CONGRESSO NAZIONALE IRC 2022

TRAUMA: NUOVE EVIDENZE E PERCORSI

AUDITORIUM DELLA TECNICA • ROMA • 14-15 OTTOBRE

IRC | Italian Resuscitation Council

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Un gioco di squadra

Host: Andrea Scapigliati

Guests: Georg Trummer

Domagoj Damjanovic

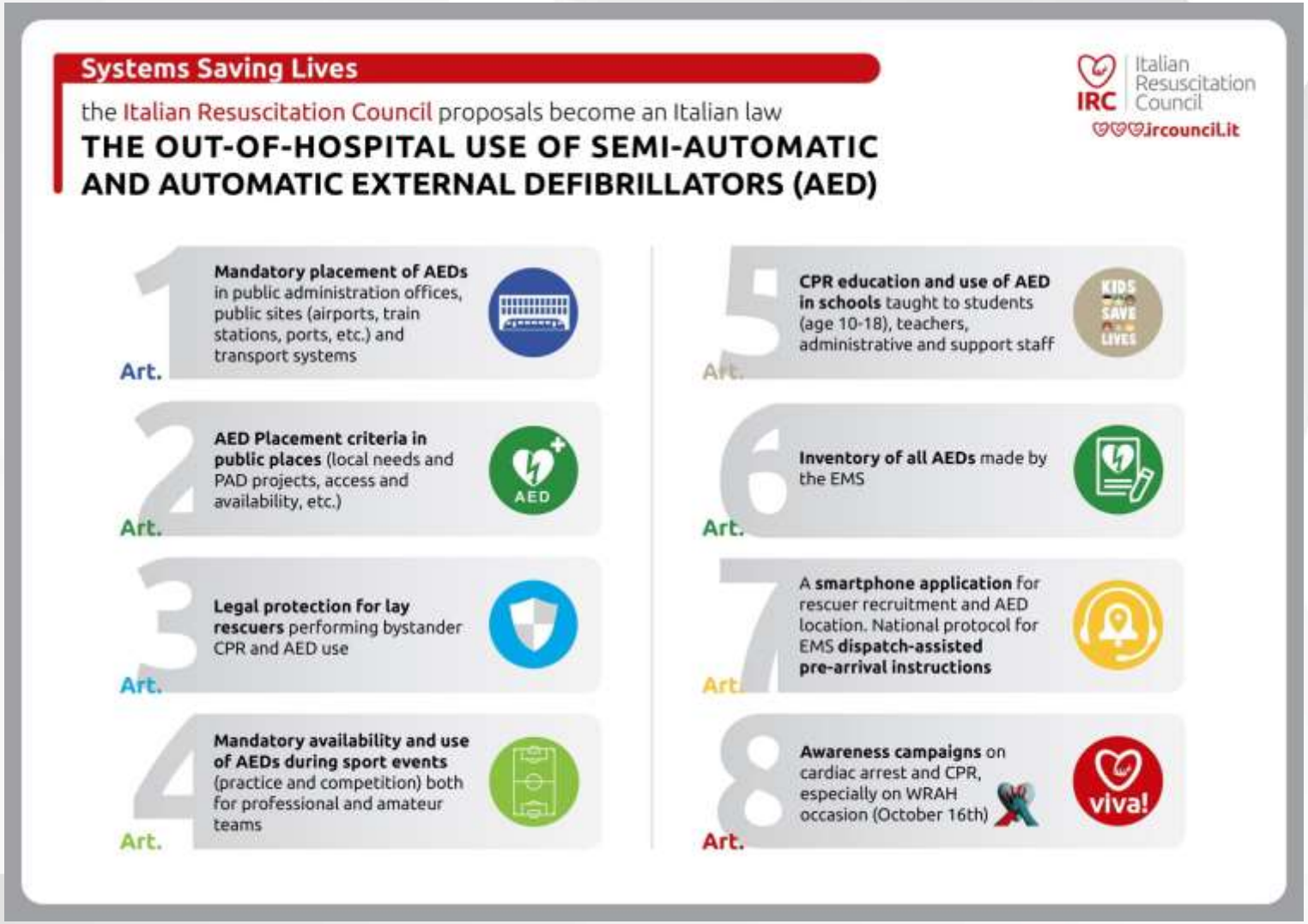
Dept. of Cardiovascular Surgery, University Heart Center,

Freiburg, Germany

IRC Italian Resuscitation Council

Why is it teamplay?

A system to save a life



Scapigliati et al, Resuscitation 2021

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A system to save a life

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Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

EUROPEAN RESUSCITATION COUNCIL

European Resuscitation Council Guidelines 2021: Systems saving lives

Federico Semeraro[a,*], *Robert Greif*[b], *Bernd W Böttiger*[c], *Roman Burkart*[d], *Diana Cimpoesu*[e], *Marios Georgiou*[f], *Joyce Yeung*[g], *Freddy Lippert*[h], *Andrew S Lockey*[i], *Theresa M. Olasveengen*[j], *Giuseppe Ristagno*[k], *Joachim Schlieber*[l], *Sebastian Schnaubelt*[m], *Andrea Scapigliati*[n], *Koenraad G Monsieurs*[o]

Semeraro et al, Resuscitation 2021

A system to save a life

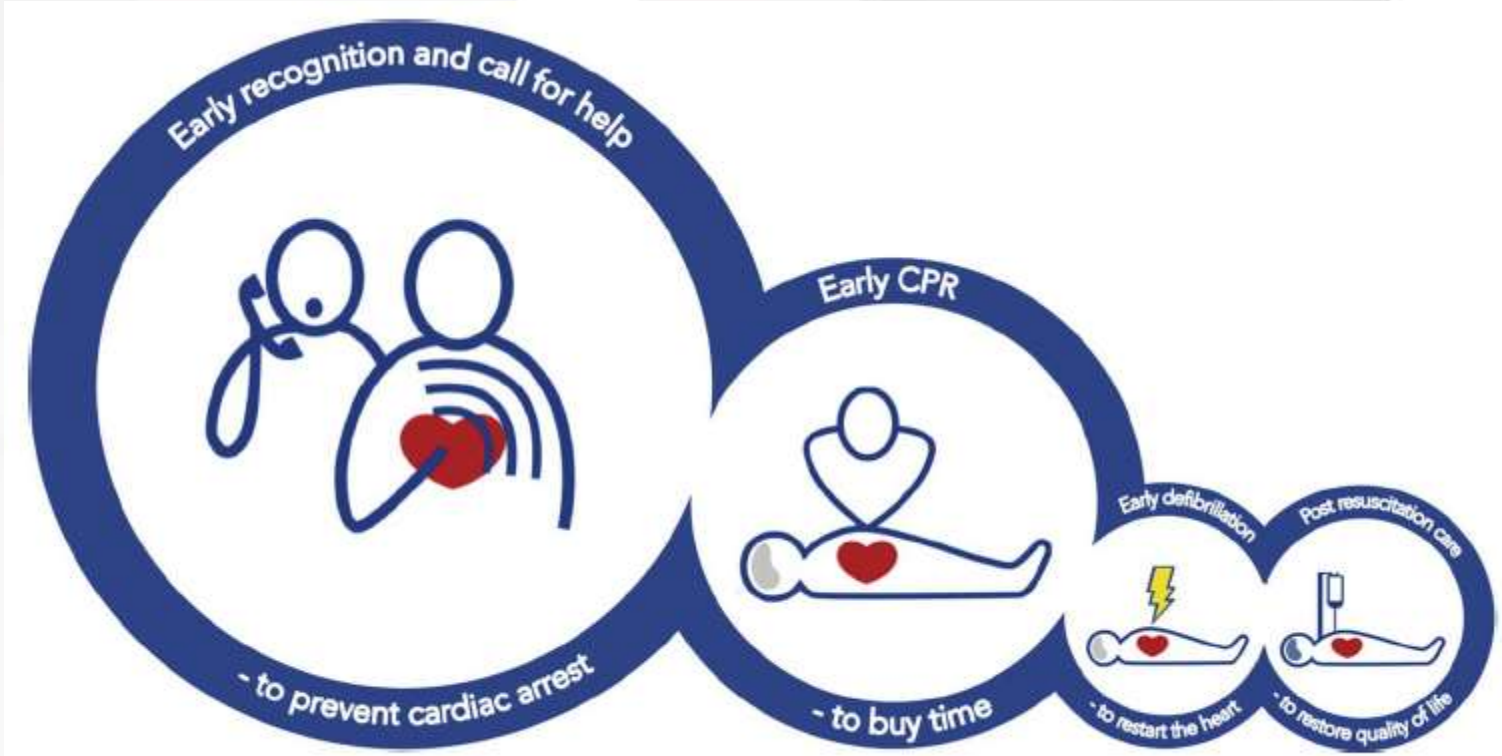


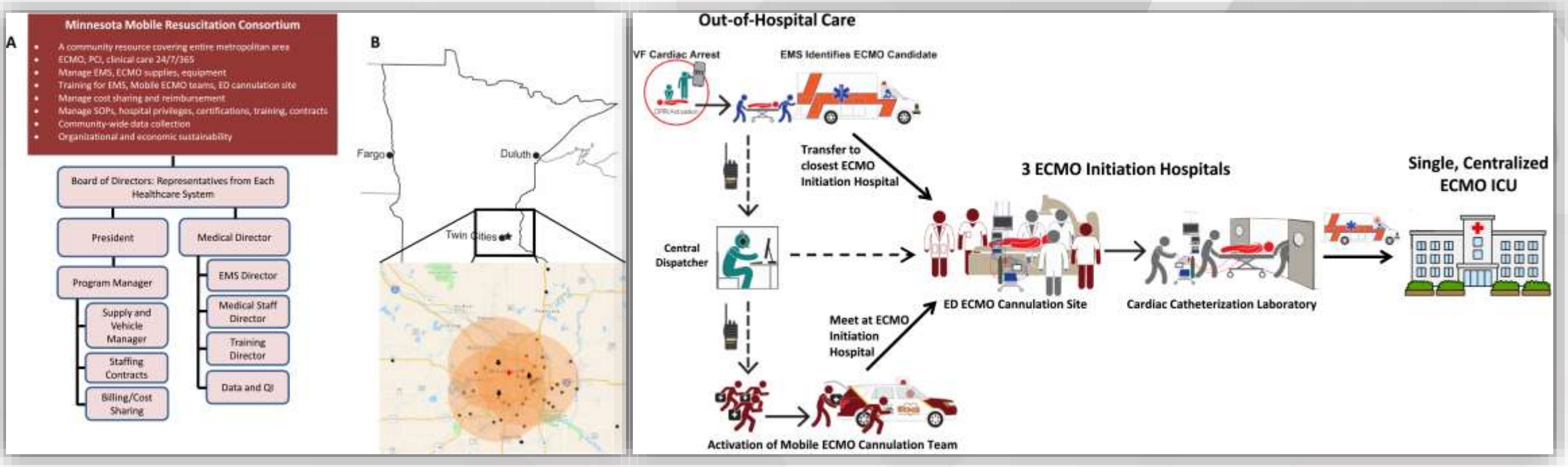
Fig. 1. Chain of survival for out-of-hospital cardiac arrest (Area ratios 1.0, 0.47, 0.12, 0.12).

Deakin, Resuscitation 2018

A system to save a life

Trummer 2022

A system to save a life



Bartos et al, eClinical Medicine 2020

A system to save a life

@mmrcbeat on twitter

Putting the rubber on the road

Making worlds meet

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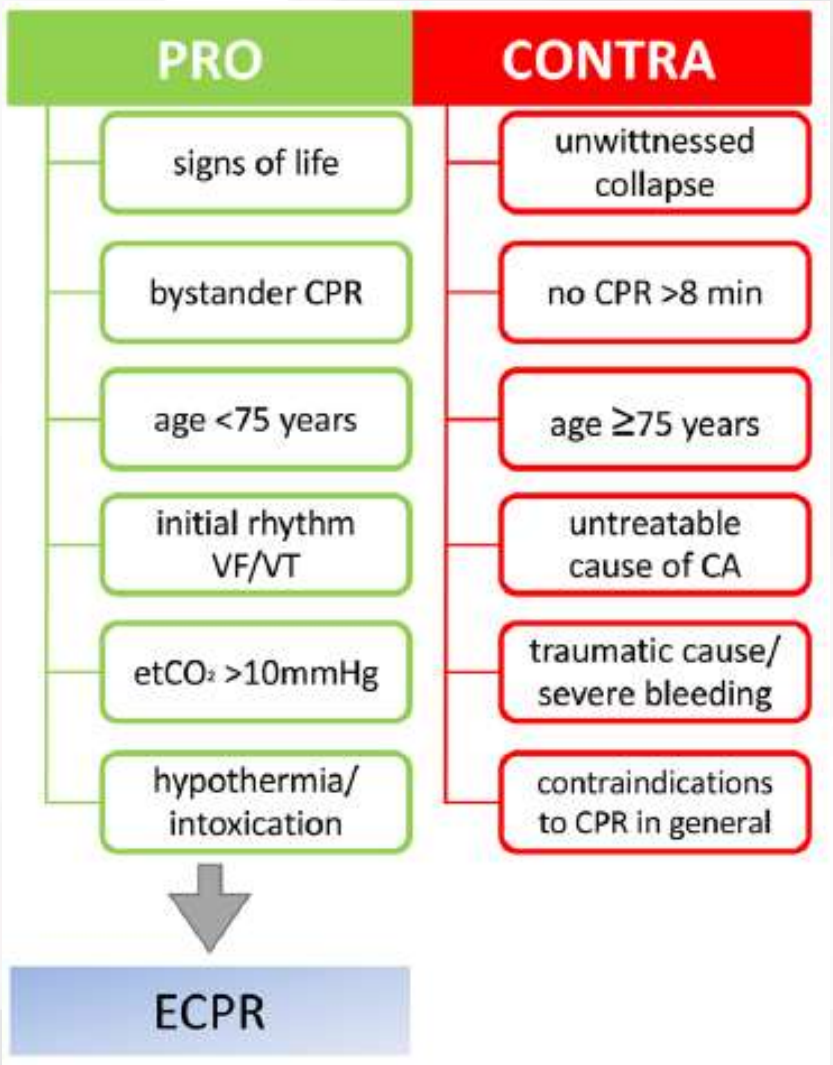
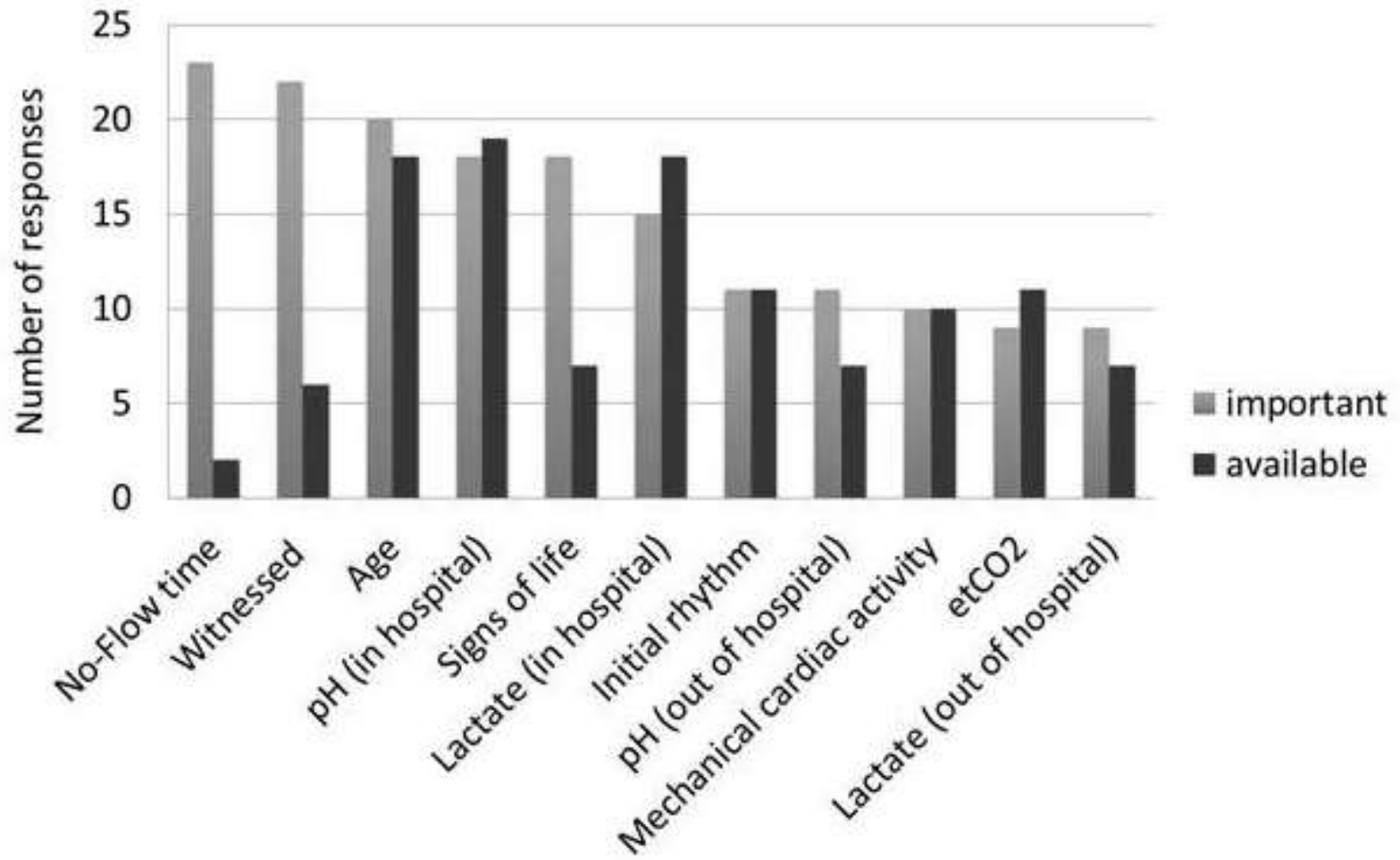
Decision making

Decision making



Duerschmied ez al., Nature sci rev 2020

Deal with information deficit



Damjanovic *et al, ERC conference 2020*.

Performance

qCPR

timing

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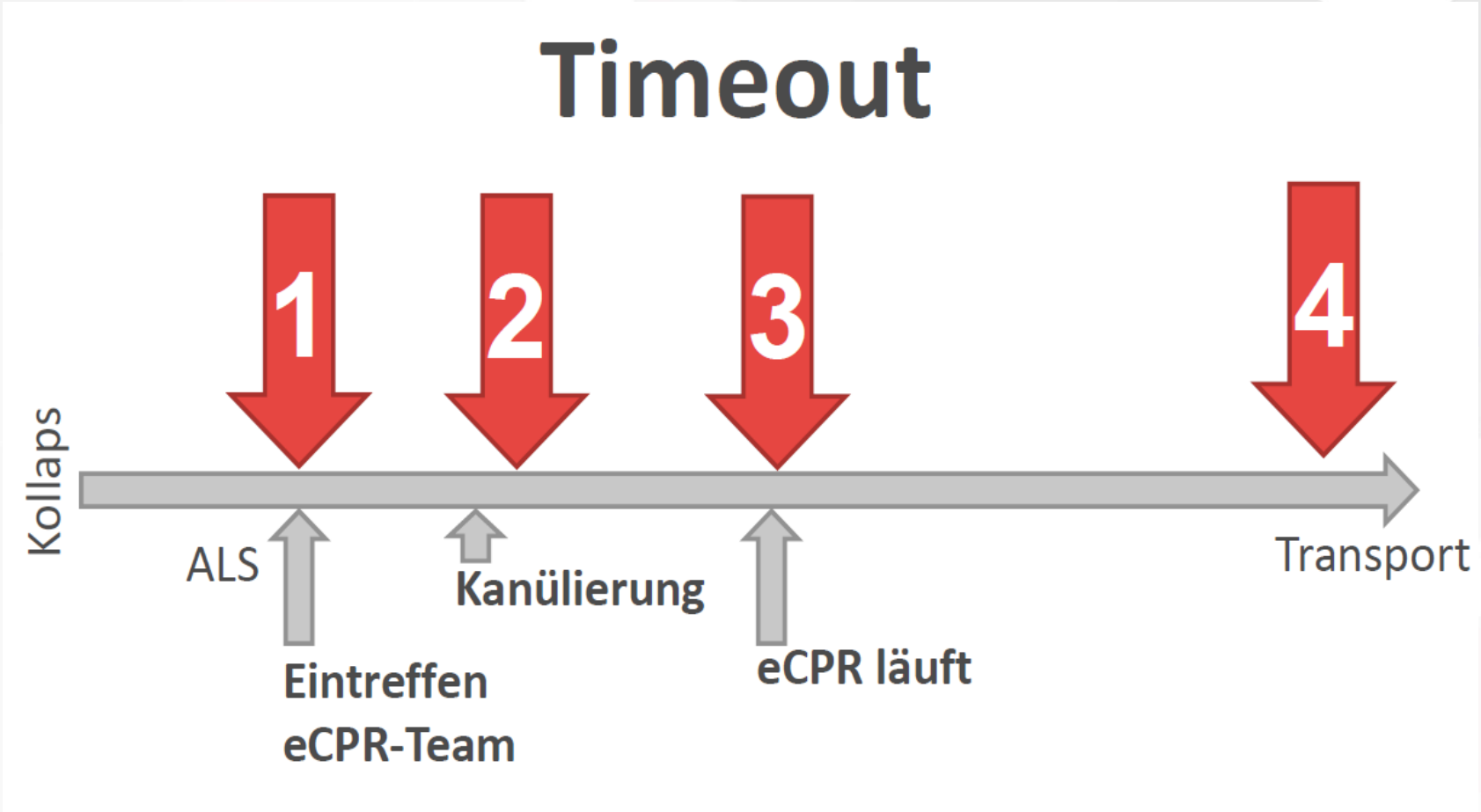
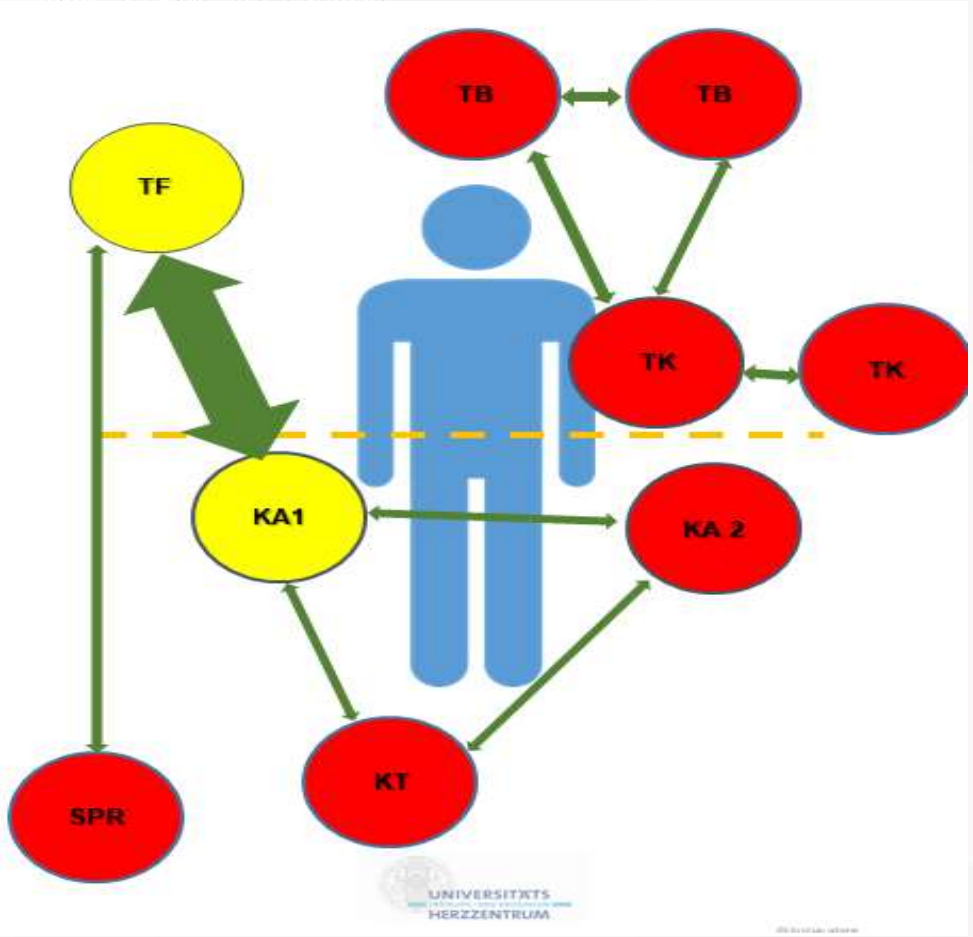
CRM in eCPR



Damjanovic *et al. Notfall Rettungsmed* **22,** 124–135 (2019).

Communication



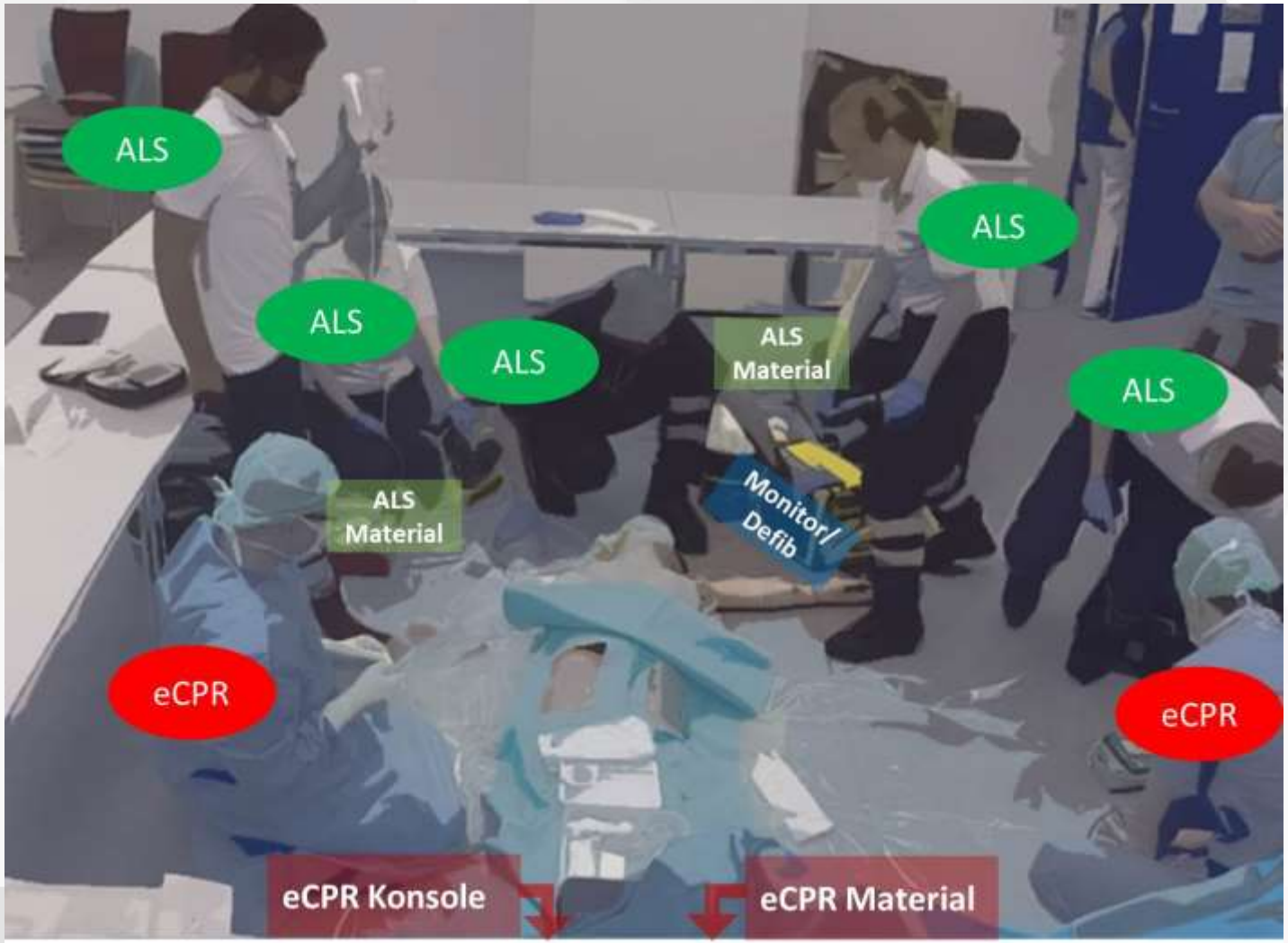
Use the defined paths

Avoid cross communication

Speak clear, goal oriented with adequate volume

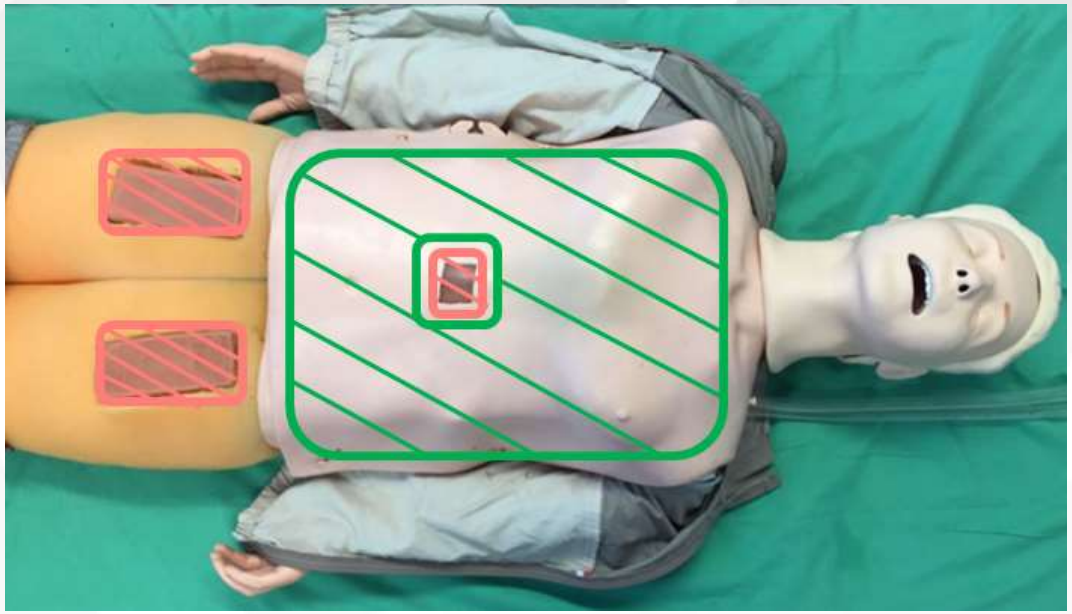
Scherer 2018

Teamplay



Damjanovic *et al. Notfall Rettungsmed* **22,** 124–135 (2019).

Simulation for process optimization



Pooth, DIVI conference 2018

Simulation for proce timization

How can we do better?

«Reperfusion»

Post-resuscitation care

Table 1. Post Cardiac Arrest Syndrome: Pathophysiology and Potential Treatment Strategies

Post Cardiac Arrest Syndrome	Anoxic Brain Injury	Arrest-Related Myocardial Dysfunction	Systemic Ischemic/Reperfusion Response	Persistent Precipitating Pathology
Pathophysiology	Disrupted calcium homeostasis Free radical formation Cell death signaling pathways Reperfusion injury No reflow Additional insults: pyrexia, hyperglycemia, hyperoxygenation	Stunning phenomenon Global hypokinesis Elevated LVEDP Preserved coronary blood flow (excluding patients with ACS)	Intra-arrest global tissue hypotension Reperfusion injury Endothelial activation Systemic inflammation Activation of clotting cascades Intravascular volume depletion Disturbed vasoregulation Risk of infection	ACS plaque rupture/thrombus formation Chronic ischemic myocardial scar Pulmonary embolism Cardiomyopathies: dilated, restrictive, hypertrophic, genetic, channelopathy, congenital
Potential therapeutic approaches	Therapeutic hypothermia Early hemodynamic optimization Ventilation and airway protection Seizure control Controlled oxygenation	Systems of care Revascularization Intravenous fluid Inotropes IABP ECMO LVAD	Goal-directed therapy Intravenous fluids Vasopressors Glucose control Hemofiltration Antimicrobials	Address disease specific origin

ACS indicates acute coronary syndrome; LVEDP, left ventricular end diastolic pressure; IABP, intra-aortic balloon pump; ECMO, extracorporeal membrane oxygenation; and LVAD, left ventricular assist device.

Stub D et al. Circulation. 2011;123:1428–1435

„CARL“: New Approach in eCPR

The CARL Therapy

CPR

Aim for best possible CPR/ALS. Check "Stop/Go" criteria for eCPR. Make a decision to use CARL as early as possible, approximately 10-15 minutes after cardiac arrest.

Cannulation

Cannulate femorally under sonographic control while CPR/ALS is in progress. Cannula size arterial 15-17 F, venous 21-23 F. Continue CPR/ALS until circulation is safely implemented by CARL. Establish, display and continuously monitor distal leg perfusion within 3 hours after cardiac arrest.

CARL

Minute 0-60	Day 1	Day 2	Day 3	Day 4	Day 7
Blood flow: 60-80 ml/kg bw/min Blood pressure arterial: > 65 mmHg Pulsatile in asystole/ventricular fibrillation In persistent ventricular fibrillation: 40 mmol KCl Lidocaine 10mg/kg bw	Close echo monitoring: LV distention, valvular regurgitation, reduce blood flow at CARL depending on LV function Support LV unloading with ß-adrenergics, calcium sensitizers, rhythmization and impella, if necessary.		Start weaning from extracorporeal circulation by using a weaning protocol, ensure lung function, EF > 30%		
pH arterial < 7,25 within the first 30 minutes	After 30 minutes, aim for a physiological arterial pH of 7.45 and maintain it permanently by adapting circulation, volume therapy and ventilation.				
p_aO2 100-200 mmHg p_aCO_2 40-55 mmHg	Establish an invasive measurement of arterial blood pressure via the right A. radialis. Aim arterial blood gas standard values, target values: p_aO_2 70-100 mmHg, p_aCO_2 35-45 mmHg; *Cave:* Harlequin syndrome as a result of increasing myocardial function ⇨ adjust ventilation, apply positioning therapy, if necessary				
Lower core body temperature immediately to 33°C for 24 hrs.	After cranial CT control, warm up by 0.1 °C/h. 48 h after cardiac arrest, aim normothermia. Avoid fever; NSE every 24 h. After reaching normothermia, allow sufficient sedation-free time to pass (e.g., 72 h) before making a new forecast.				
Reduce serum calcium immediately to 0.5-0.8 mmol/l.	Raise serum calcium to standard value and permanently adjust it. Aim for 136-146 mmol/l serum sodium and maintain this value permanently.				
Raise serum magnesium immediately to an upper standard value.	Permanently adjust serum magnesium to standard value.				
Immediate administration of 6 g ascorbic acid	Ascorbic acid 6 g/day up to day 7				
Heparinization i.v., target PTT 50- 60 s	Target PTT 50-60 s, check coagulation every 6 h and adjust plasmatic coagulation, if necessary. *Cave:* Willebrand syndrome! Invasive measures (chest drainage, catheterization) should be performed restrictively and only by experienced personnel; targeted substitution of coagulation factors, if necessary				
Restrictive volume substitution with parity administration of crystalloid solution and human albumin: osmolarity > 320 mosmol/l, target value hemoglobin 10 mg/dl, thrombocytes > 60000/µl	Continue to apply crystalloid solution and human albumin alternately. Hemoglobin target 8 mg/dl, platelets > 60000/µl Avoid excessive plus balance > 3000 ml/day, adjust vasopressor therapy . In case of renal failure, initiate continuous dialysis procedures at an early stage. Liberally calculated antibiosis with aspiration, which is likely in most cases; close cultivation, transition to targeted infection therapy				

„CARL“: Targets for guideline goals

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