Data Supplement 3. Rationale for Automated Chest Compression Classification Criteria

Automated classification of the chest compression pattern as 30:2 or continuous chest compressions (CCC) was based on fulfillment of at least two of the three criteria for each arm:

Measure	Criteria for CCC	Criteria for 30:2 Chest Compressions
Mean chest compression fraction	>0.80	0.60-0.80
Median chest compression segment length (seconds)	60-150	<20
Mean chest compression pauses (n per minute)	<1	2-4

Cases not fulfilling criteria for 30:2 or CCC were categorized as "indeterminate."

Chest Compression Fraction

We defined chest compression fraction (CCF) as the proportion of elapsed time with delivery of chest compressions. We calculated the CCF for each one-minute interval, and determined the mean CCF across the intervals.

In the CCC Trial protocol, the pre-defined expected performance thresholds were CCF ≥0.60 for 30:2, and ≥0.75 for CCC. For the automated analysis, to better discriminate between the two chest compression strategies, we increased the minimum CCF threshold to ≥0.80 for classification as CCC and modified the expected CCF range to 0.60 to 0.80 for classification as 30:2.

Chest Compression Segment Length

A chest compression segment is a time interval with uninterrupted chest compressions. We calculated the median time segment length for all chest compression intervals during the first eight minutes of resuscitation.

The American Heart Association recommended chest compression rate is 90 to 130 compressions/minute. In the 30:2 arm, providers provide 30 compressions followed by two

ventilations. At a compression rate of 90 compressions/minute, the expected length of one chest compression is 60 sec ÷ 90 compressions = 0.67 seconds. Therefore, 30 compressions should be completed in 30 X 0.67 = 20 seconds. We defined the expected median chest compression segment length as ≤20 seconds for classification as 30:2 chest compressions.

The CCC arm specifies the delivery of uninterrupted chest compressions in 120-second segments. The protocol also allowed for segments to be defined by the delivery of 200 uninterrupted chest compressions. To allow for natural variations in segment length, we defined the expected median chest compression segment length as 60 to 150 seconds for classification as CCC.

Number of Chest Compression Interruptions

The number of chest compression interruptions was defined as the number of chest compression pauses 2 seconds or longer. We determined the mean number of chest compression interruptions per minute during the first eight minutes of resuscitation.

In the CCC arm, chest compressions occur continuously for 120 seconds, with one interruption for electrocardiogram rhythm analysis and rescue shock delivery. Therefore, we defined the expected number of chest compression interruptions as fewer than one for classification as CCC.

For the 30:2 arm, pauses for ventilation may occur every 30 chest compressions and may last 5 to 10 seconds. Therefore, each one-minute chest compression epoch may have between two and four interruptions. Therefore, we defined the expected number of chest compression interruptions as two to four for classification as 30:2 chest compressions.