Akurasi estimasi kebutuhan energi dengan rumus schofield dan WHO pada anak sakit kritis = Accuracy of Estimated Energy Expenditure Using Schofield and WHO Formula in Critically Ill Children

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Abstrak

Latar belakang: Penentuan kebutuhan nutrisi secara tepat pada anak sakit kritis perlu dilakukan untuk menghindari underfeeding dan overfeeding. Rumus estimasi menjadi dasar perkiraan kebutuhan energi jika kalorimetri indirek sebagai baku emas tidak tersedia. Akurasi rumus pada studi terdahulu sangat bervariasi dan dipengaruhi oleh karakteristik populasi setempat, sehingga akurasinya perlu diuji pada populasi Indonesia.
Tujuan: Mengevaluasi akurasi rumus Schofield WH, Schofield W, dan WHO dibandingkan kalorimetri indirek, serta mengevaluasi dampak penambahan faktor stres terhadap akurasi.
Metode: Penelitian deskriptif analitik potong lintang ini mengikutsertakan pasien anak yang menggunakan ventilasi mekanik Mei sampai Juli 2019. Analisis kesesuaian dilakukan dengan membandingkan perhitungan rumus Schofield WH, Schofield W, dan WHO, dengan dan tanpa faktor stres terhadap pengukuran kalorimetri indirek.
Hasil: Penelitian mengikutsertakan 52 subjek pada hari perawatan 1-5 di PICU dengan median usia 5 tahun (1 bulan 10 hari hingga 17 tahun 9 bulan). Kebutuhan energi yang diukur kalorimetri indirek adalah 60,7 ± 23,5 Kkal/kg/hari. Estimasi rumus Schofield WH, Schofield W, dan WHO lebih rendah dari hasil pengukuran tersebut dengan %bias berturut-turut -13 ± 19, -15 ± 20, dan -16 ± 21. Nilai estimasi dan hasil pengukuran kalorimetri indirek berkorelasi kuat (intraclass correlation coefficient r > 0,9) namun interval kesesuaian (limit of agreement) dari %bias sangat lebar. Hanya 12 (23%) subjek yang memiliki nilai estimasi akurat sesuai dengan kalorimetri indirek. Pada populasi penelitian ini faktor stres meningkatkan akurasi rumus estimasi.
Simpulan: Rumus Schofield WH, Schofield W, dan WHO tidak akurat sebagai estimasi kebutuhan energi anak sakit kritis. Hasil prediksi rumus tersebut lebih rendah dari kebutuhan aktual jika faktor stres tidak digunakan.
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Background: Accurate estimation of energy expenditure in critically ill children is important to avoid underfeeding and overfeeding. Prediction formula helps to estimate energy expenditure when the gold standard indirect calorimetry is not available. Previous study on estimation accuracy yielded variable result in different population characteristics, therefore the accuracy of prediction formula in Indonesian population needs to be evaluated.
Objective: To assess the accuracy of Schofield WH, Schofield W, and WHO formula compared to indirect calorimetry. To evaluate the impact of additional stress factor on the accuracy of prediction formula.

Methods: This is a descriptive analytic cross-sectional study on mechanically ventilated critically ill children held in May-July 2019. We analyze the agreement of measured energy expenditure using indirect calorimetry and estimated energy expenditure calculated by Schofield WH, Schofield W, and WHO formula, with and without additional stress factor.
Results: This study included 52 subjects with median age 5 years old (1 month 10 days -17 years 9 months) on day 0-5 after they were admitted to PICU. Mean measured energy expenditure was 60,7 ± 23,5 Kcal/kg/day. All estimated energy expenditure by Schofield WH, Schofield W, and WHO were lower than measured energy expenditure with % bias of -13 ± 19, -15 ± 20, and -16 ± 21, respectively. Estimated and measured value have strong correlation (intraclass correlation coefficient $r > 0.9$) but the limit of agreement interval is too wide. Only 12 (23%) subjects have accurate estimation of energy expenditure. In this population stress factor improves the accuracy of prediction formulas.
Conclusion: Schofield WH, Schofield W, and WHO formula have poor accuracy in estimating energy expenditure in critically ill children. Without additional stress factor, the estimated value were lower than actual/measured energy expenditure