

# Transport from the Labor Room to the Operating Room Significantly Decreases the Quality of CPR During Simulated Maternal Cardiac Arrest

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## Background

The American Heart Association (AHA) recommends delivery within 5 minutes of a cardiopulmonary arrest during pregnancy. If gestational size approximates 20 weeks or greater and vaginal delivery is not immediately possible, a perimortem cesarean delivery (PCD) is recommended (1, 2).

However, the AHA has not endorsed whether PCD should be performed in the operating room or in the labor room. Many clinicians may elect to transport arrested patients to the operating room in order to perform PCD.

The study objectives were to compare the quality of cardiopulmonary resuscitation (CPR) rendered by teams during transport to the operating room versus that rendered while stationary, in the labor room. We hypothesized that transport to the operating room would cause a deterioration in quality of CPR.

Fig 1: Percentage of Correct Compressions

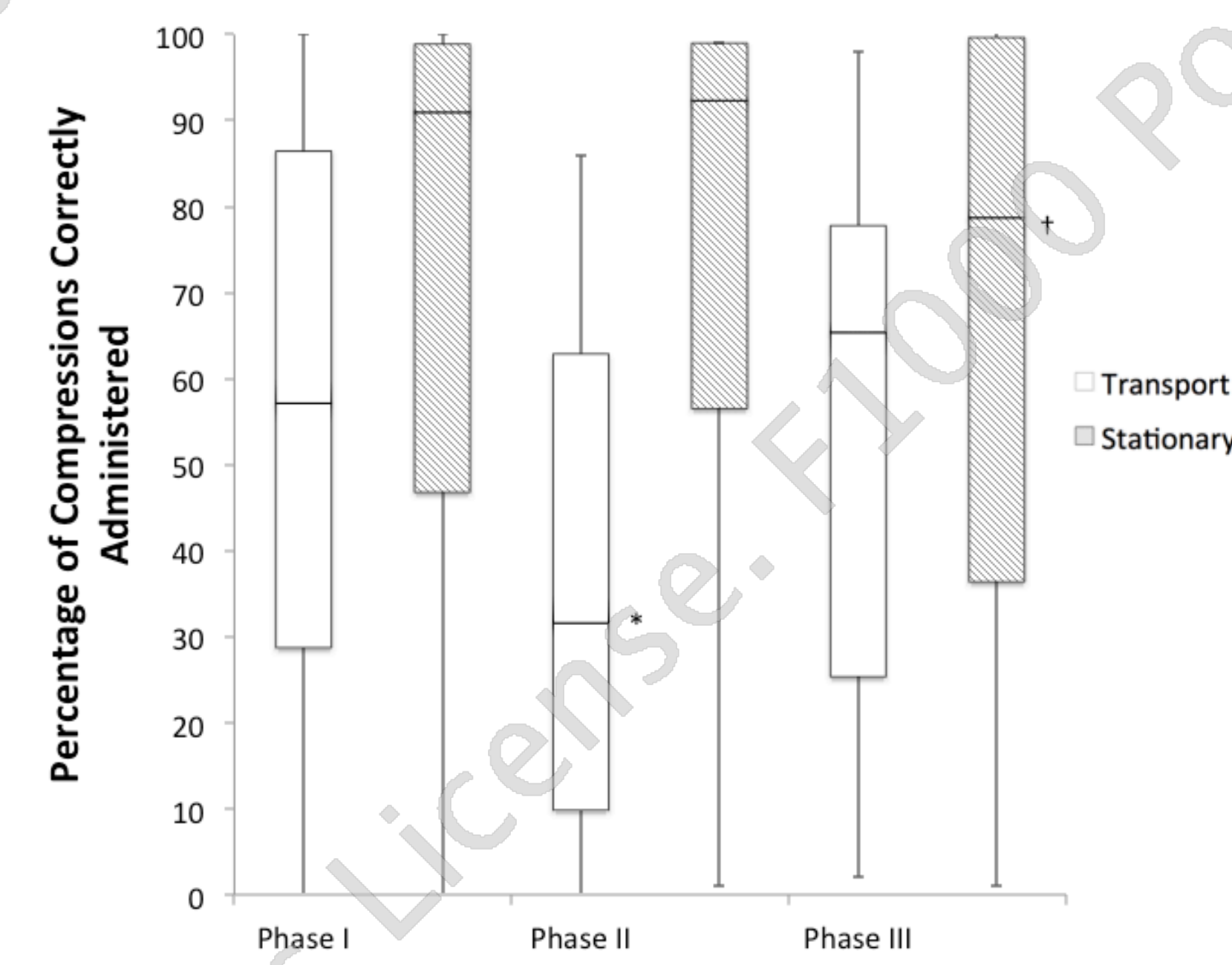


Fig 2: Mean Compression Rate

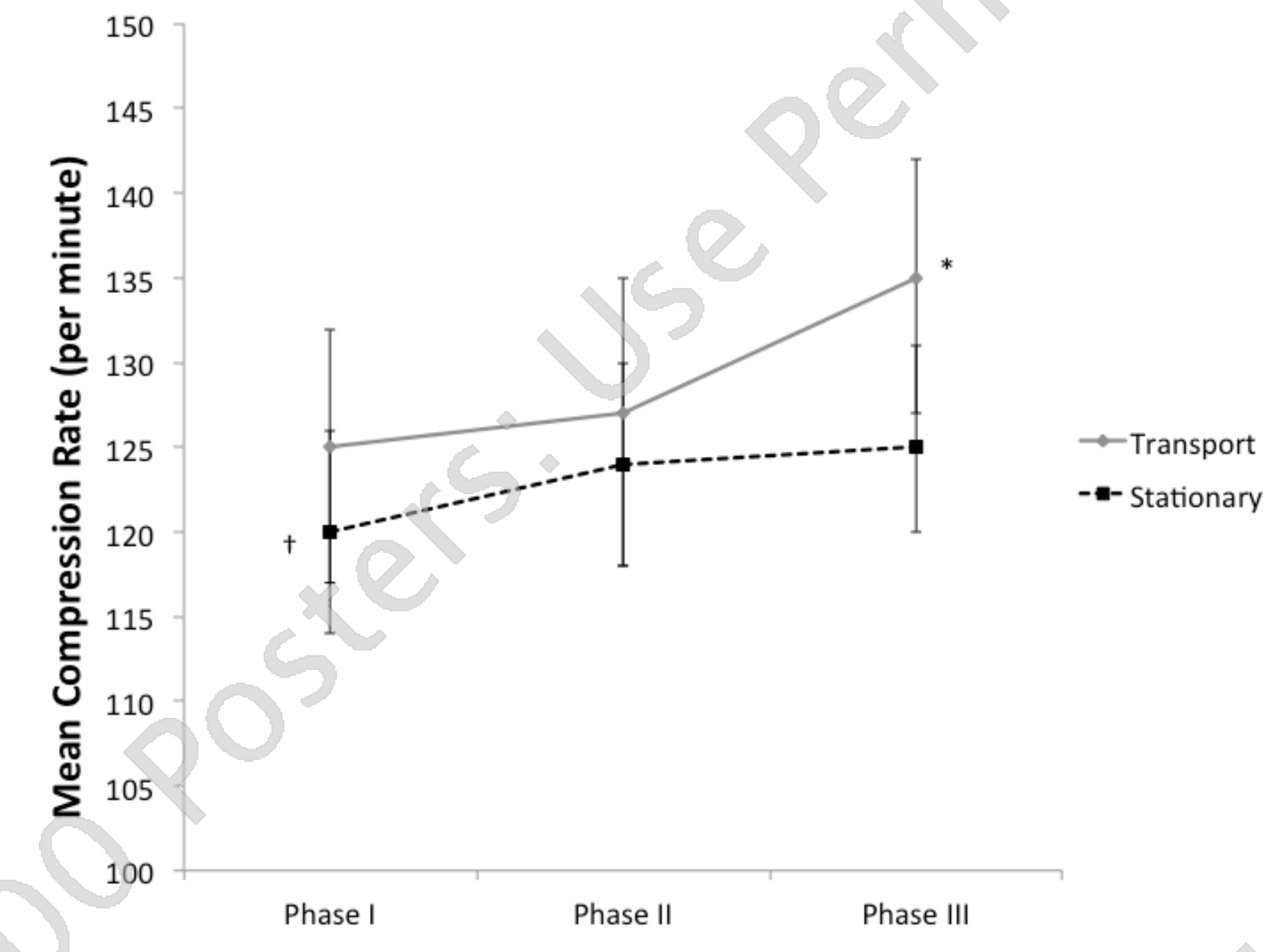
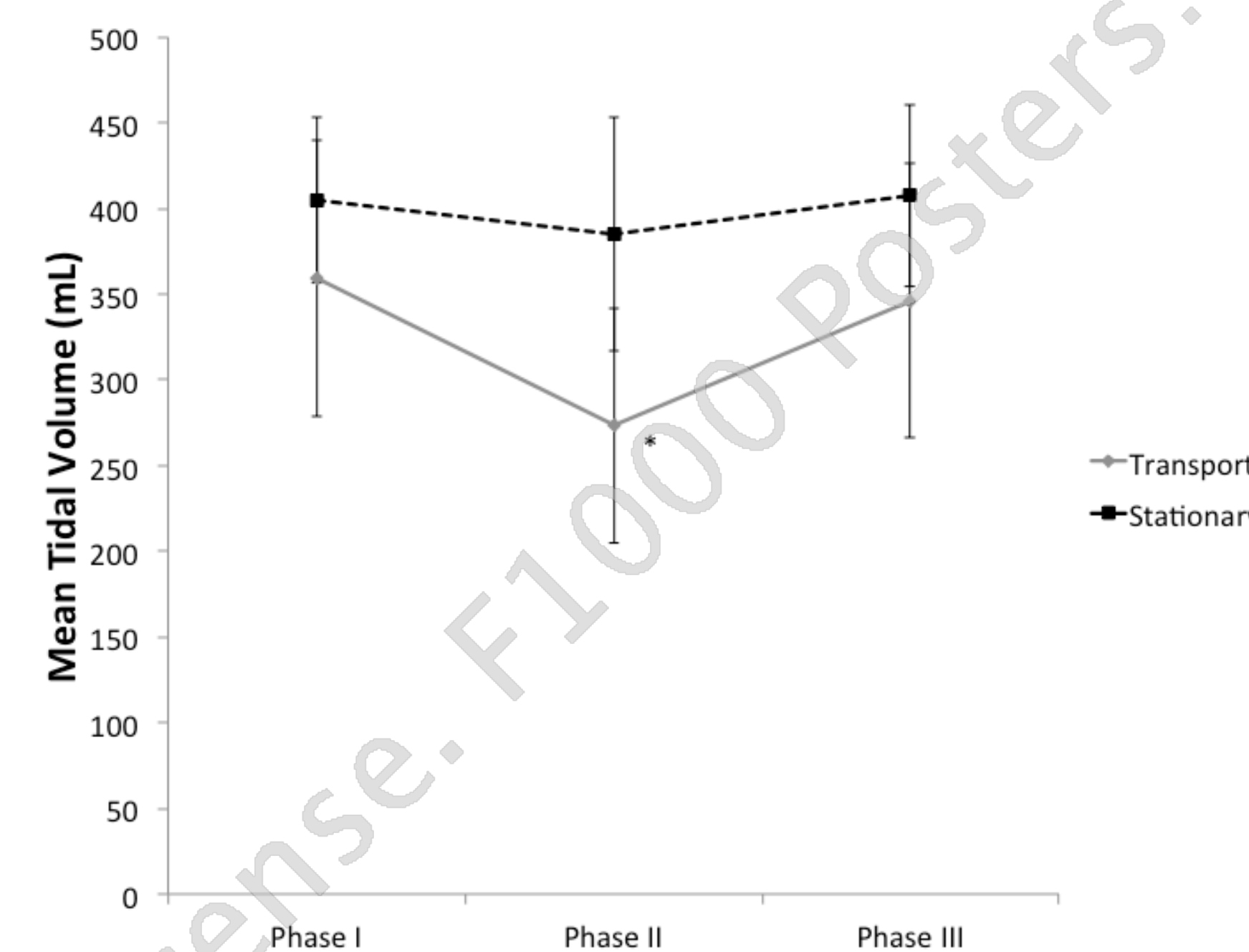


Fig 3: Mean Tidal Volume



## Methods

This randomized, prospective study was conducted at Lucile Packard Children's Hospital, Stanford, California. Twenty-six teams composed of two staff persons (obstetricians, nurses, anesthesiologists) were randomized to perform CPR on the Laerdal Skills Reporter mannequin during transport or while stationary. The mannequin was designed to measure compressions (rate, depth, release) and ventilations (volume, flow rate).

Participants practiced on the mannequin to perfect CPR skills just prior to the drill. Each drill was comprised of three phases: 4 min while stationary (Phase I), 2 min randomized to either remaining stationary or to transport (Phase II), and 4 min while stationary (Phase III). During transport, the gurney was moved from the labor room to the operating room.

The primary outcome was percentage of correctly delivered compressions (based on rate, hand placement, depth > 1.5 inches, and release). Secondary outcomes included interruptions in compressions, ventilation tidal volume, and position of staff relative to the mannequin during the transport phase. Appropriate statistical tests were utilized with  $P < 0.05$  considered significant.

## Results

The percentage of correct compressions was 32% in the transport group and 93% in the stationary group (Figure;  $P < 0.001$ ). The median (IQR) compression rates were 124 (110-140) per minute in the transport group and 123 (115-132) in the stationary group ( $P = 0.703$ ). The percent of compressions of insufficient depth was 21% in the transport group and <1% in the stationary group ( $P < 0.001$ ). Interruptions in CPR were observed in 92% of transport and 8% of stationary drills ( $P < 0.001$ ). Median (IQR) tidal volume was 270 (166-430) mL in the transport group and 390 (232-513) mL in the stationary group ( $P = 0.031$ ). During transport, 2 staff straddled the mannequin, 18 knelt next to the mannequin, and 4 ran alongside the gurney.

## Conclusion

The quality of compressions and ventilations decreased significantly during transport during simulated cardiac arrest. Compressions are now thought to be so critical that the 2010 AHA guidelines now recommend C-A-B rather than A-B-C. Correct ventilations based on flow rate and adequate (> 500ml) tidal volumes were challenging for both groups, perhaps because mask ventilation technical and the compliance of the mannequin was poor.

Our data suggests that in the event of an actual maternal arrest, transport would negatively impact the overall quality of resuscitation. Previous work demonstrates that transport significantly delays perimortem cesarean delivery (3). The current findings further strengthen recommendations that perimortem cesarean delivery should be performed at the site of arrest.

## References

1. Katz V. Am J Obstet Gynecol 2005; 192: 1916-20
2. American Heart Association, Circulation 2010. 122: S833-38.
3. Lipman Obstet Gynecol 2011 (In press)

## Acknowledgements

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