EMERGENCY NURSES ASSOCIATION

Clinical Practice Guideline:
Synopsis Non-Invasive Blood Pressure Measurement

CLINICAL QUESTION:

In emergency department patients, what non-invasive blood pressure (NIBP) measurement techniques provide acceptable measurements throughout the lifespan?

PROBLEM:

Blood pressure (BP) is a core vital sign used for patient diagnosis, management and treatment. Accurate blood pressure measurement is critical as inaccuracies may delay treatment of a serious condition and/or result in clinical decisions that under- or over-treat the patient's medical condition. Invasive blood pressure measurement using arterial access is considered the "gold" standard to accurately and reliably determine the patient's BP. The previous Clinical Practice Guideline (CPG): Non-Invasive Blood Pressure Measurement with Automated Devices (initially published in 2012), provided evidence for an acceptable correlation between auscultatory and automatic, or oscillometric, non-invasive blood pressure measurement. Therefore, this CPG will use upper arm non-invasive blood pressure as the standard reference by which other methods are evaluated. The primary focus of emergency departments is to provide initial patient management and stabilization. NIBP is a readily available method to ascertain BP, and therefore is the most common method of BP measurement in the emergency setting. Clinicians should be aware of the limitations and potential biases of various non-invasive BP measurement techniques in different patient populations and under different conditions to ensure the BP measurement technique used is appropriate and evidence-based. This CPG focuses on evidence-based practices regarding the use of noninvasive, oscillometric BP measurement for patients across the lifespan in the emergency care setting.

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Description of Decision Options/Interventions and the Level of Recommendation

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Intermittent BP: Location of NIBP Measurement	Use of the wrist for blood pressure measurement is acceptable when upper arm measurement is not possible. Wrist BP measurements will trend lower than upper arm measurements. (Furgeson & Mickels-Foster, 2013; Guggiari, et al., 2014; Irving, et al., 2016)	B
	Use of the forearm for blood pressure measurement is acceptable when upper arm measurement is not possible. Forearm BP measurements will trend higher than upper arm measurements. (Keidan, et al., 2014; Leblanc et al., 2013; Schell et al., 2006; Schell, et al., 2010; Taksande, et al., 2015; Watson, 2017)	B
	There is insufficient evidence to make a recommendation on the accuracy of lower extremity locations (thigh, calf, or ankle) for blood pressure measurement. (Keidan, et al., 2014; Lakhal, et al., 2012; Schell, et al., 2011)	I/E
Intermittent NIBP: Cuff Size	An appropriately sized BP cuff is more important for accurate measurement than location, population, or BMI. (Anast, et al., 2016; Keidan et al., 2014; Leblanc et al., 2013; Lakhal et al., 2012; O'Shea and Dempsey, 2009; Schell et al., 2006; Schell et al., 2010; Schell et al., 2011; Taksande et al., 2015; Umana, et al., 2006; Watson, et al., 2017)	A
Intermittent NIBP: Effect of Clothing	Measuring BP on the upper arm over sleeved or bare arm below a rolled sleeve is usually comparable to bare arm measurements among adults. Measurements over thicker clothing will trend towards higher BP than on bare arm. (Ertug, et al., 2017; Ma, et al., 2008; Ozone, et al., 2018; Pinar, et al., 2010; Liebl et al., 2004; Thien, et al., 2015). Older adults may be more susceptible to variances in blood pressure associated with the effect of clothing (Ozone, et al.)	B
Continuous NIBP (cNIBP)	Use of continuous noninvasive blood pressure (cNIBP), using a finger cuff sensor, is acceptable for emergency department patients. (Gratz, et al., 2017; Nowak, et al., 2011)	B
Obesity	In patients with obesity or large upper arm circumference, wrist and forearm BP measurement may be acceptable when a correctly fitting cuff for the upper arm is not available. Forearm SBP measurements will trend higher than upper arm measurements. (Anast, et at., 2016; Hersh et al., 2014; Irving et al., 2016; Leblanc, et al., 2013; Verhosvsky et al., 2018; Watson et al., 2017)	B
Special Populations: Age Special Considerations	Measuring BP of adults over 65 requires no special technique. (Anast et al., 2016; Guggiari et al., 2014; Irving et al., 2016; Lakhal et al., 2012; Liebl et al., 2004; Ma et al., 2008; Ozone et al., 2018; Pinar et al., 2010; Schell et al., 2010; Thien et al., 2015; Umana et al., 2006)	B
	Use of arm, ankle, or calf BP locations in children aged 1-15 years may not be as reliably accurate when compared to upper arm measurements and should be used only when upper arm is not available. (Keidan et al., 2014; Schell et al., 2011; Taksande et al., 2015)	C
	There is insufficient evidence to recommend for or against use of NIBP in the neonatal population. (O'Shea & Dempsey, 2009)	I/E

Level A (High)	Based on consistent and good quality of evidence; has relevance and applicability to emergency nursing practice.
Level B (Moderate):	There are some minor inconsistencies in quality evidence; has relevance and applicability to emergency nursing practice.
Level C (Weak)	There is limited or low-quality patient-oriented evidence; has relevance and applicability to emergency nursing practice.
N/R Not Recommended	Based upon current evidence.
I/E:	Insufficient evidence upon which to make a recommendation.
N/E:	No evidence upon which to make a recommendation.

Access the full CPG at: https://www.ena.org/docs/default-source/resource-library/practice-resources/cpg/nibpmcpg.pdf

ENA Clinical Practice Guidelines (CPGs) are evidence-based documents that facilitate the application of current evidence into everyday emergency nursing practice. CPGs contain recommendations based on a systematic review and critical analysis of the literature about a clinical question. CPGs are created following the rigorous process described in ENA's Requirements for the Development of Clinical Practice Guidelines. The purpose of CPGs is to positively impact patient care in emergency nursing by bridging the gap between practice and currently available evidence.

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