

Noninvasive hemodynamic monitoring in the intensive care.

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Background

Monitoring hemodynamics including blood pressure accurately is of key concern in the Intensive Care Unit (ICU). Arterial lines are invasive with possibilities for complications. In 2012 FDA approved a new device called BPro ABPM + CASP a wrist-watch like device that captures and displays the radial pulse wave in real time with derived central aortic systolic blood pressures. Comparison with the device and blood pressures derived from cardiac catheterization showed a correlation of $r=0.893$. (Christian Ott MD, JCH,2012)

Rational

We hypothesized that the BPro device will be comparable in hemodynamic monitoring as compared to the peripheral arterial lines. We examined the systolic, diastolic and MAP derived from the arterial line and compared to the corresponding data from the BPro and also comparison to the central systolic blood pressures as well. Guidelines as listed by the Association for the Advancement of Medical Instruments (AAMI) will be used to validate the BPro as a viable blood pressure measuring device.

Methods

We performed a prospective, single-center, IRB-approved, experimental, non-inferior pilot study comparing the blood pressured obtained by a radial arterial line and from the BPro device on the other arm in the ICU. Arterial waveforms and serial central blood pressure obtained from the BPro ABPM + CASP was compared to the radial arterial line every 15 minutes for 24 hours which is the basic interval setting for the BPro device. AAMI guidelines indicate that the new device needs to achieve a mean difference of ± 5 mmHg

Results

20 patients were recruited for the study, out of whom 13 reached the predetermined threshold of greater than 70% total data collected. The average differences in systolic blood pressure was 3.7mmHg and a correlation between the central systolic blood pressure from BPro and systolic blood pressure from radial arterial line was $r=0.7335$.

Conclusions

Out of the 13 patients that undergone statistical analysis we obtained a mean difference of 3.7mmHg which is within the AAMI guidelines for new blood pressure devices. We also found a 0.7335 correlation between the pressures from the BPro and radial arterial line. In order to prove statistical significance of $p<0.05$ an estimated 104 cases will be required. This non invasive method of monitoring both central and peripheral pressure offers promise for noninvasive hemodynamic monitoring in the ICU.

