Impact of norepinephrine on the relationship between pleth variability index and pulse pressure variations in ICU adult patients.

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INTRODUCTION: Pleth Variability Index (PVI) is an automated and continuous calculation of respiratory variations in the perfusion index. PVI correlates well with respiratory variations in pulse pressure (ΔPP) and is able to predict fluid responsiveness in the operating room. ICU patients may receive vasopressive drugs, which modify vascular tone and could affect PVI assessment. We hypothesized that the correlation between PVI and ΔPP and the ability of PVI to identify patients with ΔPP > 13% is dependent on norepinephrine (NE) use.
METHODS: 67 consecutive mechanically ventilated patients in the ICU were prospectively included. Three were excluded. The administration and dosage of NE, heart rate, mean arterial pressure, PVI and ΔPP were measured simultaneously.
RESULTS: In all patients, the correlation between PVI and ΔPP was weak (r^2 = 0.21; p = 0.001). 23 patients exhibited a ΔPP > 13%. A PVI > 11% was able to identify patients with a ΔPP > 13% with a sensitivity of 70% (95% confidence interval: 47%-87%) and a specificity of 71% (95% confidence interval: 54%-84%). The area under the curve was 0.80 ± 0.06. 35 patients (53%) received norepinephrine (NE(+)). In NE(+) patients, PVI and ΔPP were not correlated (r^2 = 0.04, p > 0.05) and a PVI > 10% was able to identify patients with a ΔPP > 13% with a sensitivity of 58% (95% confidence interval: 28%-85%) and a specificity of 61% (95% confidence interval:39%-80%). The area under the ROC (receiver operating characteristics) curve was 0.69 ± 0.01. In contrast, NE(-) patients exhibited a correlation between PVI and ΔPP (r^2 = 0.52; p < 0.001) and a PVI > 10% was able to identify patients with a ΔPP > 13% with a sensitivity of 100% (95% confidence interval: 71%-100%) and a specificity of 72% (95% confidence interval: 49%-90%).

The area under the ROC curve was 0.93 ± 0.06 for NE(-) patients and was significantly higher than the area under the ROC curve for NE(+) patients (p = 0.02).

CONCLUSIONS: Our results suggest that in mechanically ventilated adult patients, NE alters the correlation between PVI and ΔPP and the ability of PVI to predict ΔPP > 13% in ICU patients.