



Does the position of the paramedic performing chest compressions during a simulated cardiac arrest influence compliance with the 2010 guidelines?

Paul Davey, Auckland University of Technology

Dr Bridget Dicker, St John, Auckland University of Technology

Dr Chris Whatman, Auckland University of Technology



2010 Resuscitation Guidelines

CPR Quality Metric	Performance Standard
Chest compression rate	$\geq 100/\text{minute}$ (100 – 120/minute)
Chest compression depth	$\geq 50\text{mm}$
Chest compression fraction	$> 80\%$ - minimise interruptions
Peri-shock Pause	< 10 seconds
Chest recoil (leaning)	Leaning should be minimised / avoided
Duty Cycle	$< 50\%$
Ventilation	< 12 breaths/minute (8-10/min when advanced airway used)



Study Design

- Randomised cross over study
- Paramedics n = 30
- Pairs randomised to rescuer 1 and 2
- Rescuer 1 randomised to either over-the-head (OTH) or from-the-side (FTS) CPR
- Standardised cardiac arrest simulation (VF)
- Performed CPR for 10 cycles, Figure 1

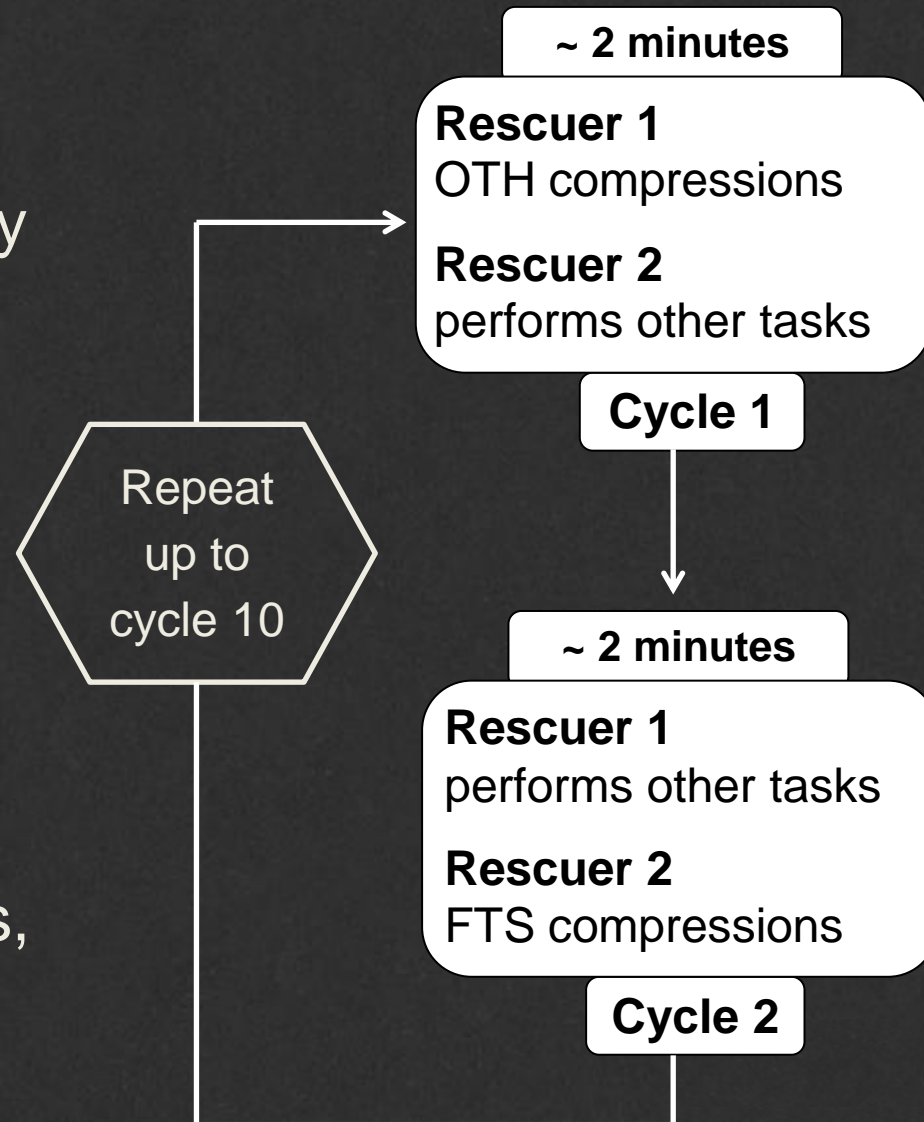
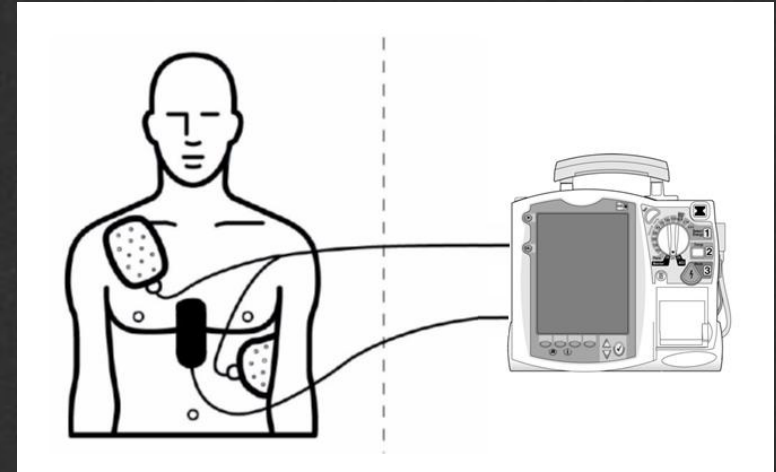


Figure 1: Study protocol



Experimental setup

- **Resusci Anne Simulator (intubated)**
- **MRx Defibrillator with Q-CPR**
- **Feedback disabled: participant blinded to performance**
- **Data analysed using Event Review Pro**





FTS
From-the-side

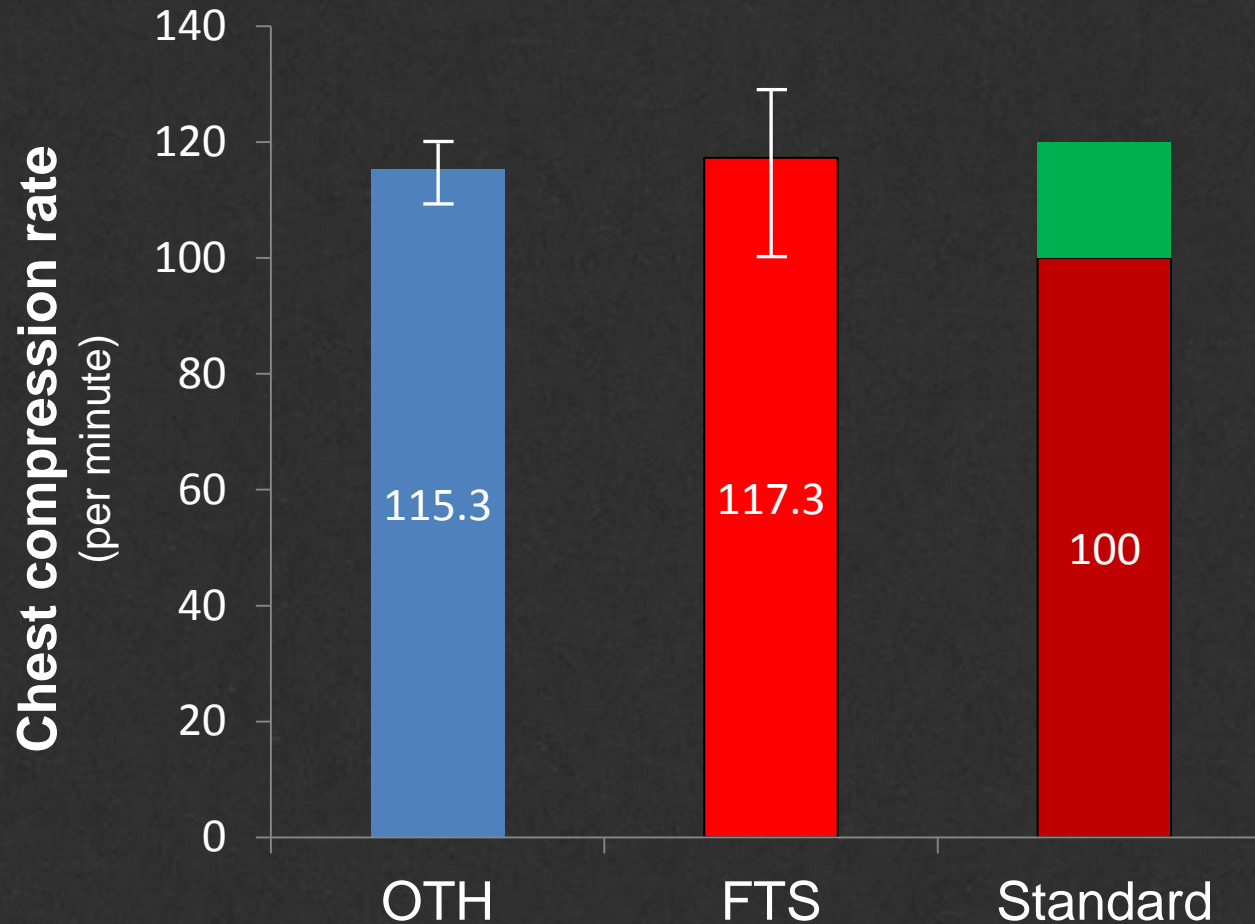


OTH
Over-the-head

Results

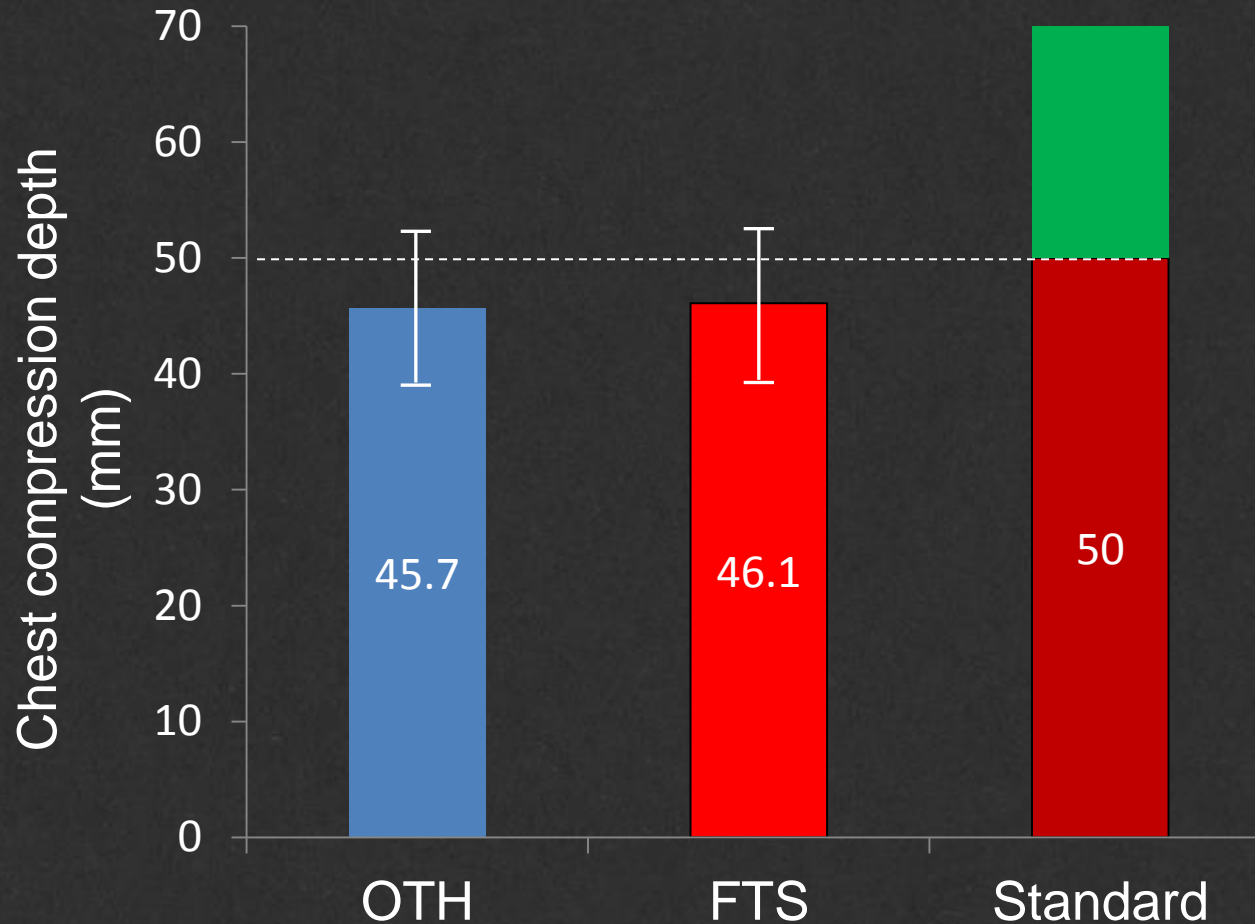
Demographics		Male (n=23)	Female (n=7)
Years practicing		10.5 (7.8)	12.1 (5.6)
Weight (kg)		89.4 (17.9)	67.9 (7.3)
Height (cm)		180.4 (7.2)	170.1 (5.8)
BMI (kg.m ⁻²)		27.2 (4.0)	23.5 (2.7)
Arm Length (cm)		58.9 (3.9)	55.3 (2.9)
Age	21 – 30 years	10%	7%
	31 – 40 years	43%	10%
	41 – 50 years	23%	3.5%
	51 – 60 years	0%	3.5%
Scope			
Intermediate Life Support		47%	10%
Intensive Care Paramedic		30%	13%

Figure 2. Chest compression rate



- No difference in rate between OTH and FTS ($p=0.43$)
- Compression rate complies with Guidelines for both positions

Figure 3. Chest compression depth



- No difference in depth between OTH and FTS ($p=0.45$)
- Compression depth did not comply with Guidelines for both positions



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Clinical Paper

Chest compression depth and survival in out-of-hospital cardiac arrest[☆]

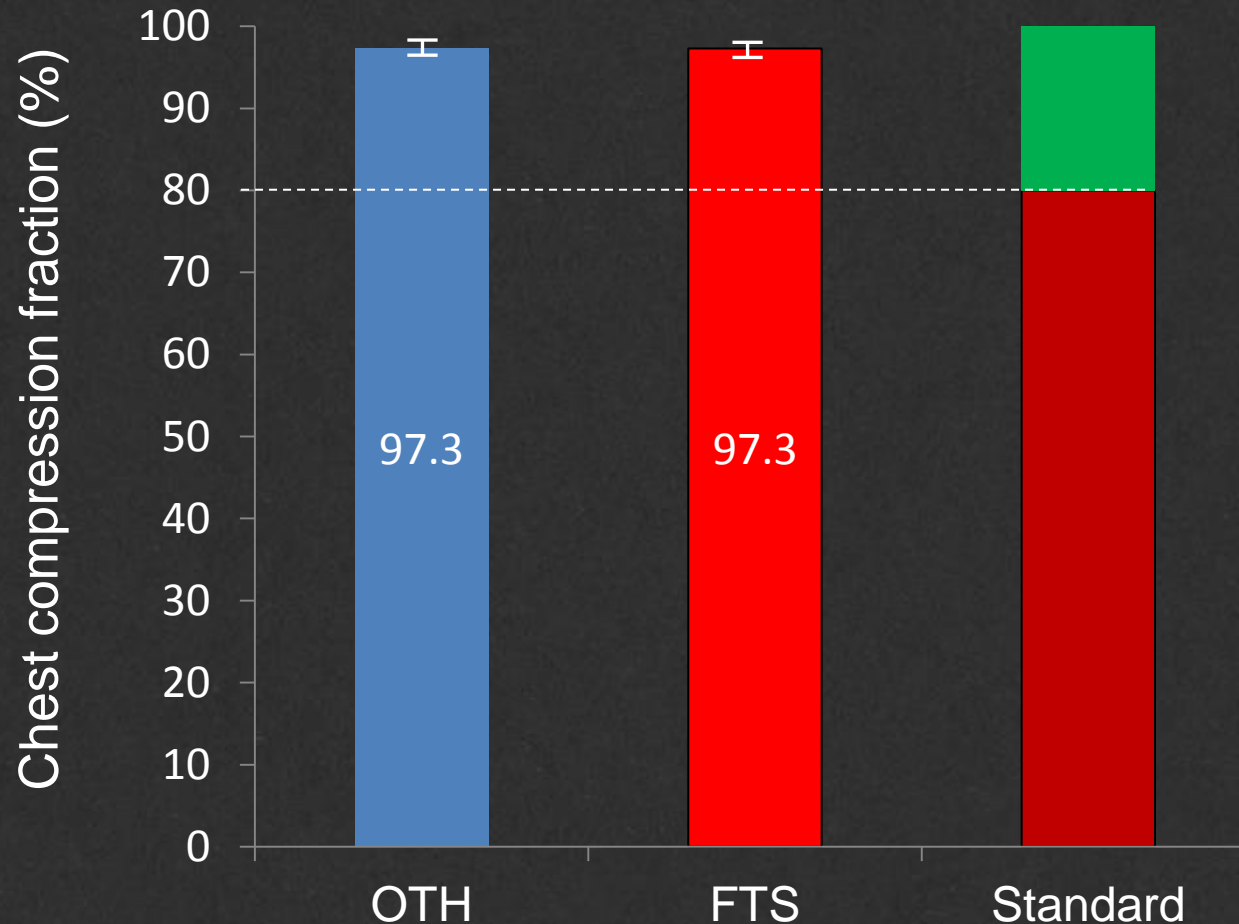


Tyler Vadeboncoeur^{a,*}, Uwe Stolz^{b,1}, Ashish Panchal^{i,2}, Annemarie Silver^c,
Mark Venuti^d, John Tobin^e, Gary Smith^e, Martha Nunez^f, Madalyn Karamooz^g,
Daniel Spaite^{b,1}, Bentley Bobrow^{f,h,j,3}

Deeper chest compressions (at least 51mm)
were independently associated with improved
survival with favourable functional outcome



Figure 4. Chest compression fraction (CCF)



- No difference in CCF between OTH and FTS ($p=0.87$)
- CCF complies with Guidelines for OTH and FTS



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Clinical paper

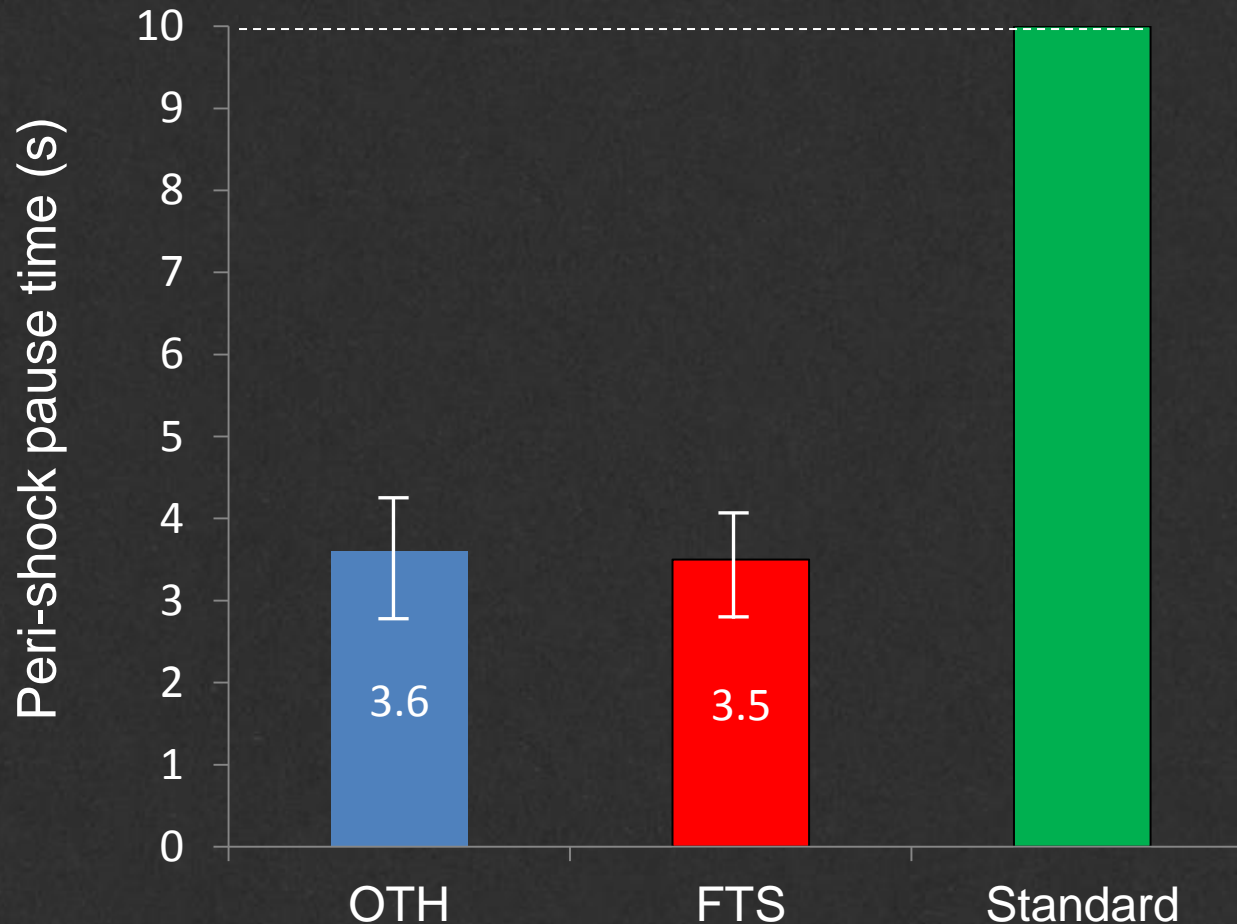
The impact of increased chest compression fraction on return of spontaneous circulation for out-of-hospital cardiac arrest patients not in ventricular fibrillation[☆]

Christian Vaillancourt^{a,*}, Siobhan Everson-Stewart^b, Jim Christenson^c, Douglas Andrusiek^c, Judy Powell^b, Graham Nichol^b, Sheldon Cheskes^d, Tom P. Aufderheide^e, Robert Berg^f, Ian G. Stiell^a, the Resuscitation Outcomes Consortium Investigators

- Increased chest compression fraction among non-VF OHCA is associated with a trend towards increased likelihood of ROSC
- Highest ROSC rates seen with CCF >80%



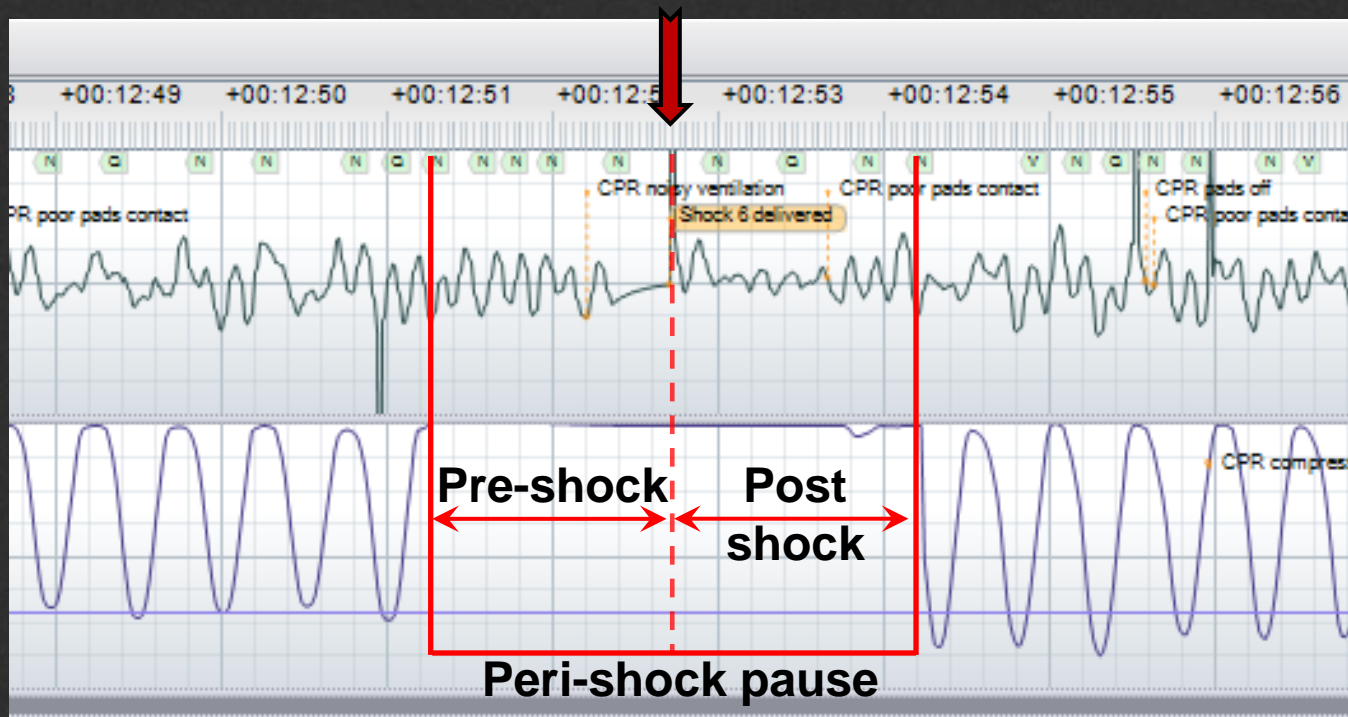
Figure 5. Perishock pause



- No difference in CCF between OTH and FTS ($p=0.87$)
- CCF complies with Guidelines for OTH and FTS

Perishock pause

DC
Shock



This example: Pre-shock pause = 1.51 seconds
Post-shock pause = 1.43 seconds
Peri-shock pause = 2.94 seconds



Perishock Pause: An Independent Predictor of Survival From Out-of-Hospital Shockable Cardiac Arrest

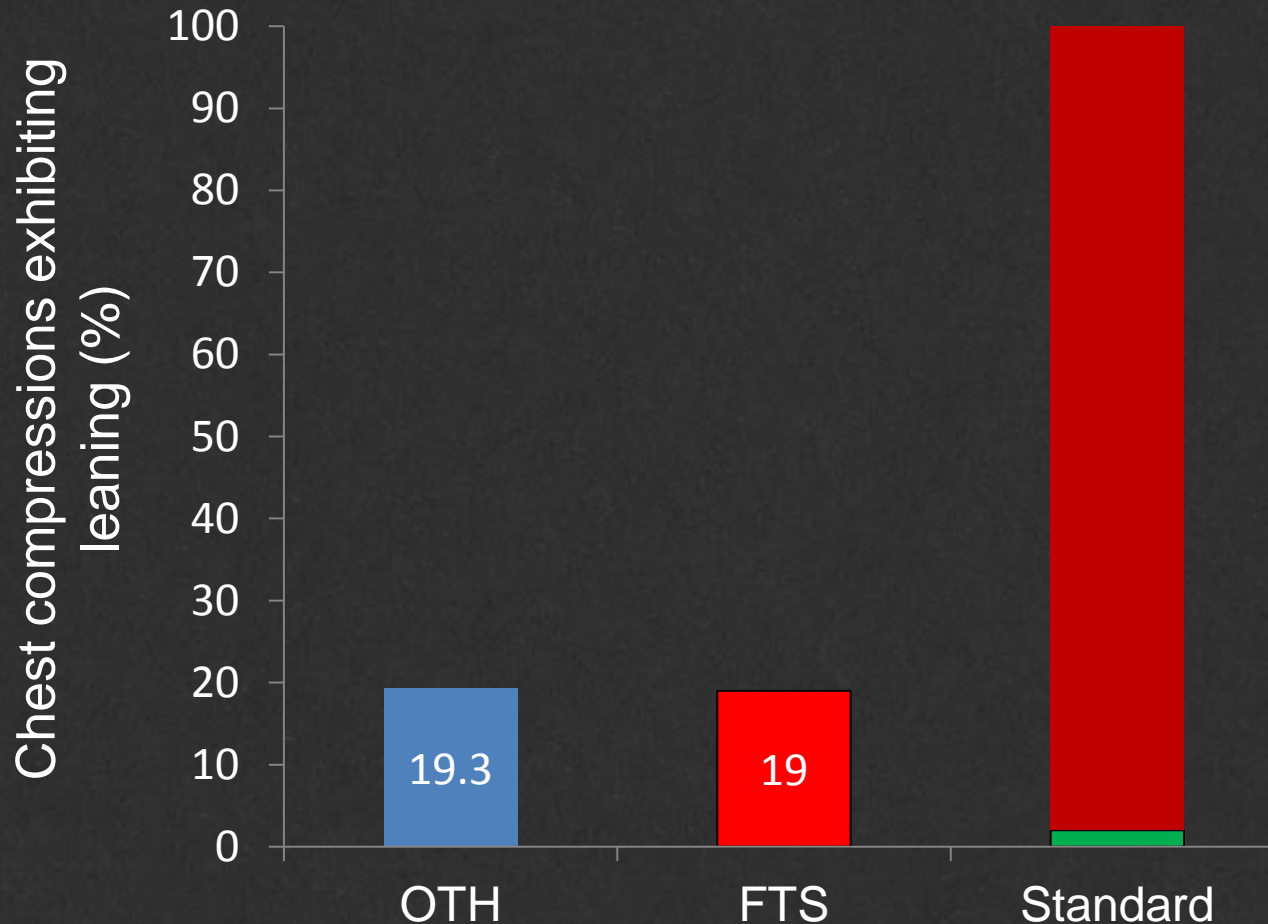
Sheldon Cheskes, Robert H. Schmicker, Jim Christenson, David D. Salcido, Tom Rea, Judy Powell, Dana P. Edelson, Rebecca Sell, Susanne May, James J. Menegazzi, Lois Van Ottingham, Michele Olsufka, Sarah Pennington, Jacob Simonini, Robert A. Berg, Ian Stiell, Ahamed Idris, Blair Bigham and Laurie Morrison

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- Every 5 second increase in preshock pause :
18% decrease in survival to discharge
- Every 5 second increase in perishock pause :
14% decrease in survival to discharge

Figure 5. Chest recoil (Leaning)



- No difference in leaning between OTH and FTS ($p=0.92$)
- Incidence of leaning does not comply with Guidelines for OTH and FTS



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Resuscitation

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



Clinical paper

The prevalence of chest compression leaning during in-hospital cardiopulmonary resuscitation[☆]

David A. Fried^a, Marion Leary^a, Douglas A. Smith^a, Robert M. Sutton^b, Dana Niles^b,
Daniel L. Herzberg^a, Lance B. Becker^a, Benjamin S. Abella^{a,*}

^a Center for Resuscitation Science and Department of Emergency Medicine, University of Pennsylvania School of Medicine, Philadelphia, PA 19104, USA

^b Department of Anesthesiology, Critical Care and Pediatrics, Center for Simulation, Advanced Education and Innovation, The Children's Hospital of Philadelphia, University of Pennsylvania School of Medicine, Philadelphia, PA 19104, USA

- 91% of cases had evidence of leaning
- 12% of all chest compressions exhibited leaning

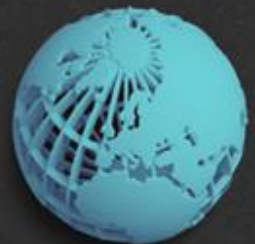
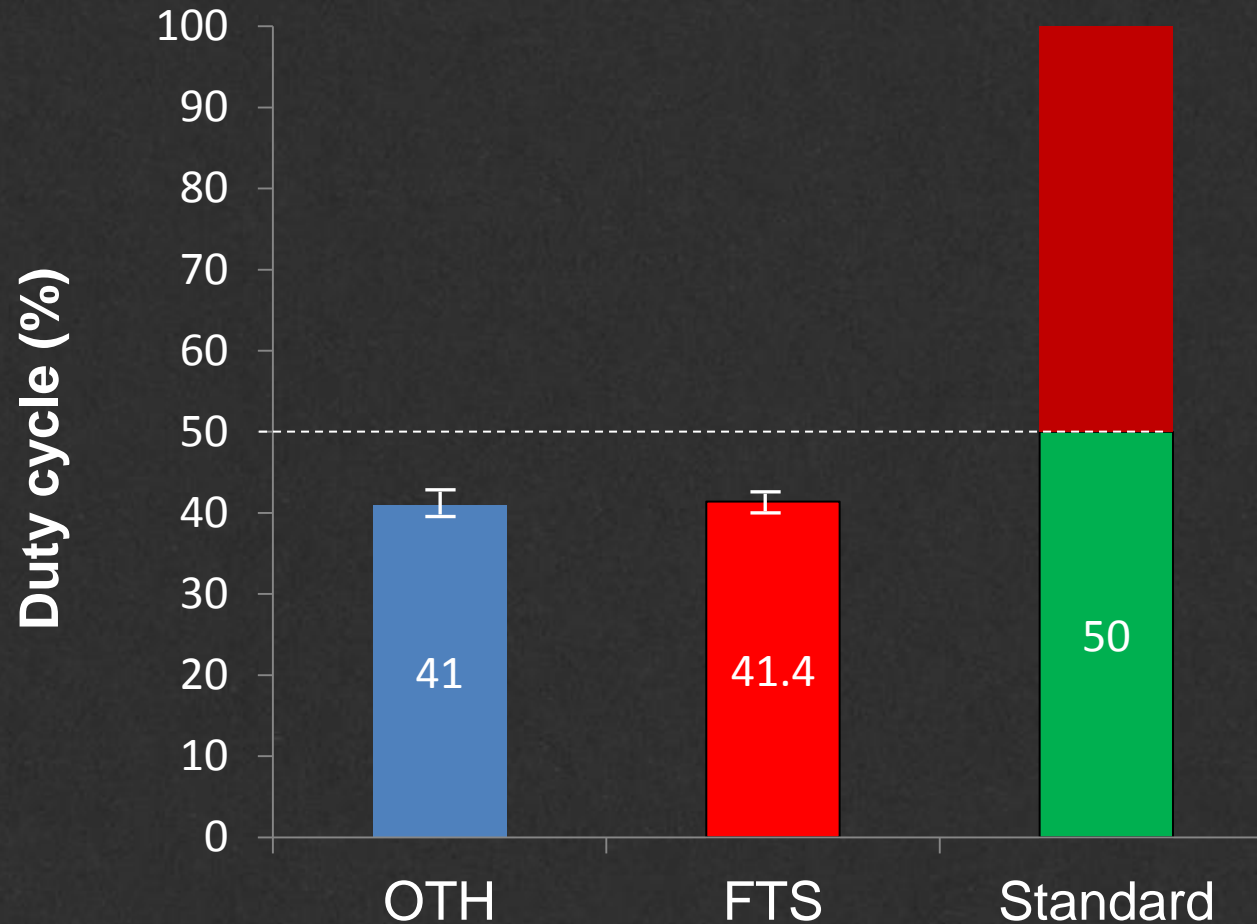
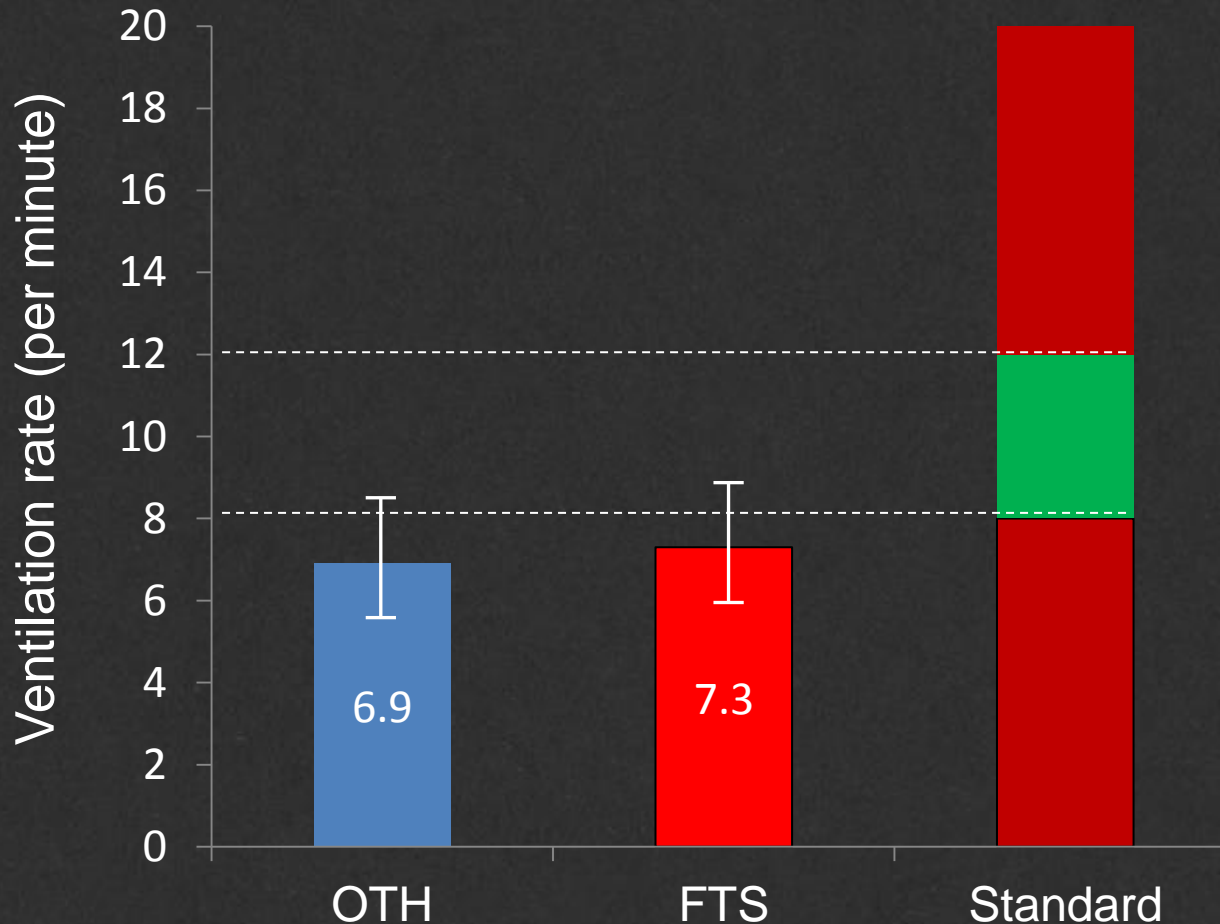


Figure 6. Duty Cycle



- No difference in duty cycle between OTH and FTS ($p=0.23$)
- Duty cycle complies with Guidelines for both positions

Figure 7. Ventilation rate



- No difference in ventilation rate between OTH and FTS ($p=0.10$)
- Hyperventilation avoided, ventilation rate < 12 per minute, complies with Guidelines of ventilation < 12 per minute

Compliance of 2010 Resuscitation Guidelines and position of paramedic performing chest compressions

CPR Quality Metric	Over-the-head	From-the-side
Chest compression rate	✓	✓
Chest compression depth	✗	✗
Chest compression fraction	✓	✓
Perishock Pause	✓	✓
Chest recoil (leaning)	✗	✗
Duty Cycle	✓	✓
Ventilation	✓	✓



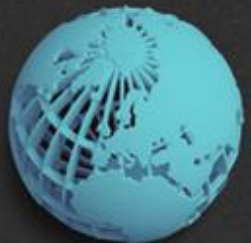
Conclusion:



The position of the paramedic performing chest compressions does not influence compliance with the 2010 Guidelines.



Further education in regards to depth of compression and leaning is warranted.



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