

# IRC 2021

CONGRESSO  
NAZIONALE

16•17•18 DICEMBRE

NUOVE LINEE GUIDA 2021:  
RIANIMAZIONE CARDIOPOLMONARE  
**POST-LOCKDOWN**



Italian  
Resuscitation  
Council

Advanced Life Support 2021

## Compressori meccanici: quando?

Alberto Cucino  
alberto.cucino@gmail.com



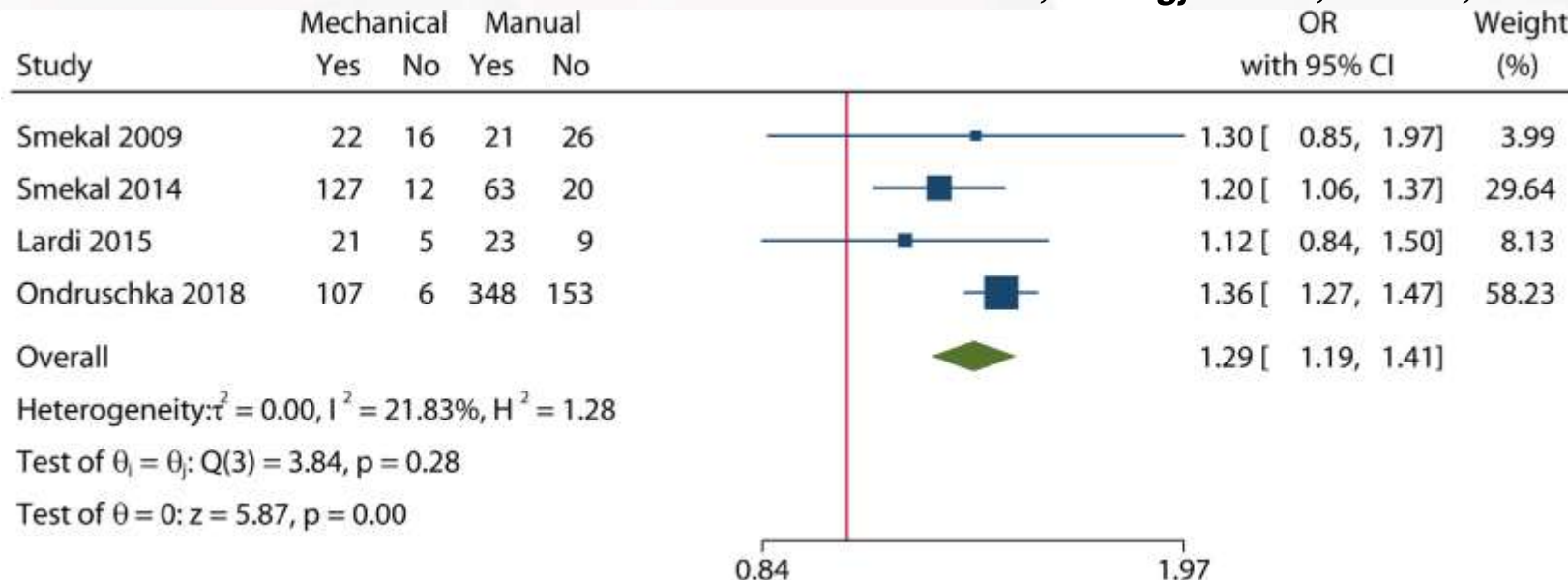
# Disclosure



## Review

# Safety of mechanical and manual chest compressions in cardiac arrest patients: A systematic review and meta-analysis

Yanxia Gao<sup>a,1</sup>, Tongwen Sun<sup>b,1</sup>, Ding Yuan<sup>a</sup>, Huoyan Liang<sup>b</sup>, Youdong Wan<sup>c</sup>,  
Bo Yuan<sup>b</sup>, Changju Zhu<sup>a</sup>, Yi Li<sup>d,\*</sup>, Yanwu Yu<sup>a,\*</sup>



Resuscitation 2021



## Mechanical chest compressions are associated with increased severity of post-cardiac arrest syndrome: a sub-study from the TTH48 trial

Giovanni Babini<sup>1</sup>, Hans Kirkegaard<sup>2</sup>, Eldar Søreide<sup>3</sup>, Fabio Silvio Taccone<sup>4</sup>, Markus Skrifvars<sup>5</sup>

<sup>1</sup> Department of Pathophysiology and Transplantation, University of Milan, Milan, Italy

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<sup>3</sup> Department of Anesthesiology and Intensive Care, Stavanger University Hospital, Stavanger, Norway

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## Probability of receiving mechanical chest compressions is associated with cardiac arrest mortality: a propensity score analysis

Giovanni Babini<sup>1</sup>, Hans Kirkegaard<sup>2</sup>, Eldar Søreide<sup>3</sup>, Fabio Silvio Taccone<sup>4</sup>, Markus Skrifvars<sup>5</sup>

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Quindi...  
i compressori meccanici non sono  
vantaggiosi!?



# RCP di elevata qualità

Iniziare le compressioni appena possibile.

Comprimere il torace a livello del terzo inferiore dello sterno (centro del torace).

Comprimere con una profondità di almeno 5 centimetri fino ma non più di 6.

Eseguire le compressioni con una frequenza di 100-120/minuto

Garantire il completo rilascio del torace (non rimanere sul torace)

Se possibile eseguire le compressioni su una superficie rigida

Evita le interruzioni

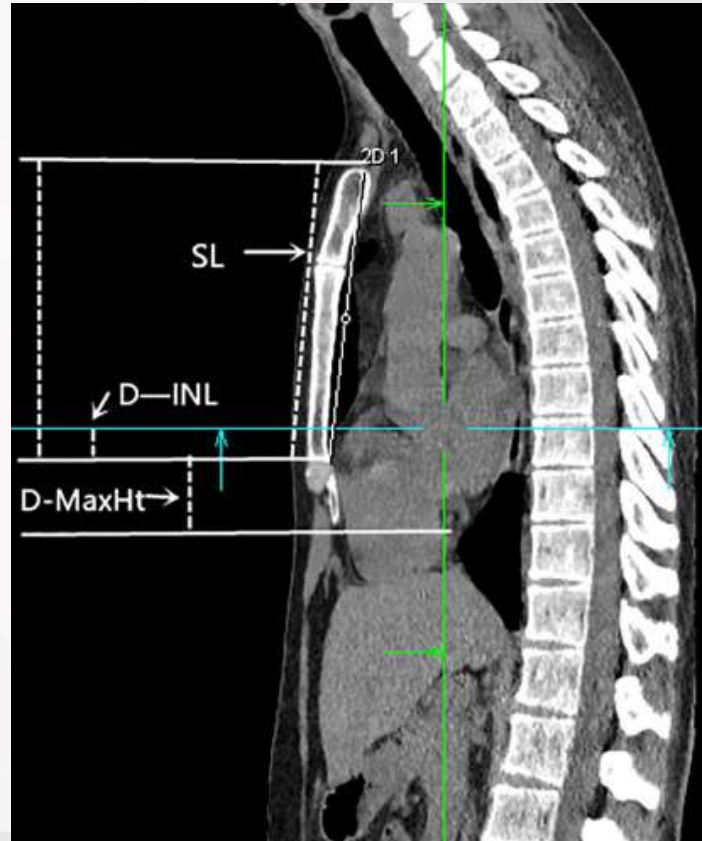
Evita l'iperventilazione



Olasveengen, Resuscitation 2021

# RCP di elevata qualità

Comprimere il torace a livello del terzo inferiore dello sterno (centro del torace).



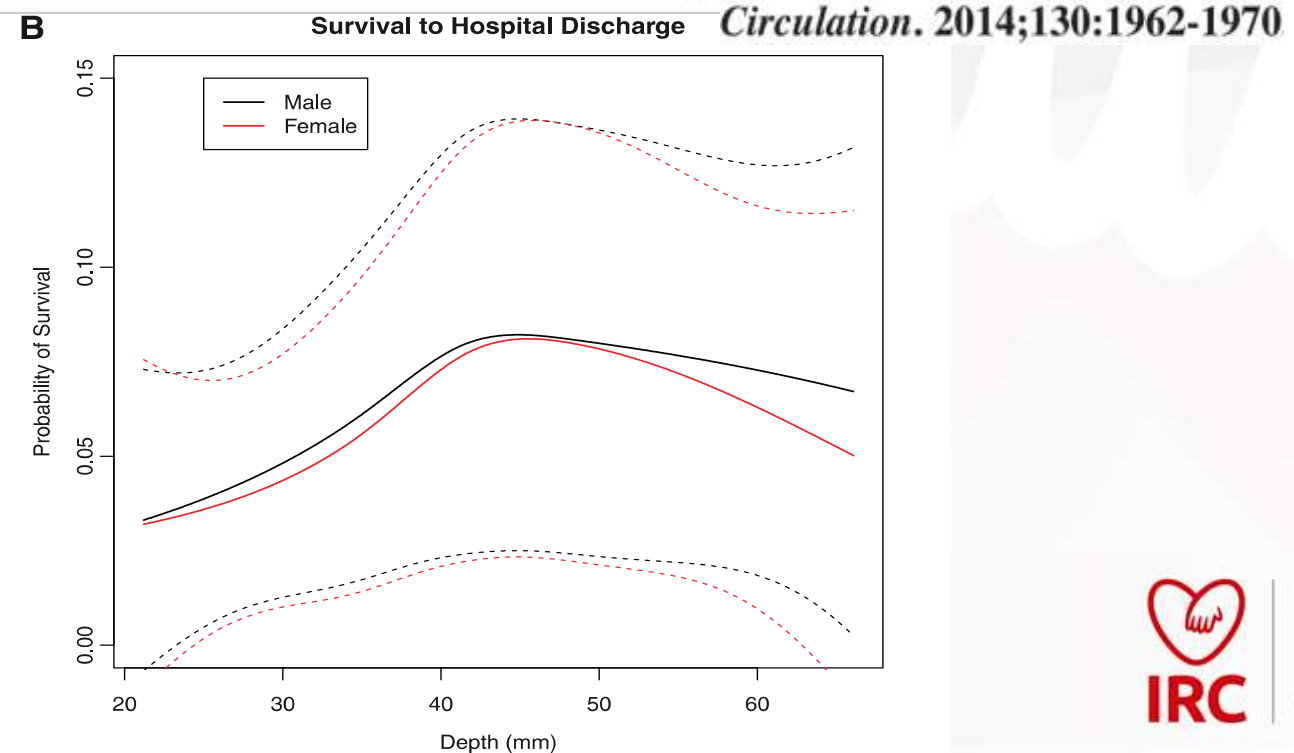
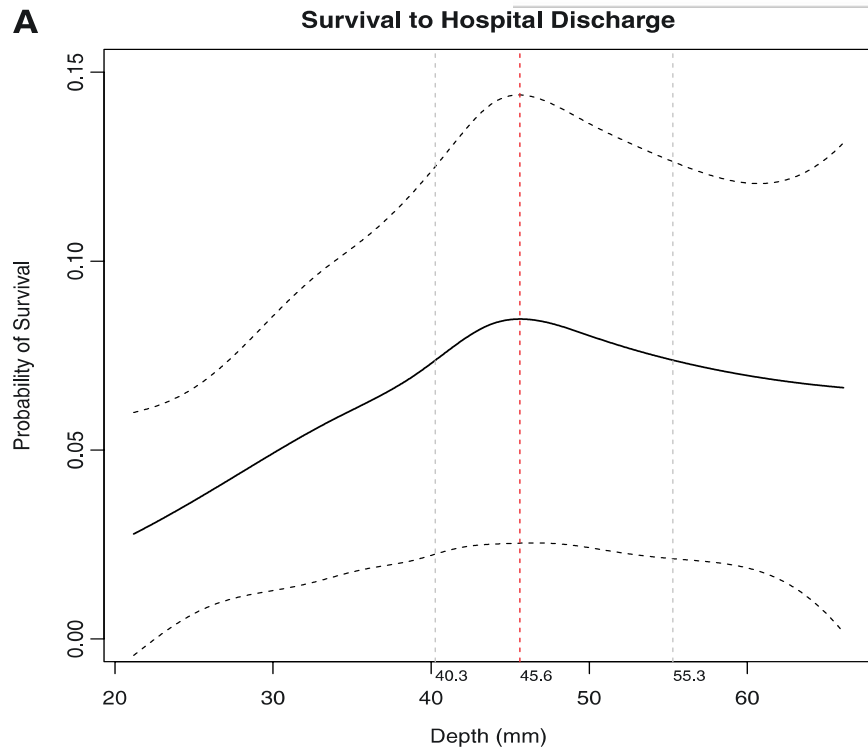
Jiang, 2020

# RCP di elevata qualità

Comprimere con una profondità di almeno 5 centimetri fino ma non più di 6.

## What Is the Optimal Chest Compression Depth During Out-of-Hospital Cardiac Arrest Resuscitation of Adult Patients?

Ian G. Stiell, MD; Siobhan P. Brown, PhD; Graham Nichol, MD; Sheldon Cheskes, MD;  
Christian Vaillancourt, MD; Clifton W. Callaway, MD; Laurie J. Morrison, MD;  
James Christenson, MD; Tom P. Aufderheide, MD; Daniel P. Davis, MD; Cliff Free, EMT-P;  
Dave Hostler, PhD; John A. Stouffer, EMT-P; Ahamed H. Idris, MD;  
and the Resuscitation Outcomes Consortium Investigators





# RCP di elevata qualità

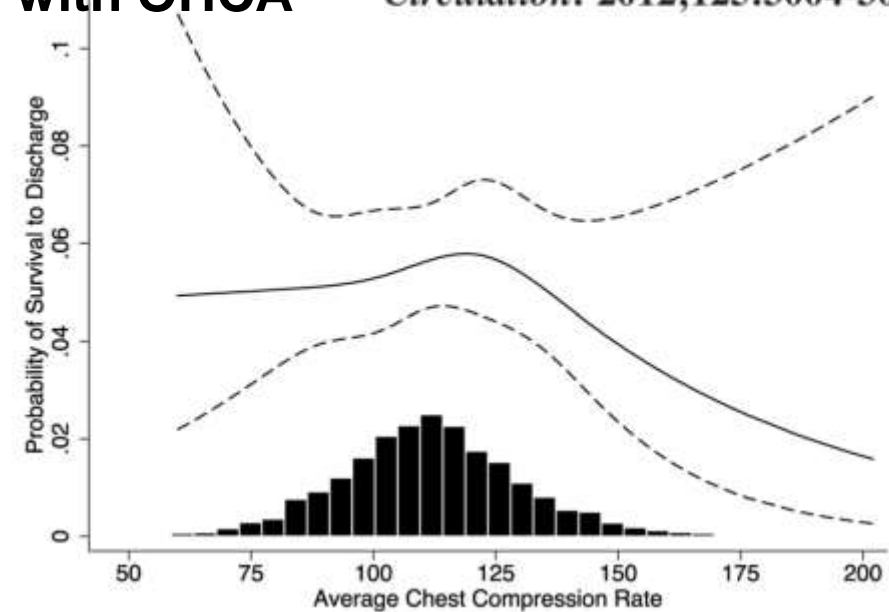
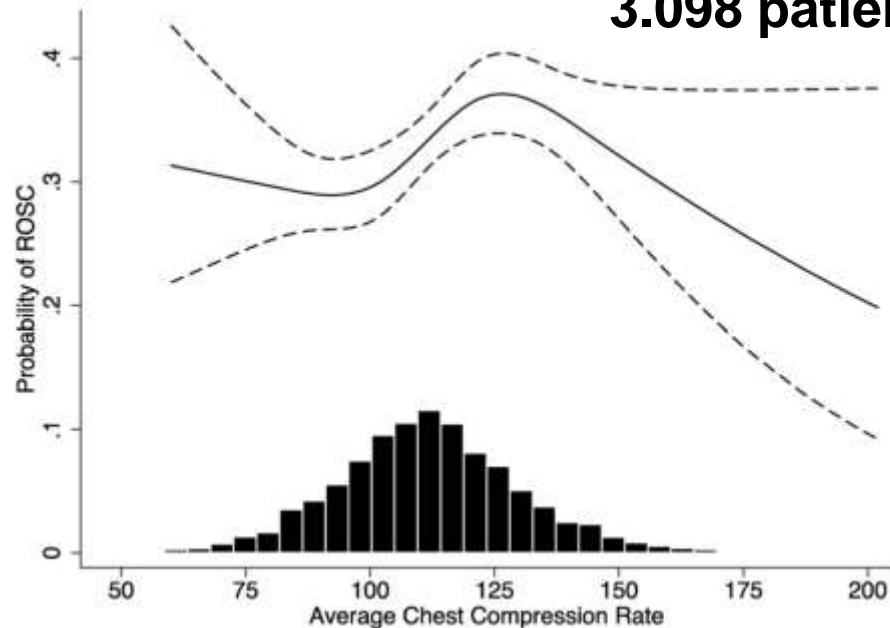
Eseguire le compressioni con una frequenza di 100-120/minuto

## Relationship Between Chest Compression Rates and Outcomes From Cardiac Arrest

Ahamed H. Idris, MD; Danielle Guffey, BS; Tom P. Aufderheide, MD; Siobhan Brown, PhD;  
Laurie J. Morrison, MD, MSc; Patrick Nichols, DO; Judy Powell, BSN; Mohamud Daya, MD;  
Blair L. Bigham, MSc; Dianne L. Atkins, MD; Robert Berg, MD; Dan Davis, MD;  
Ian Stiell, MD, MSc; George Sopko, MD, MPH; Graham Nichol, MD, MPH;  
the Resuscitation Outcomes Consortium (ROC) Investigators

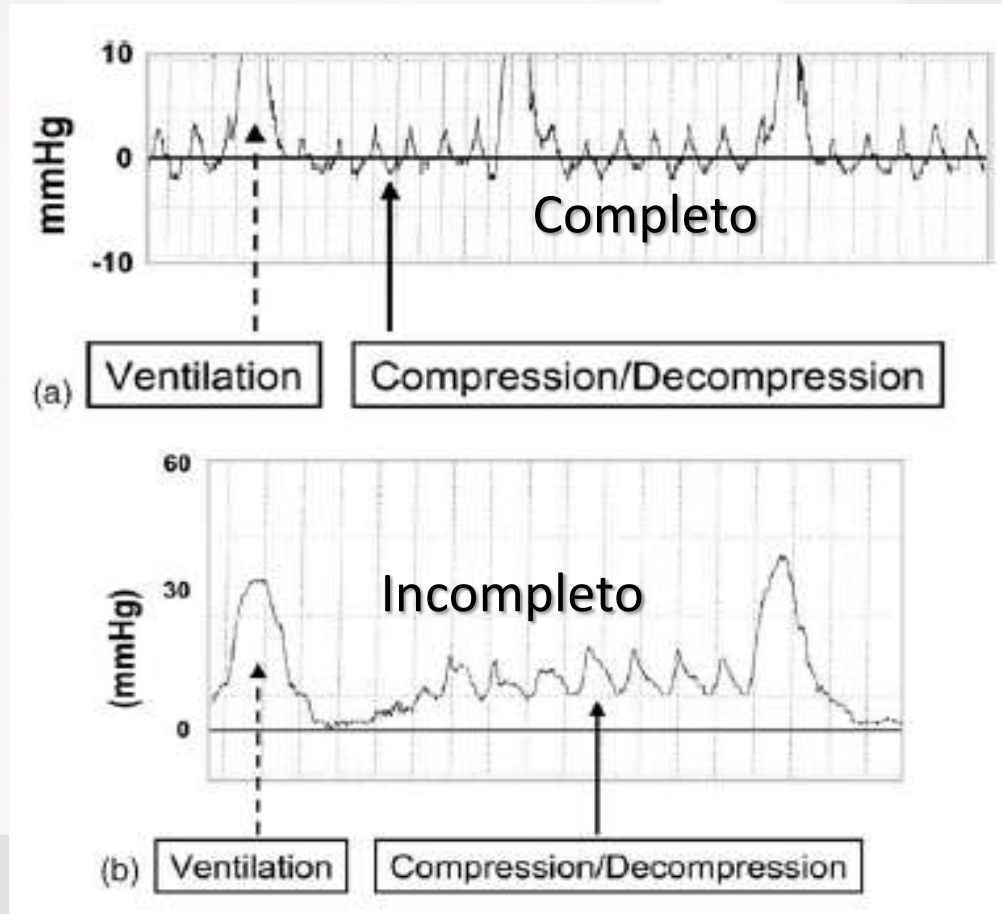
**3.098 patients with OHCA**

*Circulation. 2012;125:3004-3012*



# RCP di elevata qualità

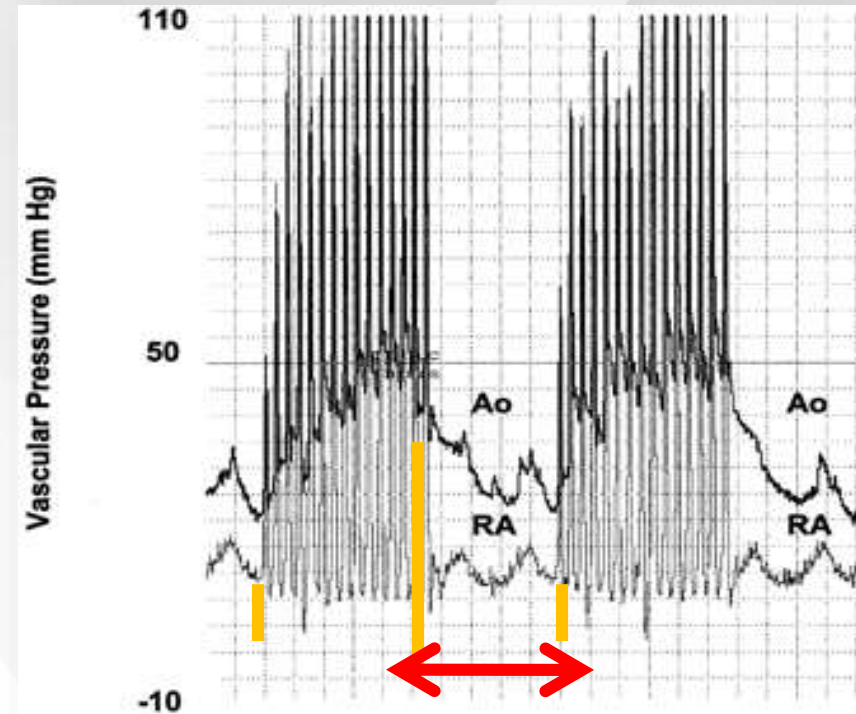
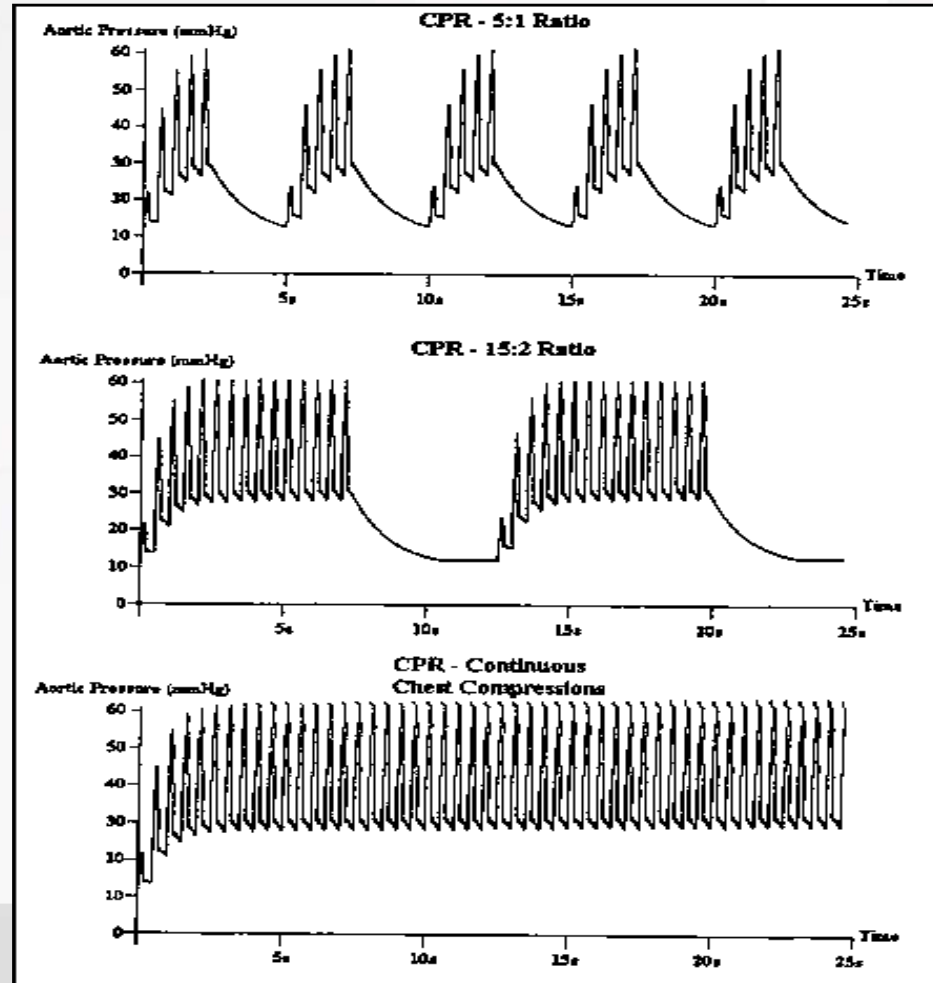
Garantire il completo rilascio del torace (non rimanere sul torace)



*T.P. Aufderheide et al. / Resuscitation 64 (2005) 353–362*

# RCP di elevata qualità

Evita le interruzioni



*Berg RA, Circulation 2001;104:2465*



Rimini  
**IRC 2021**  
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RISPOSTE CRISTOPORANE  
POST-LOCKDOWN



Italian  
Resuscitation  
Council

# Veniamo da qui...



# Passando da qui...

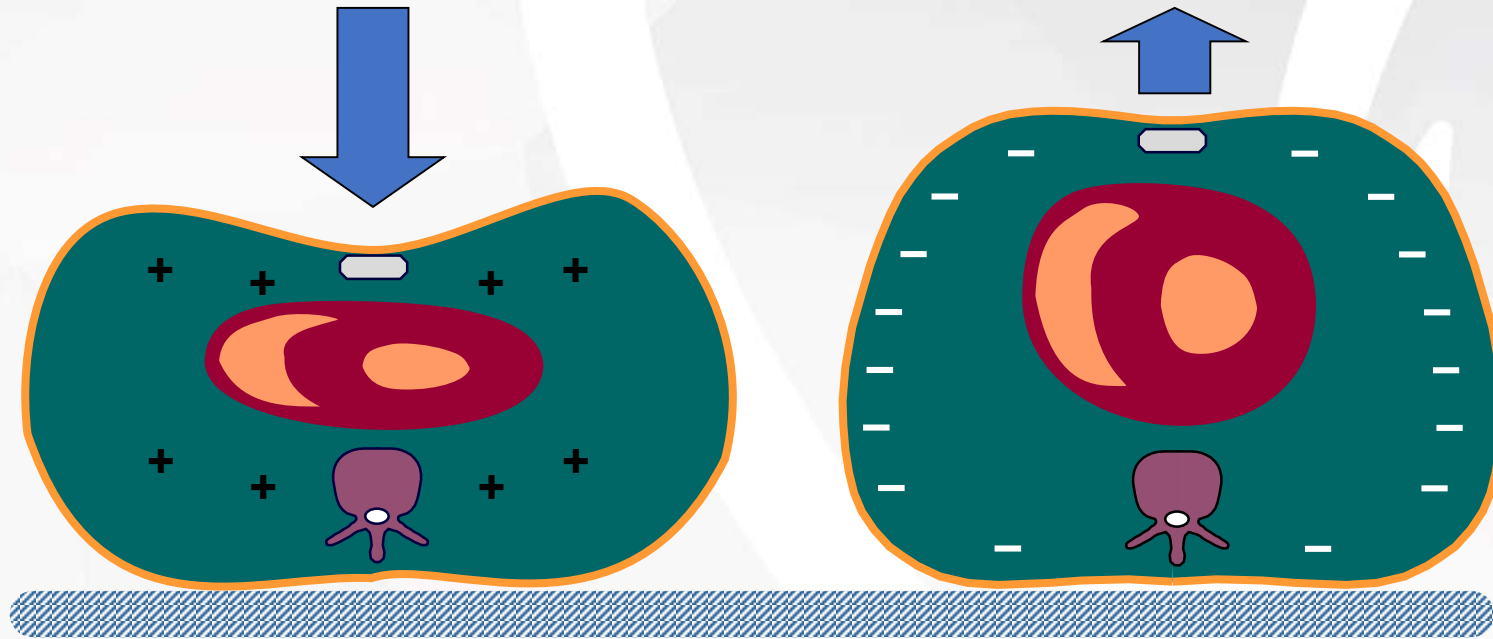


William Bennett Kouwenhoven



1960 compressioni toraciche  
moderne

# Compressioni toraciche



**Flusso  
sanguigno  
anterogrado**

**Ritorno venoso**

# Quality CPR: perché?



Il flusso coronarico normale è di circa 70 ml/100 g/min, in altri termini circa 225 ml/min (4-5% della gittata)



La perfusione cerebrale normale corrisponde a circa 50-65 ml/100 g/min, in altri termini 750-900 ml/min (15% circa della gittata cardiaca a riposo)

*Guyton, Textbook of Medical Physiology*



# Quality CPR: perché?



***DURANTE CPR OTTIMALE  
15 – 25 % DELLA GITTATA BASALE***

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La perfusione cerebrale normale corrisponde a circa 50-65 ml/100 g/min, in altri termini 750-900 ml/min (15% circa della gittata cardiaca a riposo)

*Guyton, Textbook of Medical Physiology*



***DURANTE CPR OTTIMALE  
15 – 25 % DELLA GITTATA BASALE:  
che sarebbe a dire che in autostrada  
viaggiamo a 20-30 km/h***

# Presente o futuro?



Clinical Paper

Manual vs. integrated automatic load-distributing band CPR with equal survival after out of hospital cardiac arrest. The randomized CIRC trial<sup>☆,☆☆</sup>

Lars Wik<sup>a,\*,†</sup>, Jan-Aage Olsen<sup>a,b</sup>, David Perse<sup>c</sup>, Fritz Sterz<sup>d</sup>, Michael Lozano Jr.<sup>e,f</sup>, Marc A. Brouwer<sup>g</sup>, Mark Westfall<sup>h,i</sup>, Chris M. Souders<sup>c</sup>, Reinhard Malzer<sup>j</sup>, Pierre M. van Grunsven<sup>k</sup>, David T. Travis<sup>e</sup>, Anne Whitehead<sup>l</sup>, Ulrich R. Herken<sup>m</sup>, E. Brooke Lerner<sup>n</sup>



## Autopulse vs. RCP manuale di alta qualità

4.753 pazienti

### Comparison of outcome by treatment arm.

Outcomes	M-CPR (n=2132)	IA-CPR (n=2099)
Survival to Hospital Discharge	233 (11.0%) (7 cases unknown)	196 (9.4%) (5 cases unknown)
Survival to 24 h	532 (25.0%) <sup>v</sup>	456 (21.8%) (10 cases unknown)
Sustained ROSC	689 (32.3%)	600 (28.6%)
Discharge mRS	(n=233)	(n=196)
Score of 0–3	112 (48.1%)	87 (44.4%)
Score of 4–5	61 (26.2%)	50 (25.5%)
Unknown score	60 (25.8%)	59 (30.1%)

<sup>a</sup> Adjusted for covariates and interim analyses.

<sup>b</sup> Secondary outcomes can only be adjusted for the covariates, not the interim analyses.

# !Equivalenza!:

ROSC, sopravvivenza a 24 ore e alla dimissione ospedaliera



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Resuscitation  
Council

## LUCAS vs. RCP manuale di alta qualità

2.589 pazienti  
(sopravvivenza a 4 ore)

Original Investigation

# Mechanical Chest Compressions and Simultaneous Defibrillation vs Conventional Cardiopulmonary Resuscitation in Out-of-Hospital Cardiac Arrest The LINC Randomized Trial

Table 2. Primary and Secondary Outcomes

Outcomes	No. (%) of Participants		P Value	Treatment Difference, % (95% CI)
	Mechanical CPR (n = 1300)	Manual CPR (n = 1289)		
4-Hour survival <sup>a</sup>	307 (23.6)	305 (23.7)	>.99	-0.05 (-3.3 to 3.2)
ROSC <sup>b</sup>	460 (35.4)	446 (34.6)	.68	0.78 (-2.9 to 4.5)
Arrival at emergency department with palpable pulse	366 (28.2)	357 (27.7)	.83	0.46 (-3.0 to 3.9)
Survival to discharge from ICU with CPC 1-2 <sup>c</sup>	98 (7.5)	82 (6.4)	.25	1.18 (-0.8 to 3.1)
Survival to hospital discharge with CPC 1-2 <sup>c</sup>	108 (8.3)	100 (7.8)	.61	0.55 (-1.5 to 2.6)
1-Month survival with CPC 1-2 <sup>d</sup>	105 (8.1)	94 (7.3)	.46	0.78 (-1.3 to 2.8)
6-Month survival with CPC 1-2 <sup>d</sup>	110 (8.5)	98 (7.6)	.43	0.86 (-1.2 to 3.0)
Survival to discharge from ICU <sup>e</sup>	158 (12.2)	153 (11.9)	.86	0.28 (-2.2 to 2.8)
With CPC 1	54 (4.2)	34 (2.6)	.04	1.52 (0.1 to 2.9)
With CPC 2	44 (3.4)	48 (3.7)		
With CPC 3	34 (2.6)	40 (3.1)		
With CPC 4	26 (2.0)	29 (2.2)		
Survival to discharge from hospital <sup>e</sup>	117 (9.0)	118 (9.2)	.89	-0.15 (-2.4 to 2.1)
With CPC 1	89 (6.8)	67 (5.2)	.08	1.65 (-0.2 to 3.5)
With CPC 2	19 (1.5)	33 (2.6)		
With CPC 3	9 (0.7)	15 (1.2)		
With CPC 4	0	1 (0.1)		
1-Month survival <sup>f</sup>	112 (8.6)	109 (8.5)	.89	0.16 (-2.0 to 2.3)
With CPC 1	92 (7.1)	74 (5.7)	.17	1.34 (-0.6 to 3.2)
With CPC 2	13 (1.0)	20 (1.6)		
With CPC 3	7 (0.5)	13 (1.0)		
With CPC 4	0	1 (0.1)		
6-Month survival <sup>g</sup>	111 (8.5)	104 (8.1)	.67	0.47 (-1.7 to 2.6)
With CPC 1	103 (7.9)	88 (6.8)	.29	1.10 (-0.9 to 3.1)
With CPC 2	7 (0.5)	10 (0.8)		
With CPC 3	1 (0.1)	6 (0.5)		
With CPC 4	0	0		

# Mechanical versus manual chest compression for out-of-hospital cardiac arrest (PARAMEDIC): a pragmatic, cluster randomised controlled trial

## LUCAS vs. RCP manuale di alta qualità

4.471 pazienti  
(sopravvivenza a 30 gg)

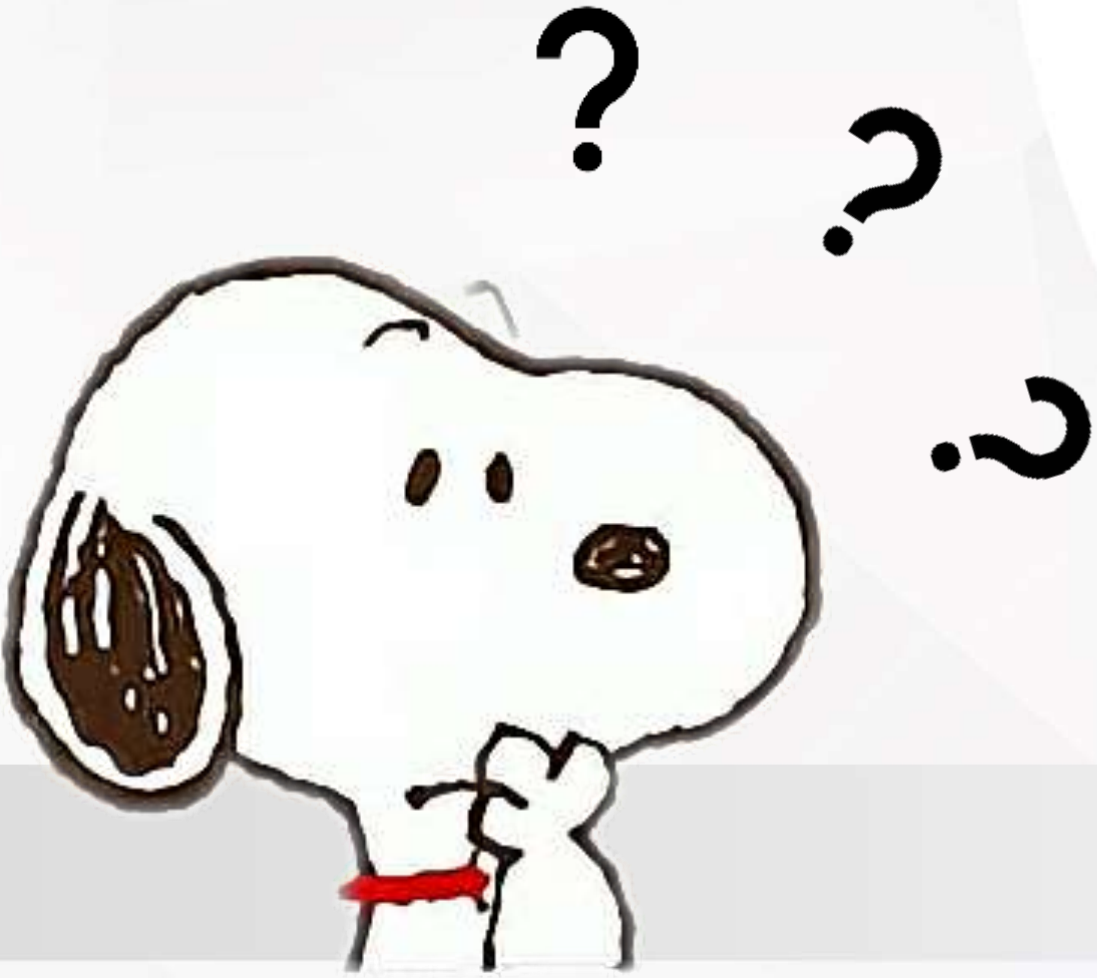
**Interpretation** We noted no evidence of improvement in 30 day survival with LUCAS-2 compared with manual compressions. On the basis of ours and other recent randomised trials, widespread adoption of mechanical CPR devices for routine use does not improve survival.

	LUCAS-2 (n=1652)	Control (n=2819)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Survival to 30 days				
Survived to 30 days	104 (6%)	193 (7%)	0.91 (0.71-1.17)	0.86 (0.64-1.15)
Not known	0	1 (<1%)	..	..
ROSC				
ROSC	522 (32%)	885 (31%)	1.02 (0.89-1.16)	0.99 (0.86-1.14)
Not known	58 (4%)	82 (3%)	..	..
Survived event				
Survived event	377 (23%)	658 (23%)	0.97 (0.83-1.14)	0.97 (0.82-1.14)
Not known	82 (5%)	129 (5%)	..	..
Survival to 3 months				
Survived to 3 months	96 (6%)	182 (6%)	0.89 (0.69-1.15)	0.83 (0.61-1.12)
Not known	0	1 (<1%)	..	..
Survival to 12 months	89 (5%)	175 (6%)	0.86 (0.60-1.12)	0.83 (0.62-1.11)
Survival with favourable neurological outcome (CPC 1-2)	77 (5%)	168 (6%)	0.77 (0.59-1.02)	0.72 (0.52-0.99)
CPC			..	..
1	67 (4%)	153 (5%)	..	..
2	10 (1%)	15 (1%)	..	..
3	14 (1%)	10 (<1%)	..	..
	2 (<1%)	1 (<1%)	..	..
	1556 (94%)	2636 (94%)	..	..
	3 (<1%)	4 (<1%)	..	..

.. as otherwise indicated. OR=odds ratio. ROSC=return of spontaneous circulation. CPC=cerebral performance score.


Lancet 2015

# E quindi??



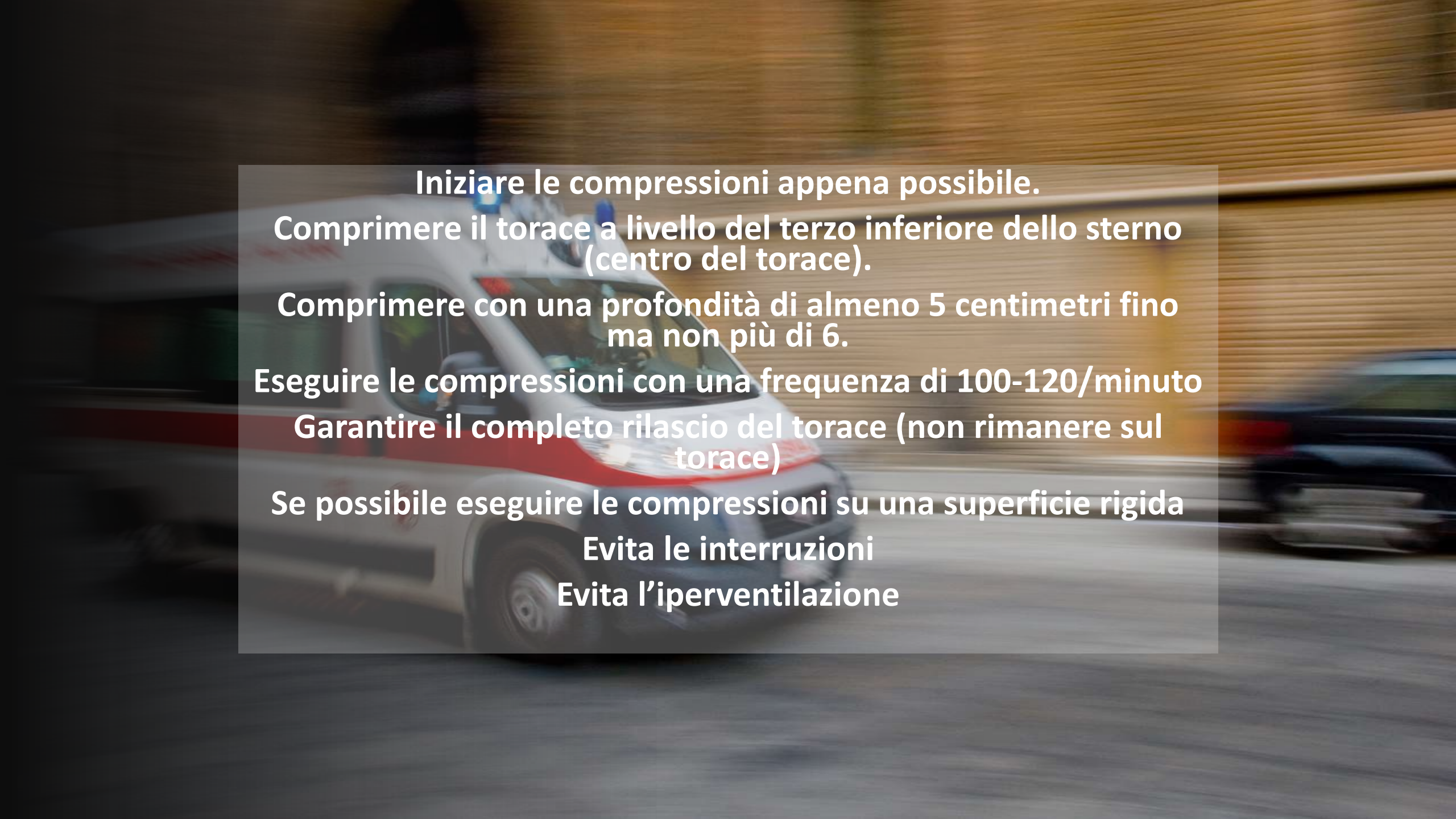






**Iniziare le compressioni appena possibile.**  
**Comprimere il torace a livello del terzo inferiore dello sterno (centro del torace).**  
**Comprimere con una profondità di almeno 5 centimetri fino ma non più di 6.**  
**Eeguire le compressioni con una frequenza di 100-120/minuto**  
**Garantire il completo rilascio del torace (non rimanere sul torace)**  
**Se possibile eseguire le compressioni su una superficie rigida**  
**Evita le interruzioni**  
**Evita l'iperventilazione**





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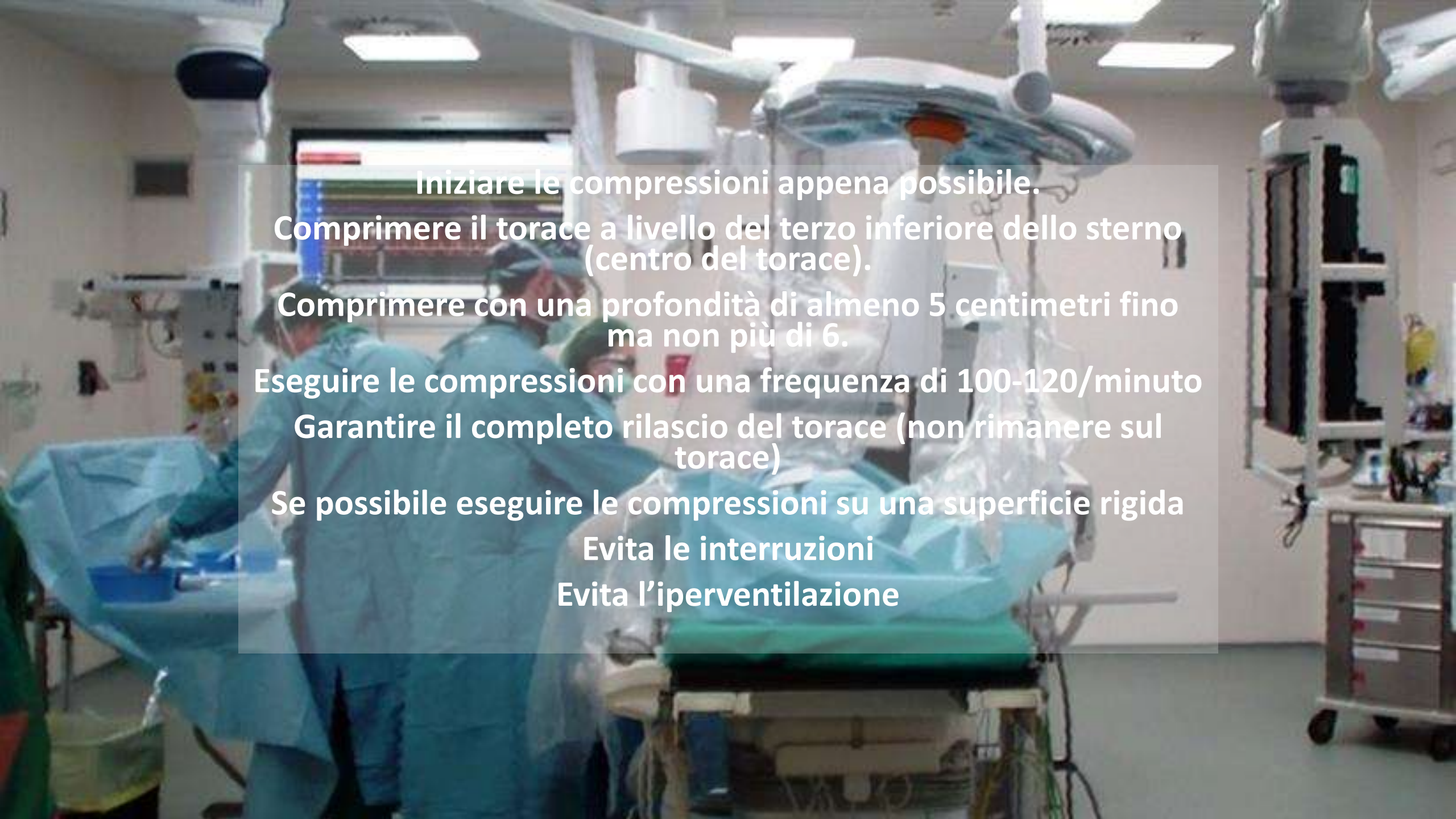
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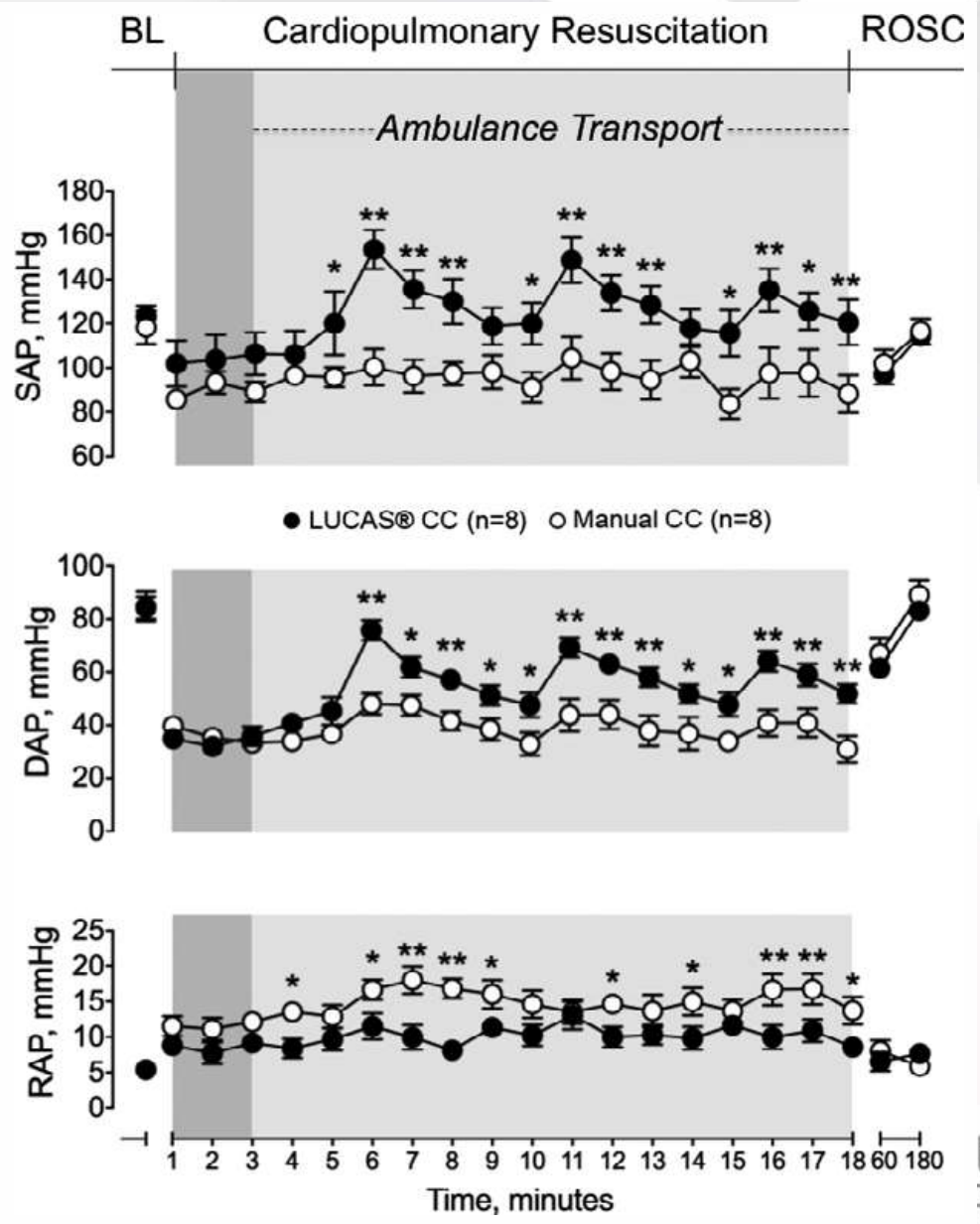
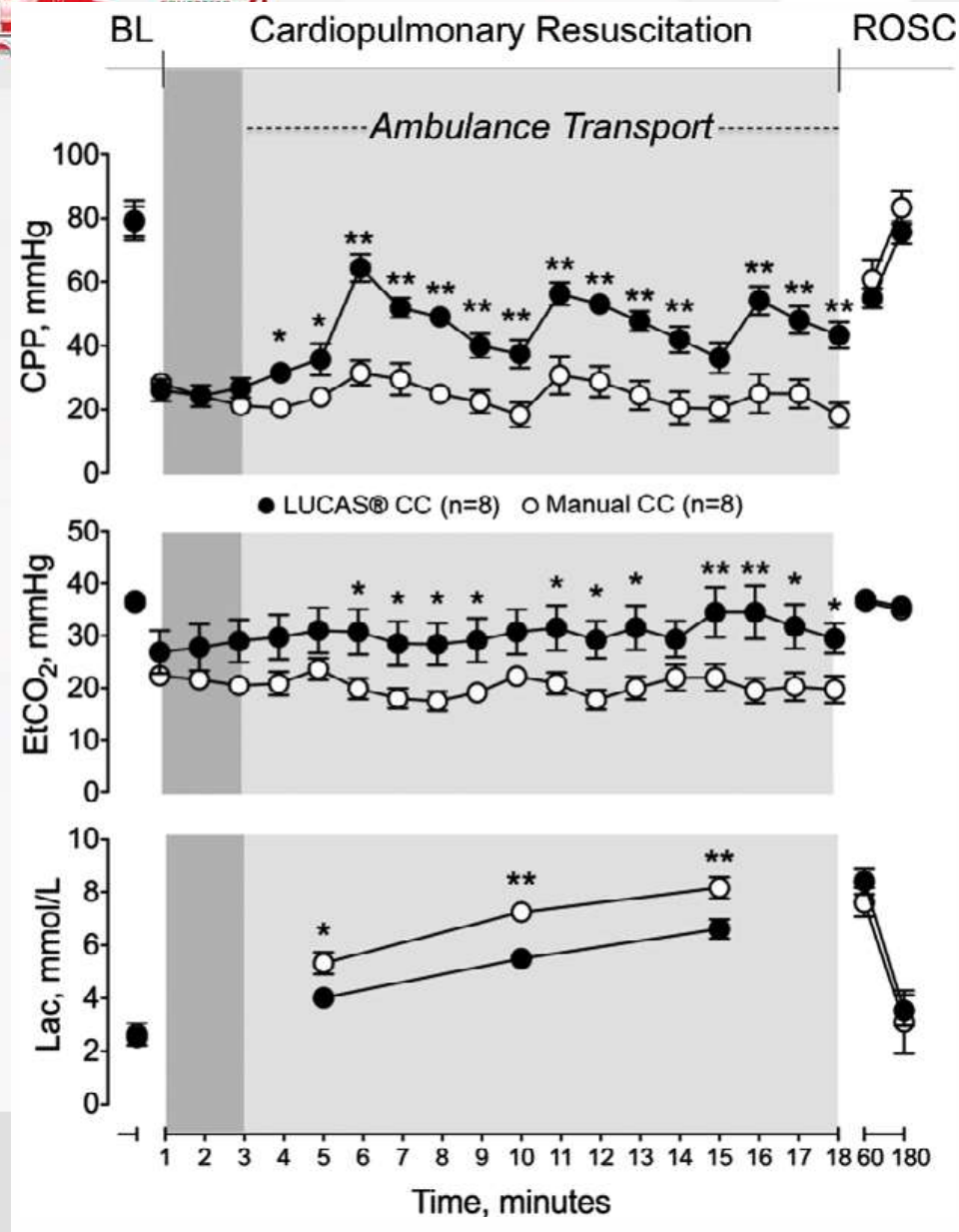






*E se devo convincervi....*







## Mechanical chest compressions are associated with increased severity of post-cardiac arrest syndrome: a sub-study from the TTH48 trial

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## Probability of receiving mechanical chest compressions is associated with cardiac arrest mortality: a propensity score analysis

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### CONTACT INFORMATION

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## CONCLUSIONS

When time to ROSC was included in the PS, the likelihood to receive mechanical CC during cardiac arrest significantly correlated with 6-months mortality while receipt of mechanical chest compressions did not. The same association was not observed when time to ROSC wasn't accounted in the PS. The longer duration of resuscitation efforts observed in patients that received mechanical CC could explain the results. Notably, mechanical CC, per se, was never associated with mortality.

## CONCLUSIONS

Patients receiving mechanical CC showed more severe clinical status after hospital admission, poorer survival and worse neurological outcome. The longer duration of the downtime observed in the mechanical CC group could partially explain the increased clinical severity observed in this subgroup of patients.



Italian Resuscitation Council

# European Resuscitation Council Guidelines 2021:

**CONSIDERA** il compressore meccanico quando un massaggio cardiaco di alta qualità non è praticabile o mette a rischio la sicurezza del soccorritore

Soar J, Resuscitation 2021

# European Resuscitation Council Guidelines

## 2021:

Embolia polmonare  
Sala di emodinamica  
Ipotermia  
Valanga  
Trasporto



**NON** raccomandato nella donna in gravidanza



Rimini  
IRC 20  
CC  
NA  
16-  
18  
19-  
20



*Grazie!*



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