

BACKGROUND

Prolonged pauses in cardiopulmonary resuscitation (CPR) are known to decrease survival in out-of-hospital cardiac arrest (OHCA). Use of external defibrillators equipped with upgraded software that performs rhythm interpretation during chest compression may allow emergency medical services to reduce CPR pauses.

OBJECTIVE

Examine the effect, if any, of a defibrillator software upgrade on the length of CPR pauses during care for OHCA among adults.

METHODS

Design & Setting

- Cohort study of adults (18+ years) with OHCA.
- CPR data were abstracted from electronic ambulance call reports and corresponding ZOLL® cardiac defibrillator files from seven Northern Ontario paramedic services.

Outcomes

- Primary outcome was perishock pause: total time that no CPR was performed during an analysis where defibrillation occurred.
- Secondary outcomes were perianalysis pause (non-shockable rhythms) and total CPR pause (all rhythms).

Statistical Analyses

- Median and interquartile ranges were calculated in seconds for CPR pauses by software.
- Percent change in median perishock pause, perianalysis pause, and total CPR pause was compared between CPR administered using ‘Standard’ or ‘RapidShock’ defibrillator software using the Mann-Whitney test.

STUDY COHORT

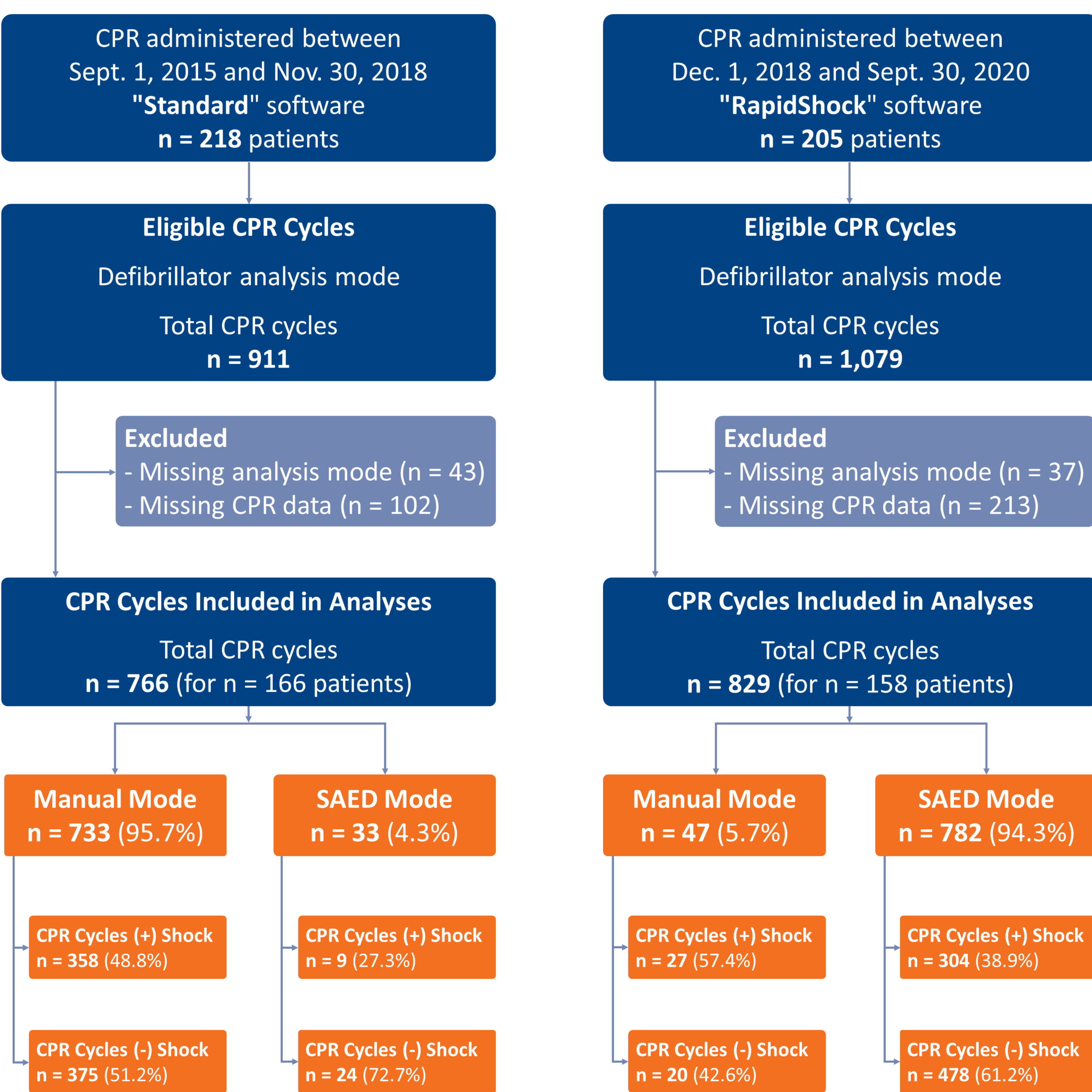


Figure 1. Selection of CPR cycles included in study analyses.

Abbreviations: CPR, cardiopulmonary resuscitation
SAED, semi-automatic external defibrillator

RESULTS

Table 1. Median pauses in CPR delivery by defibrillator software for administered shocks: 'Standard' versus 'RapidShock' software.

CPR Pauses by Defibrillator Software	n	Median Pause (seconds)	Interquartile Range (Q1 - Q3) (seconds)	Percent Change of Median (%)	P Value
Perishock Pause					
'Standard Software' ('Manual' mode)	358	22.0	(18.0 - 27.0)	-	
'RapidShock' Software ('SAED' mode)	304	15.0	(13.0 - 19.0)	-31.8	<0.01
Preshock Pause					
'Standard Software' ('Manual' mode)	358	18.0	(15.0 - 22.0)	-	
'RapidShock' Software ('SAED' mode)	304	10.0	(9.0 - 13.0)	-44.4	<0.01
Postshock Pause					
'Standard Software' ('Manual' mode)	358	3.0	(2.0 - 5.0)	-	
'RapidShock' Software ('SAED' mode)	304	4.0	(3.0 - 6.0)	33.3	<0.01

Table 2. Median pauses in CPR delivery by defibrillator software for all rhythms: 'Standard' versus 'RapidShock' software.

CPR Pauses by Defibrillator Software	n	Median Pause (seconds)	Interquartile Range (Q1 - Q3) (seconds)	Percent Change of Median (%)	P Value
Perishock Pause					
'Standard Software' ('Manual' mode)	358	22.0	(18.0 - 27.0)	-	
'RapidShock' Software ('SAED' mode)	304	15.0	(13.0 - 19.0)	-31.8	<0.01
Perianalysis Pause					
'Standard Software' ('Manual' mode)	375	11.0	(8.0 - 17.0)	-	
'RapidShock' Software ('SAED' mode)	478	11.0	(9.0 - 15.0)	0.0	0.09
Total CPR Pause					
'Standard Software' ('Manual' mode)	733	17.0	(11.0 - 24.0)	-	
'RapidShock' Software ('SAED' mode)	782	13.0	(10.0 - 17.0)	-23.5	<0.01

CONCLUSIONS

- RapidShock external defibrillator software reduced overall pauses to CPR.
- Time savings were attributed to shorter preshock pauses.
- Future studies are necessary to determine if greater reductions in CPR pauses may be achieved and to examine effects of pause reductions on patient outcomes.