# Study: Hospital CPR quality is worse at night

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CPR quality is worse during in-hospital cardiac arrests occurring overnight than those that happen during the day, according to a new University of Pennsylvania School of Medicine study that will be presented at the American Heart Association's annual Scientific Sessions on November 14. The researchers found that chest compression rates varied more at night - often dipping well below the rate per minute that's necessary to properly circulate blood - than during resuscitation efforts during the day, and rescuers paused for longer when switching between chest compressions and defibrillator shocks at night.

"Our study reveals an important factor to explain why, as previous studies have shown, patients who have cardiac arrests in hospitals during daytime hours are more likely to survive," says senior author Benjamin Abella, MD, MPhil, an assistant professor of Emergency Medicine and clinical research director in Penn's Center for Resuscitation Science. "These findings suggest that more attention to clinical emergency training and staffing at night may be an important way to improve hospital safety and patient outcomes."

The authors studied 173 cardiac arrests that occurred in non-intensive care settings over the course of two years at three urban teaching hospitals. Resuscitation efforts were monitored via a device that tracks compression depth and rates during CPR and the duration of pauses during defibrillation attempts. The results showed that mean chest compression rate was lower during resuscitations that took place at night, between 11 p.m. and 7 a.m., compared to those during the day -- 102 compressions per minute, with rates varying between 86 and 118,

compared to 107, with variance between 100 and 114. One hundred chest compressions per minute is the recommended rate, and previous research shows that when compressions are performed at lower rates, patients are more likely to die or suffer permanent brain damage from prolonged oxygen deprivation. In addition, the researchers observed that staff members appeared to move slower when alternating between chest compressions and defibrillation during night resuscitations – they stopped compressions for a mean of 15.8 seconds before shocking patients at night, vs. 11.9 seconds during the day, and for 4.6 vs. 2.8 seconds after shocking patients.

Among factors that the authors say may influence the variability in CPR quality between night and day: fatigue, lower staffing levels, and lack of supervision from supervising physicians, who are less likely to be present during overnight resuscitations. But Abella says these disparities could be addressed with a variety of interventions, including more widespread use of cardiac arrest simulated event drills, devices that monitor CPR quality and provide real-time feedback, staff debriefings following resuscitations, and more supervising physician involvement in cardiac arrest care.

“Although these results show a disparity in the care cardiac arrest patients may receive overnight, we now have one answer about where to concentrate our efforts to better ensure the safety of patients around the clock,” he says.

Other study authors include Sarah Perman, MD, Douglas Smith, Marion Leary, RN, and Lance Becker, MD, at the University of Pennsylvania, and Noah Swann and Dana Edelson, MD at the University of Chicago.

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