


# Improved Adherence to Best Practice Ventilation Management After Implementation of Clinical Practice Guideline (CPG) for United States Military Critical Care Air Transport Teams (CCATTs)

Kimberly Medellin, BSN, RN  
CPT, AN, USAR (Ret)   
USAF En Route Care Research Center  
59th MDW/ST



# Disclaimer

**The views expressed are those of the authors and do not reflect the official views or policy of the Department of Defense or its Components.**

**This study was conducted under a protocol reviewed and approved by the US Army Medical Research and Materiel Command Institutional Review Board and in accordance with the approved protocol.**



# Background

- Critical Care Air Transport Teams (CCATTs) play a vital role in the transport and care of critically ill and injured patients
- Research has demonstrated improved morbidity and mortality when lung protective ventilation strategies are used
- Our previous study of CCATT trauma patients demonstrated frequent non-adherence to the ARDSNet protocol and a corresponding association with increased mortality

### Tidal Volumes for Ventilation of Patients with ARDS - ARDSNet ARMA Trial

#### Male Patients

Height				cc's per Kg						
				4	5	6	7	8	9	10
ft in	in	cm	Pre Wt (Kg)							
5'6"	66	168	64	255	320	385	445	510	575	640
5'8"	68	173	68	275	340	410	480	545	615	685
5'10"	70	178	73	290	365	440	510	585	655	730
6'	72	183	78	310	390	465	545	620	700	775
6'2"	74	188	82	330	410	495	575	660	740	820
6'4"	76	193	87	345	435	520	610	695	780	870
6'6"	78	198	91	365	455	550	640	730	825	915

#### Female Patients

Height				cc's per Kg						
				4	5	6	7	8	9	10
ft in	in	cm	Pre Wt (Kg)							
5'	60	152	46	180	230	275	320	365	410	455
5'2"	62	157	50	200	250	300	350	400	450	500
5'4"	64	163	55	220	275	330	385	440	490	545
5'6"	66	168	59	235	295	355	415	475	535	595
5'8"	68	173	64	255	320	385	445	510	575	640
5'10"	70	178	69	275	345	410	480	550	615	685
6'	72	183	73	290	365	440	510	585	660	730

### PEEP Titration Table - ARDSNet ARMA Trial

PEEP	5	5	8	8	10	10	10	12	14	14	14	16	18	18	20	22	24
FiO2	0.3	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1	1	1	1

<-----Move across table to keep SaO<sub>2</sub> 92 – 96 %----->

Patients falling in shaded area are not necessarily too sick for flight but risks and benefits should be considered as described in the CPG.

<sup>1</sup>Increasing PEEP can decrease cardiac output and may cause significant hypotension in hypovolemic patients. Additional volume loading may be necessary to maintain hemodynamics.

<sup>2</sup>This is a fairly accurate indicator of plateau pressure in our patient population. Plateau pressure is the correct parameter to follow but it cannot be easily measured with the Impact 731 ventilator.

<sup>3</sup>Measuring the patient's "wingspan" should be used as an estimate of height. Sternum to fingertip multiplied x 2.

<sup>4</sup>A pH of 7.2 may be an appropriate target if hemodynamics are relatively normal.

# Study Aims

- Examine CCATT adherence with ARDSNet guidelines in non-trauma patients
- Evaluate adherence before and after the publication of the CCATT Ventilator Management Clinical Practice Guideline (CPG)
- Compare findings to previous study of CCATT trauma patients





# Data Collected

## CCATT Records (AF 3899 L)

- Flight Information
- In-flight Assessments
- Vital Signs
- Ventilator Settings
- In-flight Procedures

## Post-flight Data (Essentris and AHLTA)

- Disposition
- Oxygenation Measures
- Complications
- Length of Stay



# Statistical Methods

- Retrospective chart review, non-trauma ventilated patients, evacuated January 2007 to April 2015
- Patients categorized as adherent or non-adherent based on ventilator setting compliance to ARDSNet recommendations with relation to TV and PEEP-to-FiO<sub>2</sub> settings
- Compared demographics, pre- and in-flight vent settings/oxygenation status, and prevalence of events between adherent and non-adherent patients
- Made comparisons between this non-trauma population and a previously studied trauma population
- Made comparisons between patients transported pre- and post-CPG implementation (March 2012)



# RESULTS

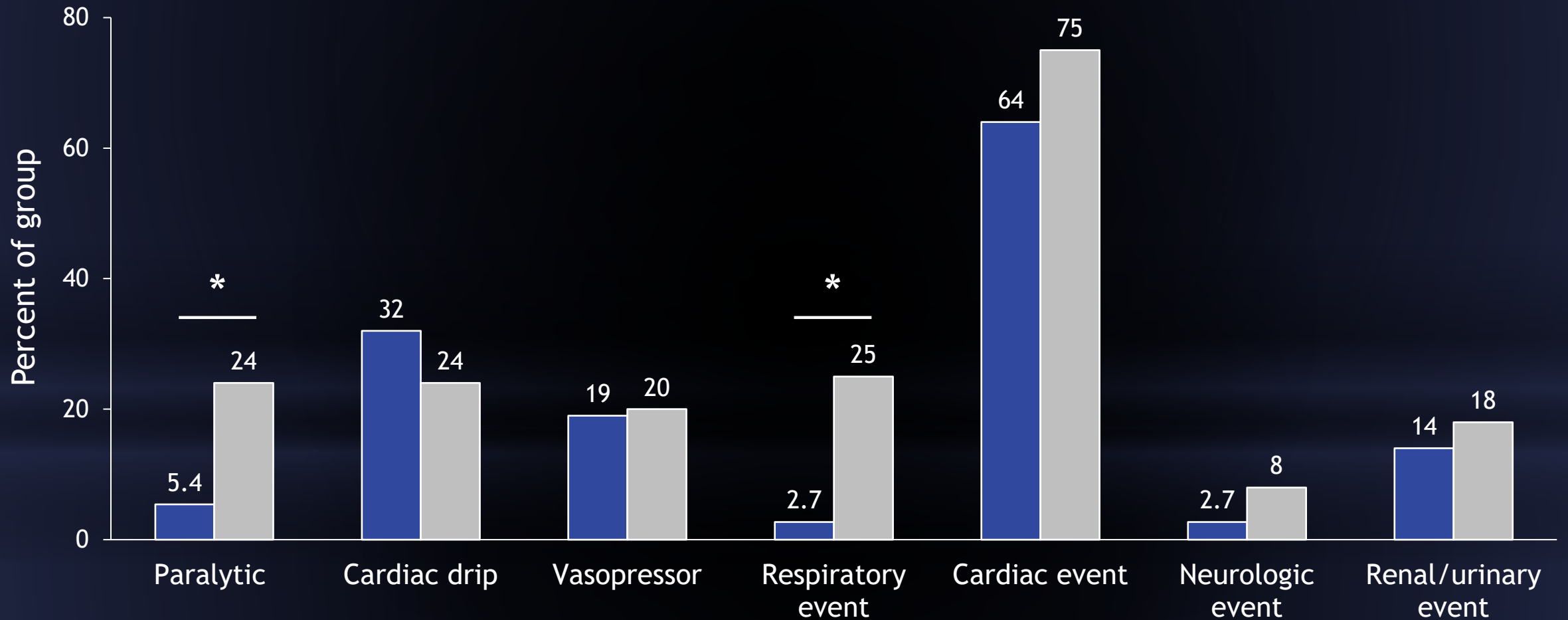


# Demographics and Diagnoses

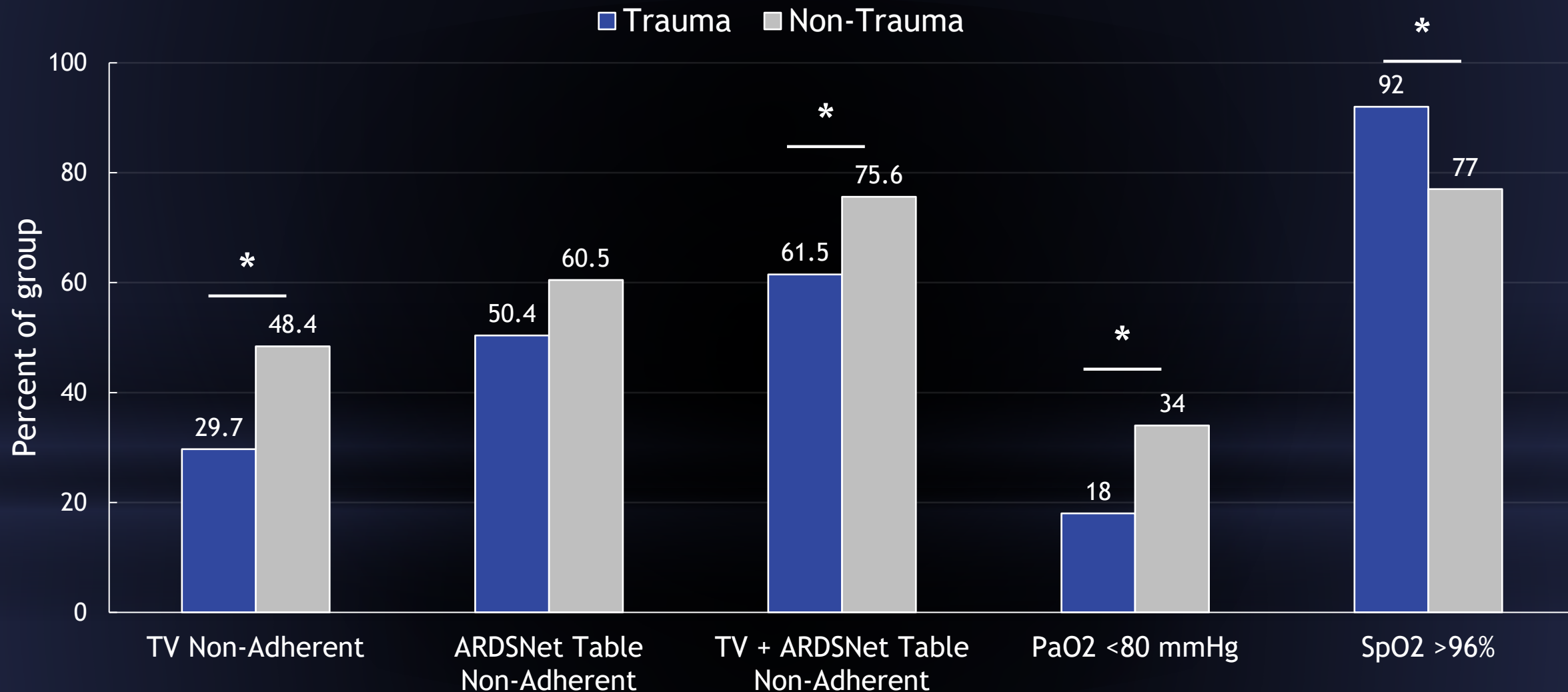
- 124 charts of mechanically ventilated patients
- 70% were non-adherent to ARDSNet recommendations
- Majority were male (88%) active-duty service members (57%), with a median age of 35 [IQR 26-51]
- Adherence rates by diagnosis: pulmonary (20%), neurologic (47%), cardiac (13%), other (29%), >1 diagnosis (12%)
- Non-adherent group had more patients with a neurologic diagnosis ( $p=0.0068$ )
- No significant difference in adherence rates between physician specialties: ED (21%), Critical Care (28%), other (41%)

# Adherent vs. Non-Adherent

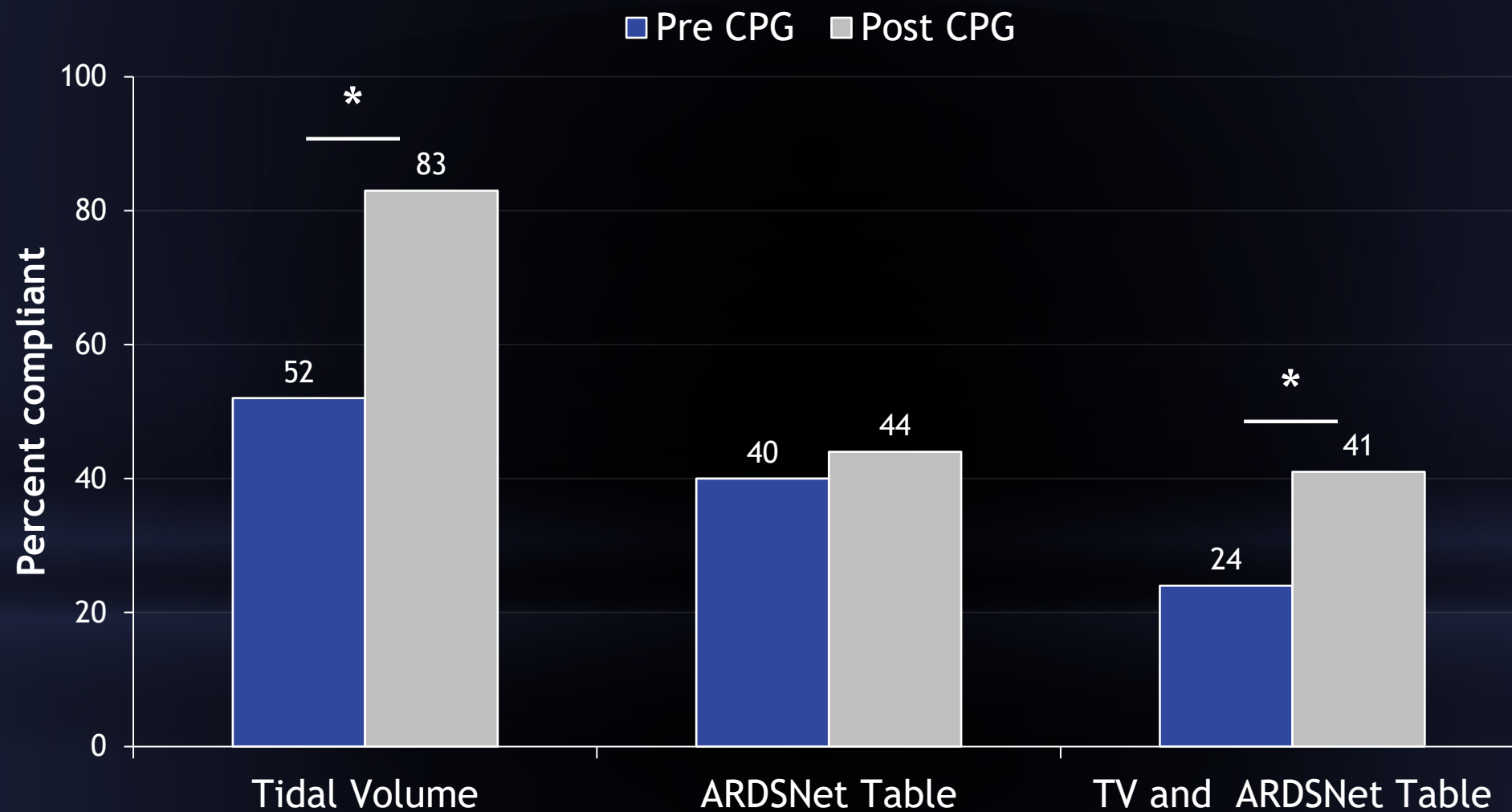
■ Adherent ■ Non-Adherent



# Trauma vs. Non-Trauma



# Pre- vs. Post-CPG Implementation



# Conclusion

- CCATTs had low adherence with the ARDSNet guidelines in non-trauma patients transported out of the combat theater
- Non-adherent patients were more likely to experience in-flight events
- Implementation of a Ventilator Management CPG was associated with improved adherence

# Thank you ECRC

Maj Patrick Ng, MD  
Maj W. Tyler Davis, MD  
Shelia Savell, PhD, RN  
Maria Castaneda, MS  
Julie Cutright, BSN, RN  
Darren Baldwin, MS, RN  
Jill Lear, BSN, RN



Allyson Arana, PhD  
Alex Mora, MS  
Krystal Valdez-Delgado, BSN, RN  
Priscilla Garza-Quintanilla  
Christopher Bennett  
A. Laura Garcia  
Dawne Wenzel



A special thank you to

Andre Gholson, RN

ERCC Pilot Unit