Supplemental Material - Metronome Use Improves Achievement of a Target Compression Rate in Out-Of-Hospital Cardiac Arrest

Jacob Kennedy[1], Kimberly Machado[2], Charles Maynard PhD[3], Robert G. Walker[4], Michael R. Sayre MD[2], Catherine R. Counts PhD MHA[2]

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Supplemental Table 1: Metronome Use

Metronome use by case and by minute for the study period.

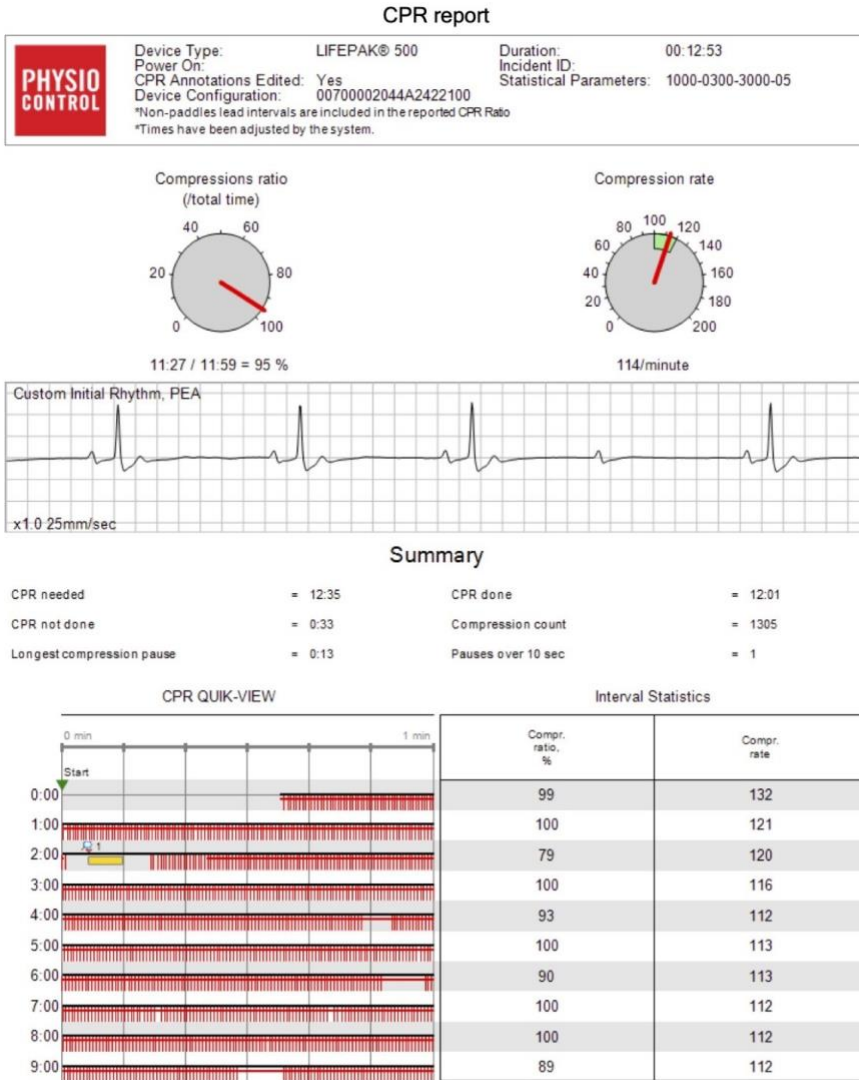| Supplemental Table 1: Metronome Use								
	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**Overall**
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Total Cases	253	280	325	317	300	333	324	2,132
Cases with No Metronome	253	280	220 (67.7%)	140 (44.2%)	81 (27.0%)	31 (9.3%)	38 (11.7%)	1,043 (48.9%)
Cases with a Metronome	-	-	105 (32.3%)	177 (55.8%)	219 (73.0%)	302 (90.7%)	286 (88.3%)	1,089 (51.1%)
Total Minutes	3,114	3,998	4,813	4,422	4,926	5,715	5,788	32,776
Minutes with No Metronome	3,114	3,998	3,366 (70.0%)	2,176 (49.2%)	1,533 (31.1%)	707 (12.4%)	773 (13.3%)	15,667 (47.8%)
Minutes with a Metronome	-	-	1,447 (30.0%)	2,246 (50.8%)	3,393 (68.9%)	5,008 (87.6%)	5,015 (86.7%)	17,109 (52.2%)
	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)
EMS Compressions to Metronome Start, minutes	-	-	3.2 (1.1 - 5.9)	1.8 (0.9 - 4.6)	1.8 (0.9 - 3.8)	1.1 (0.5 - 2.5)	0.7 (0.3 - 1.6)	1.3 (0.6 - 3.2)

Supplemental Table 2: Compression Rates by Year

Compression rates by year for the study period. P-values represent differences observed between compression rates by year for both no metronome and metronome minutes (year and compression rates were assessed separately by metronome use).

Supplemental Table 2: Compression Rates by Year

Year	2013 No Metronome	2014 No Metronome	2015 No Metronome	2015 Metronome	2016 No Metronome	2016 Metronome	2017 No Metronome	2017 Metronome	2018 No Metronome	2018 Metronome	2019 No Metronome	2019 Metronome	p
Total minutes	3114	3998	3366	1447	2176	2246	1533	3393	707	5008	773	5015	
Median Compression Rate	114.3	113.1	113.2	110.2	111.7	110.4	112.4	110.6	112.2	110.6	111.0	110.6	0.0001
IQR	108.2 - 121.0	107.4 - 119..4	108.3 - 119.3	109.7 - 112.0	108.1 - 117.5	109.8 - 112.3	109.4 - 117.4	110.1 - 112.2	109.5 - 118.1	110.1 - 112.0	110.0 - 115.0	110.1 - 111.9	
Minutes over 120 CPM	900	904	752	37	387	103	251	127	131	132	88	114	<0.0001
Minutes over 120 CPM, %	28.9%	22.6%	22.3%	2.6%	17.8%	4.6%	16.4%	3.7%	18.6%	2.6%	11.4%	2.3%	
Minutes under 100 CPM	192	285	151	33	127	26	53	21	29	30	9	18	<0.0001
Minutes under 100 CPM, %	6.2%	7.1%	4.5%	2.3%	5.8%	1.2%	3.5%	0.6%	4.1%	0.6%	1.2%	0.4%	

Supplemental Figure 1: CODESTAT Data Example

Representative example of CODESTAT data output for one case.

CPR report

Device Type:	LIFEPAK® 500
Power On:	
CPR Annotations Edited:	Yes
Device Configuration:	00700002044A2422100

*Non-paddles lead intervals are included in the reported CPR Ratio
*Times have been adjusted by the system.

Duration:	00:12:53
Incident ID:	
Statistical Parameters:	1000-0300-3000-05

Compressions ratio (/total time)

11:27 / 11:59 = 95 %

Compression rate

114/minute

Custom Initial Rhythm, PEA

x1:0 25mm/sec

Summary

CPR needed	= 12:35	CPR done	= 12:01
CPR not done	= 0:33	Compression count	= 1305
Longest compression pause	= 0:13	Pauses over 10 sec	= 1

CPR QUIK-VIEW / **Interval Statistics**

Time	Compr. ratio, %	Compr. rate
0:00	99	132
1:00	100	121
2:00	79	120
3:00	100	116
4:00	93	112
5:00	100	113
6:00	90	113
7:00	100	112
8:00	100	112
9:00	89	112

Your Organization Name

Supplemental Figure 2: Strobe Checklist

STROBE Statement; checklist of items that should be included in reports of observational studies.

	Item No	Recommendation	Page No. in Manuscript
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4-5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4-5
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up	4-6, Fig 1a,b

		Case-control study—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	n/a
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5-6
Data sources/measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5-6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	6-7 Fig.1a,b
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable,	6

		describe which groupings were chosen and why	
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	6
		(*b*) Describe any methods used to examine subgroups and interactions	n/a
		(*c*) Explain how missing data were addressed	Figure 1a and 1b, Table 1 figure legend
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed	
		Case-control study—If applicable, explain how matching of cases and controls was addressed	n/a
		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	n/a

Results

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6-7, Fig 1a,b
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	Fig 1a, 1b

Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6-7, Table 1
		(b) Indicate number of participants with missing data for each variable of interest	Table 1 figure legend
		(c) *Cohort study—* Summarise follow-up time (eg, average and total amount)	n/a
Outcome data	15*	*Cohort study—*Report numbers of outcome events or summary measures over time	6
		Case-control study— Report numbers in each exposure category, or summary measures of exposure	*n/a*
		Cross-sectional study— Report numbers of outcome events or summary measures	*n/a*
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	n/a
		(*b*) Report category boundaries when continuous variables were categorized	Table 2
		(*c*) If relevant, consider translating estimates of relative risk into absolute	n/a

		risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n/a

Discussion

Key results	18	Summarise key results with reference to study objectives	5-6
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	9-10
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	7-9
Generalisability	21	Discuss the generalisability (external validity) of the study results	7-9

Other information

Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	1