

# Korelasi antara Stroke Volume dan Indeks Kolapsibilitas Vena Jugularis Interna untuk Menilai Respons Resusitasi Cairan pada Anak Syok = Correlation Between Stroke Volume and Internal Jugular Vein Collapsibility Index to Assess Fluid Responsiveness in Children with Shock

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## Abstrak

Syok pada anak masih menjadi masalah utama karena mortalitas yang tinggi. Penilaian respons terhadap resusitasi cairan dapat menggunakan parameter klinis dan parameter hemodinamik invasif maupun non-invasif. Modalitas *ultrasound cardiac output monitor* (USCOM) pada populasi anak dengan syok memiliki korelasi yang baik dengan baku emas parameter hemodinamik invasif, tetapi memiliki beberapa keterbatasan. Modalitas lain yang semakin berkembang yaitu menggunakan *point of care ultrasound* (POCUS), dengan salah satu penilaian yang dapat dilakukan adalah pemeriksaan indeks kolapsibilitas vena jugularis interna (IKVJI). Tujuan penelitian ini adalah mengetahui hubungan antara *stroke volume* dengan IKVJI dalam menilai respons resusitasi cairan pada anak syok. Penelitian ini menggunakan desain observasional analitik, dilakukan di RSUPN Cipto Mangunkusumo pada bulan Maret hingga Juni 2024. Subyek penelitian adalah anak usia 1 bulan hingga 18 tahun yang mengalami syok yang memenuhi kriteria inklusi. Parameter klinis, penilaian *stroke volume* dengan USCOM dan IKVJI dinilai sebelum dan sesudah resusitasi cairan. Berdasarkan analisis studi didapatkan 47 subyek sampel penelitian, 27 orang perempuan (57,4%), dengan median usia 82,9 (4,0–212,0) bulan. Status gizi, terbanyak adalah gizi baik (42,6%). Diagnosis terbanyak adalah syok hipovolemik (74,5%) diikuti syok sepsis (25,5%). Sebanyak 2 pasien meninggal dalam 24 jam pertama. Pemantuan post-resusitasi cairan menunjukkan perbaikan laju nadi, tekanan darah, dan *mean arterial pressure* ( $p < 0,0001$ ), peningkatan nilai *stroke volume* ( $p < 0,0001$ ), dan perubahan nilai IKVJI ( $p < 0,0001$ ). Korelasi delta *stroke volume* dan delta IKVJI adalah negatif lemah ( $r = -0,309$ ,  $p = 0,035$ ). Korelasi MAP dan IKVJI juga negatif lemah ( $r = -0,359$ ,  $p = 0,013$ ).

Shock in children is still a major problem due to high mortality. Assessment of the response to fluid resuscitation can be done using clinical and hemodynamic parameters through invasive and non-invasive tools. The ultrasound cardiac output monitor (USCOM) among children with shock has a good correlation with the gold standard of invasive hemodynamic parameters but has some limitations. Another commonly used modality is point-of-care ultrasound (POCUS), with one of the assessments being the examination of the internal jugular vein collapsibility index (IJV-CI). The aim of this study is to determine the correlation between stroke volume and IJV-CI changes in order to assess fluid responsiveness in children with shock. Between March and June 2024, an analytical observational study was undertaken in the emergency department and pediatric intensive care unit of a tertiary referral hospital. The study subjects were children aged 1 month to 18 years who experienced shock and met the inclusion criteria. A thorough history taking, physical examination, and stroke volume assessment using the Ultrasonic Cardiac Output Monitor, and IJV-CI utilizing ultrasound before and after fluid resuscitation were conducted. This study included 47 subjects, of which there were 27 females (57.4%), with a median age of 82.9 (4.0–212.0) months. For nutritional status, most were normal

(42.6%). The most common diagnosis was hypovolemic shock (74.5%) followed by septic shock (25.5%). Mortality in the first 24 hours was 2 patients. After fluid resuscitation, there was an improvement in pulse rate, blood pressure, and mean arterial pressure ( $p < 0.0001$ ), as well as increased stroke volume post fluid resuscitation ( $p < 0.0001$ ) and changes in IJV-CI post fluid resuscitation ( $p < 0.0001$ ). The correlation between stroke volume delta and IJV-CI delta was negative and weak ( $r = -0.309$ ,  $p = 0.035$ ). The correlation between IJV-CI and MAP was also negative and weak ( $r = -0.359$ ,  $p = 0.013$ ).