care.[4] Controlled extrications are applied to stabilised casualties with non-life threatening primary injuries where the mechanism of injury dictates a high index of suspicion for cervical spine injury. A potential cause of secondary injury is through inadvertent manipulation of the spinal cord during extrication.[5] It has previously been reported that up to 2.5% of cervical cord trauma occurs because of improper immobilisation after the initial accident and therefore may be preventable.[6]

The current evidence base for spinal immobilisation techniques during prehospital extrication is poor. It appears that traditional prehospital extrication techniques have evolved through pragmatism rather than being introduced following rigorous evidence-based scientific research. Therefore, the aim of this study is to establish which technique provides the minimal deviation of the cervical spine from the neutral inline position during the controlled extrication of the RTC patient using biomechanical analysis techniques.

METHODS

Setting and participants

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Scientific Research Ethics Committee of the Mid-Western Regional Hospital, Limerick, Ireland. The location of the study was Limerick Corporation Fire and Rescue Station. A simulated crash vehicle (Mazda 323, Mazda Motor Corporation, Hiroshima, Japan) was prepared prior to initiation of the study with standard rescue cuts through A, B and C posts and subsequent roof and seat-belt pre-tensioner removal. Airbag safety was ensured through disconnection of the vehicle's electrical system. Scene safety was paramount and all necessary safety precautions including vehicle stabilisation, sharp covers (Holmatro UK, Nottingham, UK) and standard glass management protocols were in place within the vehicle itself and in the surrounding area. The extrication crew consisted of four members of the Fire Service in addition to two members of the National Ambulance Service totalling a crew of six members. This repre-

Ekstrikatsiooni meetodid

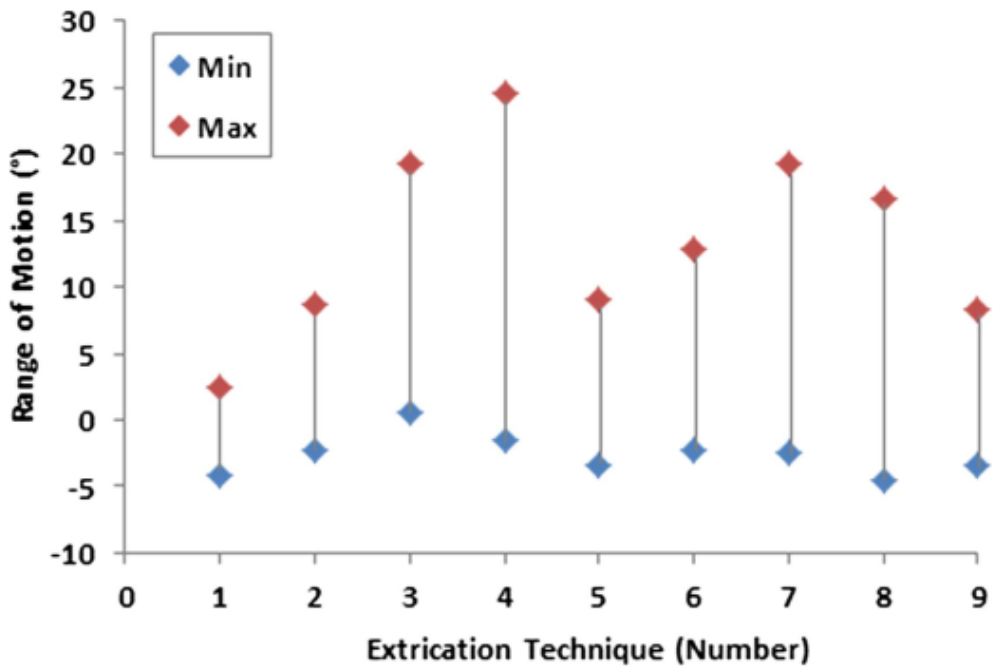


Figure 3 Minimum and maximum values and range of motion (°) for extrication techniques.

1. Tuleb ise välja
2. Tuleb ise välja + MILS
3. Läbi tagaakna LSB-l
4. Läbi tagaakna KED + LSB
5. Assisteeritud pööre ukse suunas 90 kraadi + LSB + välja kõrvaluksest
6. KED + assisteeritud pööre uksele vastu + välja kõrvaluksest
7. Assisteeritud pööre uksele vastu 90 kraadi + LSB + välja juhiuksest
8. KED + assisteeritud pööre ukse suunas + välja juhiuksest
9. KED + pöördeta välja tõstmine juhiuksest

MODE	S	SELF
	A	ASSISTED
	M	MANUAL
SPEED	U	URGENT
	R	RAPID
	A	
	I	IMMEDIATE
ROUTE	L	LINEAR
	A	ANGLED
	S	SIDE
	E	EMERGENCY
	R	RELOCATE

ANAESTHESIA TRAUMA & CRITICAL CARE ATACC

THE ATACC GROUP

EDUCATE | INNOVATE | OVERSEE

Samurai Laser

- S – self
- A – assisted
- M – manual
- U – urgent
- RA – rapid
- I – immediate
- L – linear
- A – angled
- S – side
- E – emergency
- R – relocate

Samurai Laser

- Viis
  - S (self) – tuleb ise välja
  - A (assisted) – assisteeritud, aitad jäsemete vabastamisega, pööramisega
  - M (manual) – tõstame ise patsiendi välja
- Kiirus
  - U (urgent) – stabiliseerime maksimaalselt enne ekstrikatsiooni, siis tõstame (kui stabiilne)
  - RA (rapid) – minimaalne spinaalkaitse, võtame välja (kui ebastabiilne)
  - I (immediate) – tõmba patsient koheselt välja (kohene oht elule)
- Kui läheb tõstmiseks, siis kuidas
  - L (linear) – otsesuunas (läbi tagaakna, katuse)
  - A (angled)– nurga all, enamasti läbi tagaukse
  - S (side) – külje pealt
  - E (emergency) – kui läheb kiireks, siis kokku lepitud kiirem plaan
  - R (relocate) – kui muidu ei saa välja, siis liigutad selleks masinaid

Kaelakrae

- Kuigi kasutamine on ülimalt levinud, puuduvad tõendid, et kaelakrae hoiaks ära sekundaarset vigastust
- On tõendeid, et võib olla kahjulik
  - ICP tõus
  - Komplitseeritud hingamistee tagamine
  - Kõrgem aspiratsioonirisk
  - Ebamugavuse ja agitatsiooni soodustamine
- Mitmed kiirabiasutused Austraalias ja USAs on lõpetanud kasutamise

Ekstrikatsioon

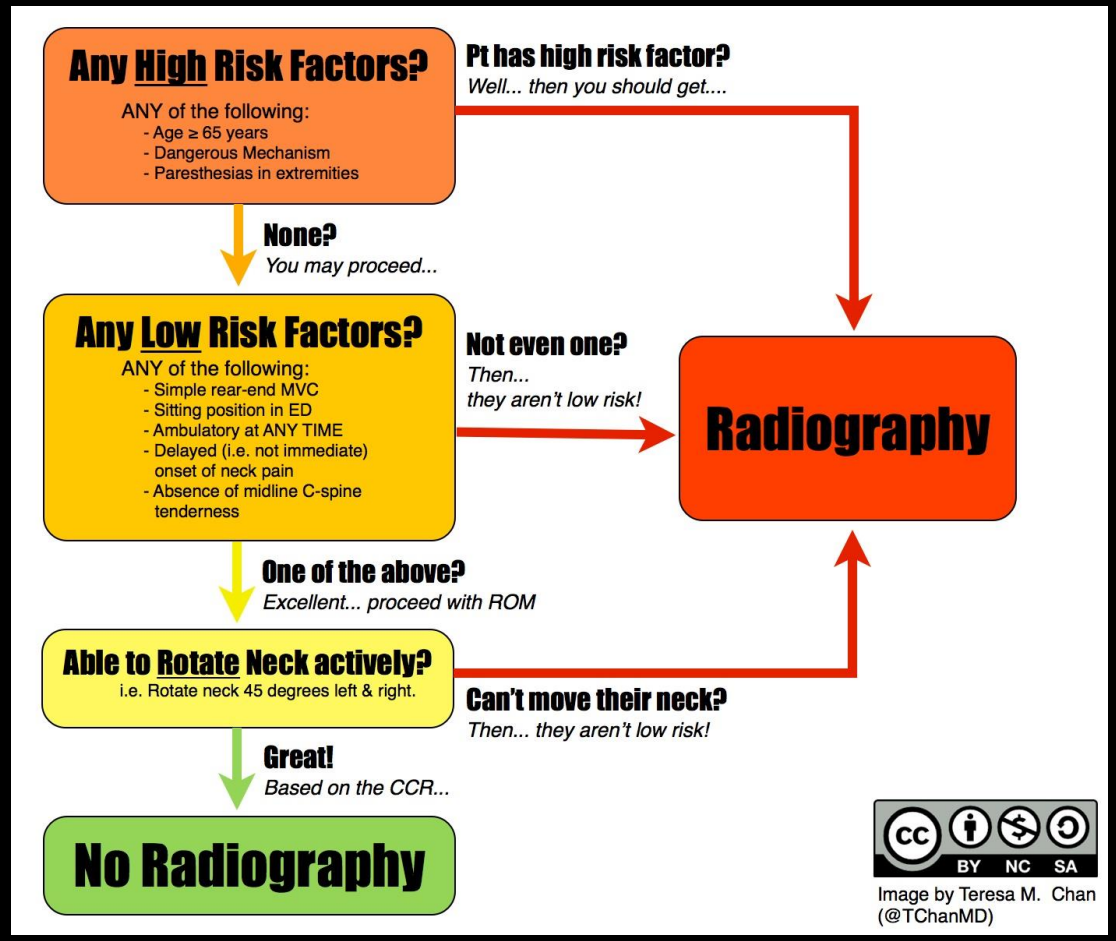
- Kui patsient saab liikuda (olenemata neuroloogiast), siis lase tal ise välja tulla
  - Pane vaakum graanul auto kõrvale valmis
  - Juhenda patsienti võimalikult rahulikult liikuma
  - Lase tal vaakumisse heita

Ekstrikatsioon

- Kui patsient teadvuseta/liikumisvõimetu
- Kaitse ekstrikatsiooni käigus selgroogu liigse liikumise eest
- Pigem MILS (kätega fikseerimine) ja peablokid kui kaelakrae

Kaelavigastus

- See, et patsient ise liigub, et tähenda, et kael on vigastusteta
- Vajab endiselt vigastuse välistamist
  - Canada C-spine rule
  - Nexus
  - CT



QAS APPLIED COLLAR
C-SPINE
NOT CLEARED

Machine entrapment

STOP

TOURNIQUET

ANALGESIA

RELEASE

THE ATACC GROUP

Machine entrapment

- Peata esimesel võimalusel aparatuur
- Kui (potensiaalsele) veritsusele pole ligipääsu, paigalda proksimaalsemale žgutt
- Teosta analgeesia
- Oota kuni ligipääs tagatakse, teosta ülevaatus
- Võimalusel eemalda žgutt

Kompressioontrauma

Kompressioontrauma

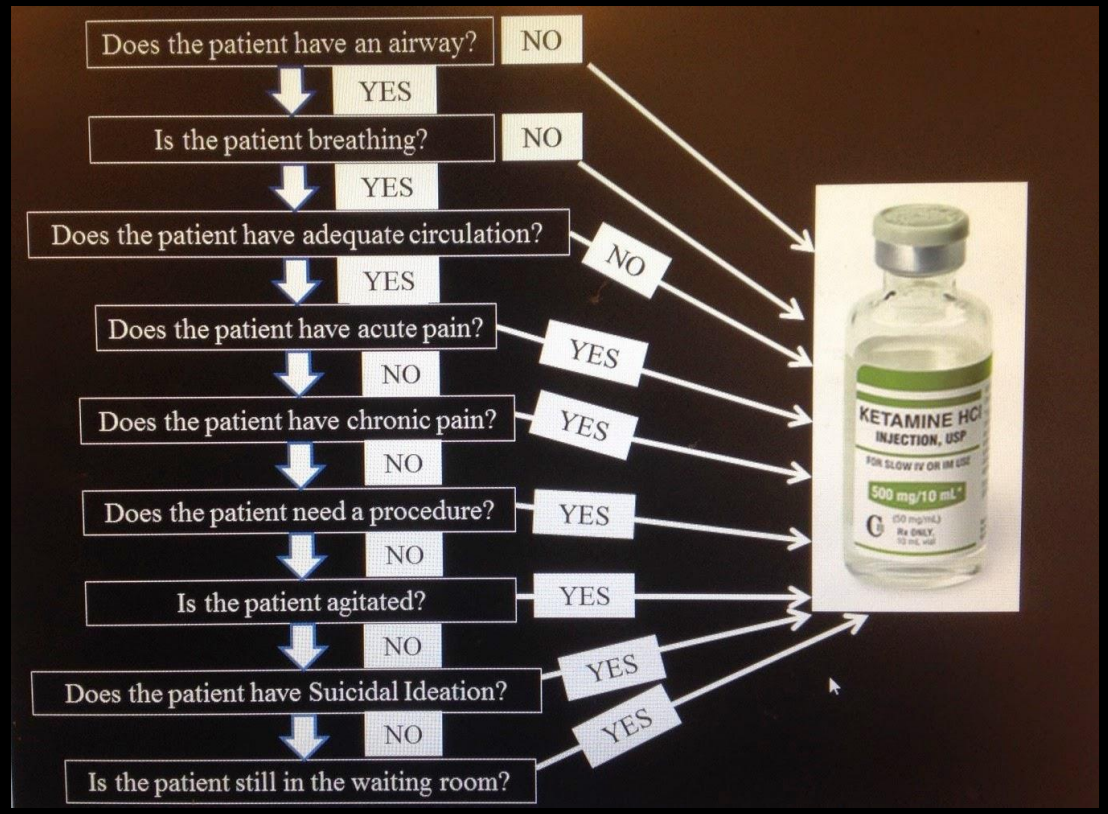
- Peamine oht on vabastamise järgne südameseiskus (rescue cardioplegia)
- Vigastatud kudedest pääseb vereringesse kaaliumi ja jääkainete rikas atsidootiline lahus, mis põhjustab järsu eelkoormuse tõusu ja võib seisata südame
- Selle järgselt ROSCi saavutamine oluliselt raskendatud

Kompressioontrauma

- Enne vabastamist
  - Žguti kinni nii palju kui saad
  - Infusioon kristalloidiga 1-2L
- Vabasta
- Teosta ülevaatus
- Kui stabiilne, siis järkjärguline žguttide avamine
  - 30 sek iga 3 min tagant 3x (üks žgutt korraga)

Ketamiin

YOU GET SOME KETAMINE! YOU GET SOME KETAMINE!
EVERYONE GETS KETAMINE!


Does the patient have an airway?
NO
YES
Is the patient breathing?
NO
YES
Does the patient have adequate circulation?
NO
YES
Does the patient have acute pain?
YES
NO
Does the patient have chronic pain?
YES
NO
Does the patient need a procedure?
YES
NO
Is the patient agitated?
YES
NO
Does the patient have Suicidal Ideation?
YES
NO
Is the patient still in the waiting room?
YES
KETAMINE HCl
INJECTION, USP
500 mg/10 mL

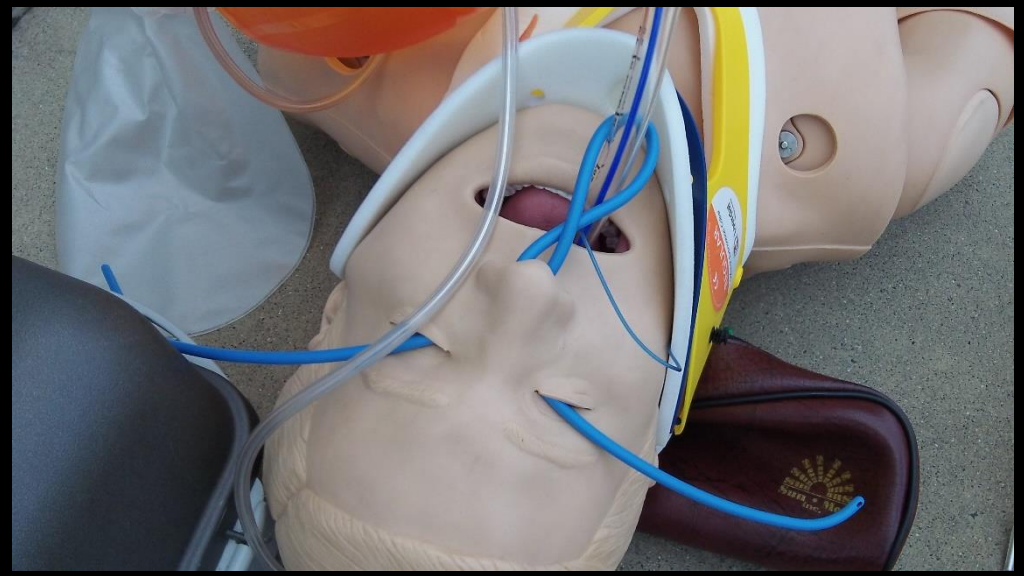
Ketamiin

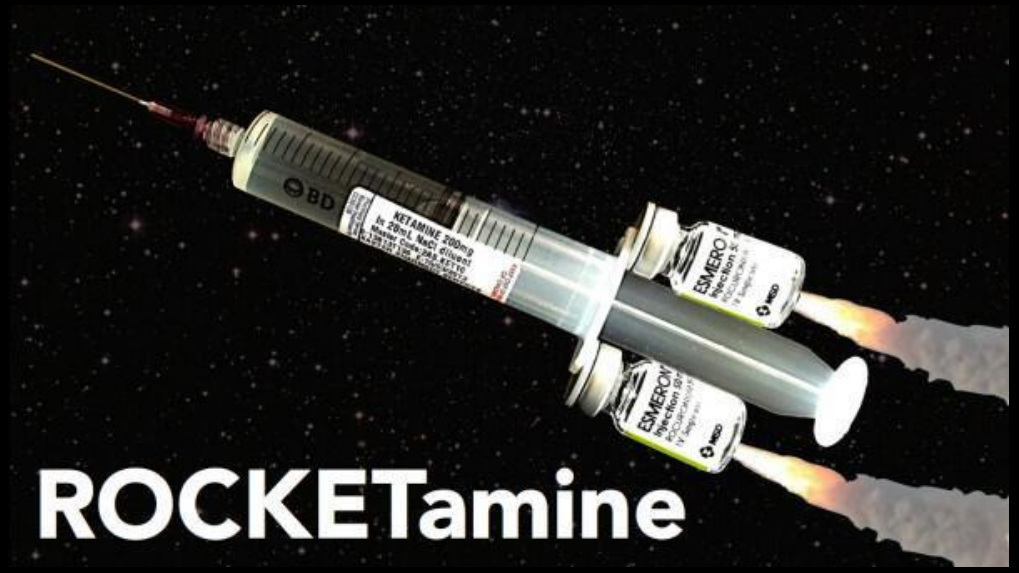
- Analgeesia
  - i/v 0,25 mg/kg
  - i/m 0,5 mg/kg
  - i/n 0,5 – 1 mg/kg
- Induktsioon/dissotsatsioon
  - i/v 1 – 4 mg/kg
  - i/m 6,5 – 13 mg/kg

Penthrox (metoksüfluraan)

RSI ravimid

- Fentanüül, ketamiin, rokuroonium
- Stabiilne/neurotrauma
  - F 3 mcg/kg + K 2 mg/kg + R 1 mg/kg (**3:2:1**)
- Ebastabiilne
  - F 1 mcg/kg + K 1 mg/kg + R 1 mg/kg (**1:1:1**)
- Peri-arrest
  - K 1 mg/kg + R 1 mg/kg (**1:1**)
- Damage control
  - R 1 mg/kg (**1**)





Sukstinüülkoliin vs rokuroonium

- Sukstinüüli eelised
  - Väiksem tõenäosus püsisedatsiooni unustamiseks
  - Lühem toimekestus ei ole RSI tingimustes eeliseks
- Rokurooniumi eelised
  - Tagab relaksatsiooni ka rescue manöövrite jätkumisel
  - Fastsikulatsioonide puudumine säästab organismi energiavaru – pikem aeg deoksügenisatsioonini (~40 s)
  - Ei põhjusta hüperkaleemiat
  - Ei ole müopaatiate korral vastunäidustatud
- Aeg heade intubatsioonitingimusteni ei ole erinev (kui roc 1,2 mg/kg)

Kommunikatsioon

PROBE

ALERT

CHALLENGE

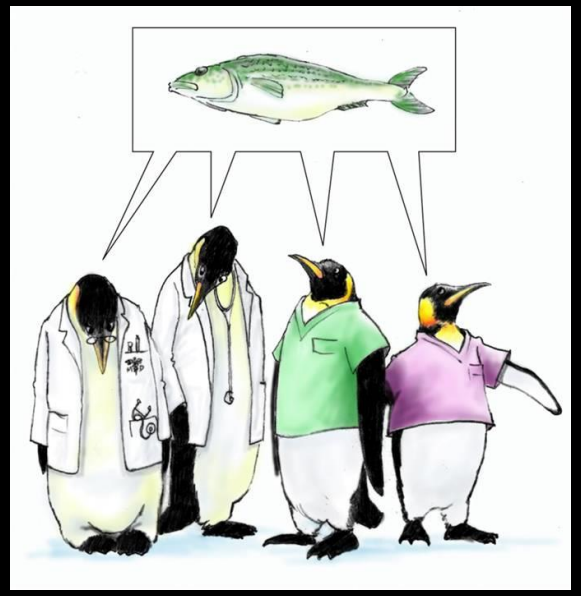
EMERGENCY

Kommunikatsiooni eskaleerimine

- **Probe** – Patsiendi saturatsioon langeb.
- **Alert** – Kas me võiks oksügenisatsiooniga midagi ette võtta?
- **Challenge** – Palun jäta see pooleli ja tagame patsiendi oksügenisatsiooni!
- **Emergency** – Stopp! Patsiendi ohutuse tagamiseks alustame hapnikravi, hindame hingamisteed üle.

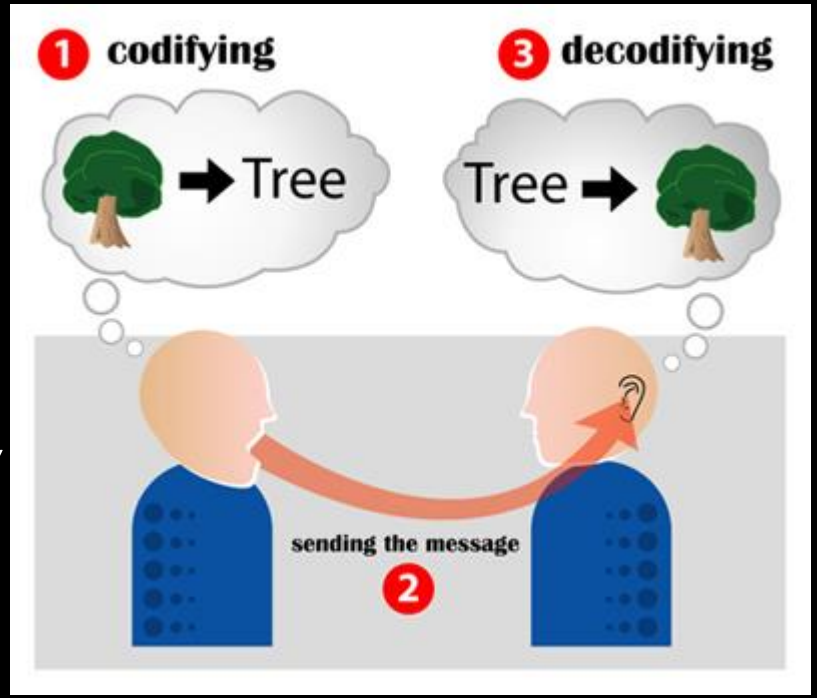
Kommunikatsioon

- Ühine arusaam olukorrast (shared mental model)
  - Verbaliseeri mida teed
  - Kõik võivad rääkida
  - Valmistu ühiselt ette
  - Tee vahepeal hetkeks paus ja saage olukorrast ühine ülevaade



Kommunikatsioon

- Tutvusta meeskonda, tea kaastöötajate eesnimesid
- 3C
  - **Cite names** – Kasuta eesnimesid
  - **Clear instruction** – Selge korraldus
  - **Closed loop communication** – Sule ring
    - **1** – „Manusta 1000 mg traneksaamhapet“
    - **2** – „Selge, manustan 1000 mg traneksaamhapet“
    - …
    - **2** – „Traneksaamhape on manustatud“
    - **1** – „Selge, traneksaamhape on manustatud“



Tänan!