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A922

Sequential measurement of 1 hour creatinine clearance (1-CRCL) in critically ill patients at risk of acute kidney injury (AKI)

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Introduction: Measuring renal function in acute kidney injury (AKI) is difficult. The criteria on which a clinical diagnosis of AKI is made are broad and open to interpretation. More objective measures remain elusive. A truly robust biomarker has not been discovered and exogenous markers are difficult to use in critically ill patients. We have previously used measures of renal clearance of Iohexol (rICl) to evaluate AKI (data submitted) and have shown that 1-hour renal creatinine clearances (1-CrCl) correlate well with rICl (correlation r = 0.99; Bland Altman bias −5.6, SD 24.1 %) performing better than 4 hourly CrCl measurements (bias 11.4 % SD 56.7 %).
Objective: To use sequential 1-CrCl measurements to measure renal function in critically ill patients with or at risk of AKI over 72 hours and to compare this with traditional methods of assessing AKI. This was part of a BSc project.
Methods: Consent was obtained from the next of kin according to ethical review (NREC: 15/LO/1720). 1-hour urine samples were collected at 7 am and 7 pm. Serum creatinine (SCr) samples were taken 30 min after the urine collections were started. SCr and urine creatinine (UCr) concentrations were measured using the enzymatic method by the dedicated researcher. 1-CrCl was calculated by the equation: $CrCl = (UCr \times \text{vol})1.73/((SCr\ /\text{min})\text{xBSA})$. 1-CrCls were compared with the ´kidney disease improving global outcomes´ (KDIGO) criteria for AKI and estimated glomerular filtration rates (eGFR) calculated by the Cockcroft-Gault (CG), modification of diet in renal disease 7 (MDRD7) and chronic kidney disease epidemiology collaboration (CKI-EPI) methods. Kruskal Wallis, Spearman correlation and the Bland-Altman method were used (IBM® SPSS® version 22) in analysis.
Results: 17 patients were included with a total of 87 1-CrCl measurements. Median (IQR) age was 67 (50–76) and admission APACHE II score 22 (22–32). 14 patients were medical admissions and 3 had emergency surgery. Observed overtime the 1-CrCl changed in similar patterns to the calculated eGFR (Figs. 49 and 50, examples) and correlations were good (1-CrCl vs CG r = 0.857, 1-CrCl vs CKD-epi = 0.861, 1-CrCl vs MDRD7 = 0.845). However the eGFR did not predict actual values. The Bland Altman comparisons for CKD-epi and MDRD7 are in Table 28. Fig 51 compares 1-CrCl with the KDIGO criteria
Conclusions: Despite good correlations, the eGFR calculated values were not good measures of actual renal function. 1-CrCl was often although not always markedly lower than the eGFR. The KDIGO criteria did reflect the measured 1-CrCl but there was marked overlap in all categories.

References

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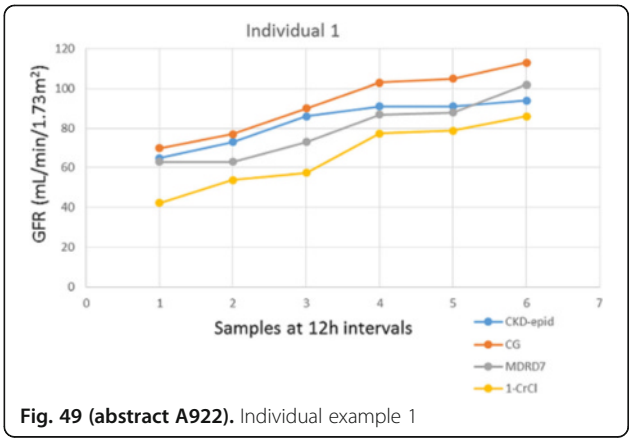

Fig. 49 (abstract A922). Individual example 1

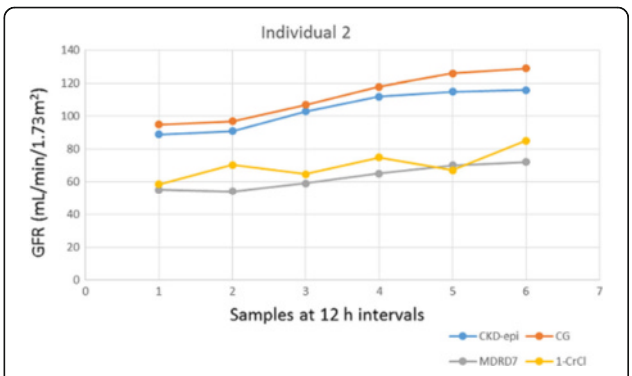

Fig. 50 (abstract A922). Individual example 2

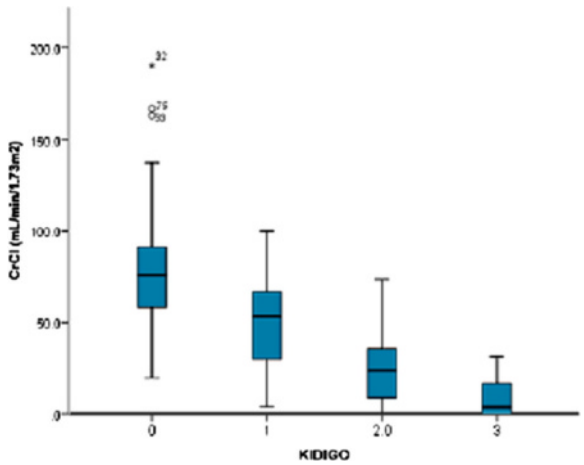

Fig. 51 (abstract A922). Boxplot of KDIGO and 1 hour CrCl

Table 28 (abstract A922). Bland Altman comparison of 1-CrCl with eGFR

Comparison	Bias (%)	SD(%)	Limits of Agreement (%)
1CrCl vs CKD-epi	−6.5	21.3	−39.4 to 44.1
1CrCl vs MDRD7	2.4	20.5	−46.5 to 33.9