

Uji Akurasi AMAN-C (Alat Modifikasi Aneroid Cuff) Sebagai Alat Ukur Alternatif Tekanan Cuff ETT pada Pasien dengan Anestesi Umum di RSUD Temanggung

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ABSTRAK

Latar Belakang: Pemantauan tekanan *cuff endotracheal tube* (ETT) dalam rentang 20–30 cmH₂O merupakan standar keselamatan pasien pada anestesi umum. Keterbatasan ketersediaan *manometer* standar di berbagai fasilitas pelayanan kesehatan mendorong pengembangan AMAN-C (Alat Modifikasi Aneroid Cuff) sebagai alat ukur alternatif berbasis *sphygmomanometer* aneroid yang ekonomis dan mudah diterapkan.

Tujuan: Menganalisis akurasi dan tingkat kesesuaian (*agreement*) AMAN-C dibandingkan dengan *manometer* standar manometer sebagai alat ukur tekanan *manset* ETT pada pasien yang menjalani anestesi umum di RSUD Temanggung.

Metode: Penelitian ini menggunakan desain *agreement study* dengan pendekatan *cross-sectional*. Sebanyak 57 pasien yang menjalani anestesi umum dengan intubasi ETT dipilih menggunakan teknik *pengambilan sampel konsekutif*. Instrumen AMAN-C dikembangkan melalui sepuluh tahap rekonstruksi yang meliputi kalibrasi, penyempurnaan konfigurasi, dan pengujian fungsional. Pengukuran tekanan *manset* dilakukan secara simultan menggunakan AMAN-C dan *manometer* standar dalam satu rangkaian tertutup. Analisis data meliputi statistik deskriptif, uji normalitas Shapiro–Wilk, uji Wilcoxon Signed Rank Test, *Intraclass Correlation Coefisien* (ICC), dan analisis Bland–Altman.

Hasil: Uji Shapiro–Wilk menunjukkan bahwa data tidak berdistribusi normal ($p < 0,05$). Uji Wilcoxon Signed Rank Test menunjukkan tidak terdapat perbedaan yang berarti antara hasil pengukuran AMAN-C dan standar *manometer manometer* ($Z = -0,429$; $p = 0,668$). Analisis ICC menunjukkan tingkat reliabilitas yang baik (ICC = 0,885; IK95%: 0,800–0,934; $p < 0,001$). Analisis Bland–Altman menunjukkan *mean bias* sebesar $-0,229$ cmH₂O dengan *Limits of Agreement* berkisar antara $-1,471$ hingga $1,012$ cmH₂O, yang masih berada dalam batas toleransi klinis.

Kesimpulan: AMAN-C memiliki tingkat keselarasan (*agreement*) dan konsistensi pengukuran yang baik dibandingkan standar manometer manometer. Berdasarkan hasil uji Wilcoxon, ICC, dan Bland–Altman, AMAN-C berpotensi digunakan sebagai alat ukur alternatif tekanan *cuff* ETT pada pasien dengan anestesi umum, terutama pada fasilitas pelayanan kesehatan dengan keterbatasan sumber daya.

Kata kunci: AMAN-C, tekanan *manset* ETT, anestesi umum, *studi kesepakatan*, Bland–Altman.

**Accuracy Test of AMAN-C (Modified Aneroid Cuff Device) as an Alternative
Measuring Instrument for ETT Cuff Pressure in Patients Undergoing
Anestesi umum at Temanggung District General Hospital**

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ABSTRACT

Background: Maintaining *endotracheal tube* (ETT) cuff pressure within the recommended range of 20–30 cmH₂O is essential to prevent tracheal mucosal injury, aspiration, and other airway complications during general anesthesia. However, the limited availability of standard cuff manometers in many healthcare facilities has encouraged the development of alternative instruments that are accurate, affordable, and feasible for routine clinical use. AMAN-C (Modified Aneroid Cuff Device) was developed by modifying an aneroid sphygmomanometer to measure ETT cuff pressure.

Objective: To develop AMAN-C and evaluate its measurement agreement, consistency, and clinical applicability compared with a standard cuff manometer for measuring ETT cuff pressure in patients undergoing general anesthesia.

Methods: An agreement study with a cross-sectional approach was conducted involving 57 patients undergoing general anesthesia with endotracheal intubation at Temanggung District General Hospital. Participants were recruited using consecutive sampling. ETT cuff pressure was measured simultaneously using AMAN-C and a standard cuff manometer within the same closed system. Data were analyzed using descriptive statistics, the Shapiro–Wilk normality test, the Wilcoxon Signed Rank Test, the Intraclass Correlation Coefficient (ICC), and Bland–Altman analysis.

Results: The Shapiro–Wilk test demonstrated that the data were not normally distributed ($p < 0.05$). The Wilcoxon Signed Rank Test showed no statistically significant difference between measurements obtained using AMAN-C and the standard cuff manometer ($Z = -0.429$; $p = 0.668$). The ICC demonstrated good measurement consistency (ICC = 0.885; 95% CI: 0.800–0.934; $p < 0.001$). Bland–Altman analysis showed a mean bias of -0.229 cmH₂O, with 95% Limits of Agreement ranging from -1.471 to 1.012 cmH₂O, indicating good agreement between the two measurement methods.

Conclusion: AMAN-C demonstrated good measurement agreement and consistency compared with the standard cuff manometer. Based on the results of the Wilcoxon Signed Rank Test, ICC, and Bland–Altman analysis, AMAN-C has the potential to serve as an alternative instrument for measuring ETT cuff pressure in patients undergoing general anesthesia, particularly in healthcare facilities with limited resources.

Keywords: AMAN-C; *endotracheal tube* cuff pressure; general anesthesia; agreement study; Bland–Altman analysis.