

# Comparison of renal function estimation methods in critically ill children: a pilot study



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## BACKGROUND

Renal function assessment is crucial in critically ill patients. Both acute kidney injury and augmented renal clearance (ARC) may compromise outcome.

Common formulas to estimate glomerular filtration rate (GFR) are unreliable in critically ill adults (1).

Our aim was to evaluate the feasibility of measuring plasma iohexol clearance ( $CL_{IOHEX}$ ) for GFR assessment in critically ill children and to compare  $CL_{IOHEX}$  with estimated GFR using the modified Schwartz formula ( $eGFR_{Schwartz}$ ).

## METHODS

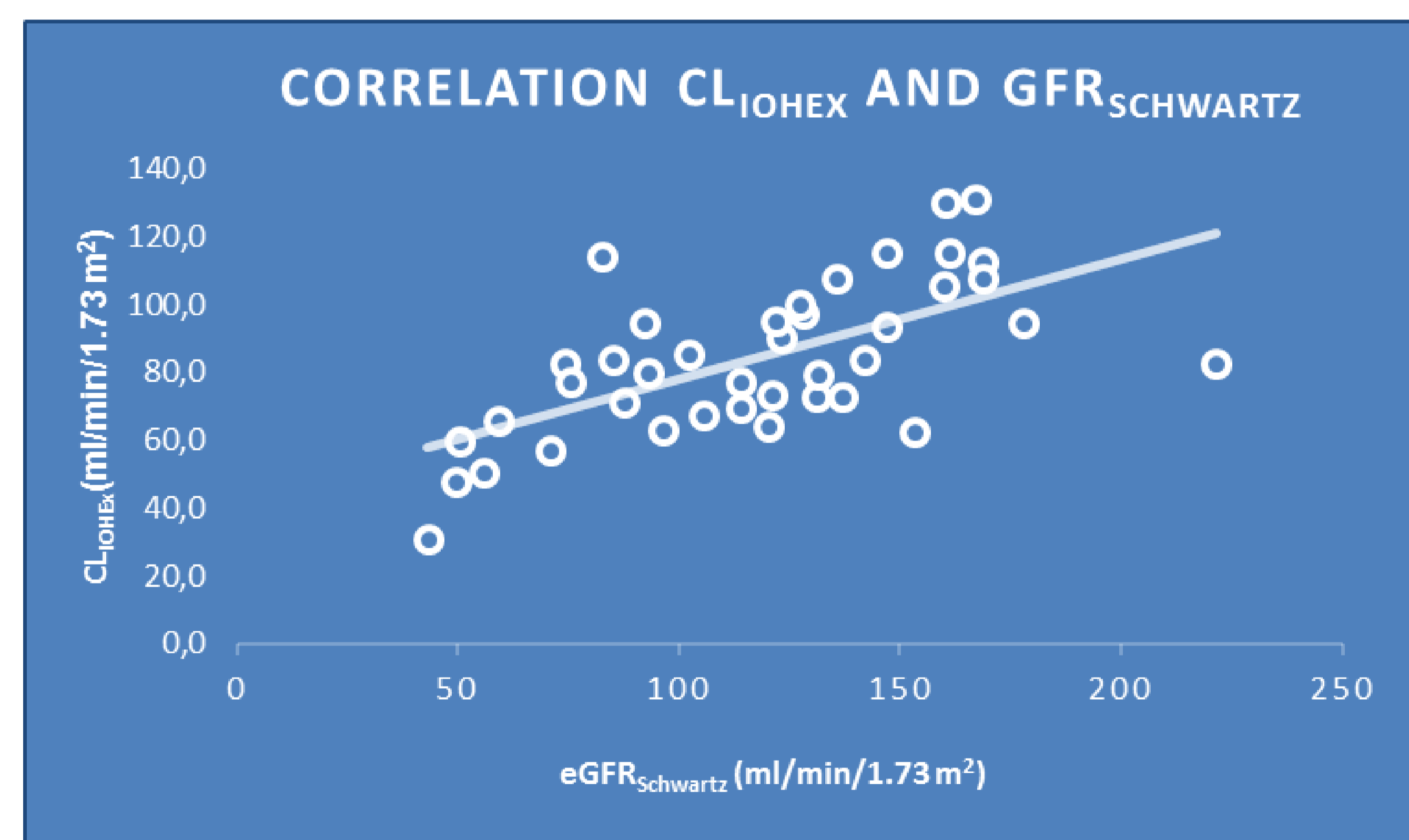
- prospective, interventional study
- injection of a weight-dependent bolus of iohexol (Omnipaque<sup>300</sup>)
- $CL_{IOHEX}$  calculation using non-compartmental analysis with area under the curve based on 6 iohexol sampling points over a 6-hours interval
- ARC was defined as a GFR exceeding normal values for age plus two standard deviations.

TABLE: PATIENT CHARACTERISTICS

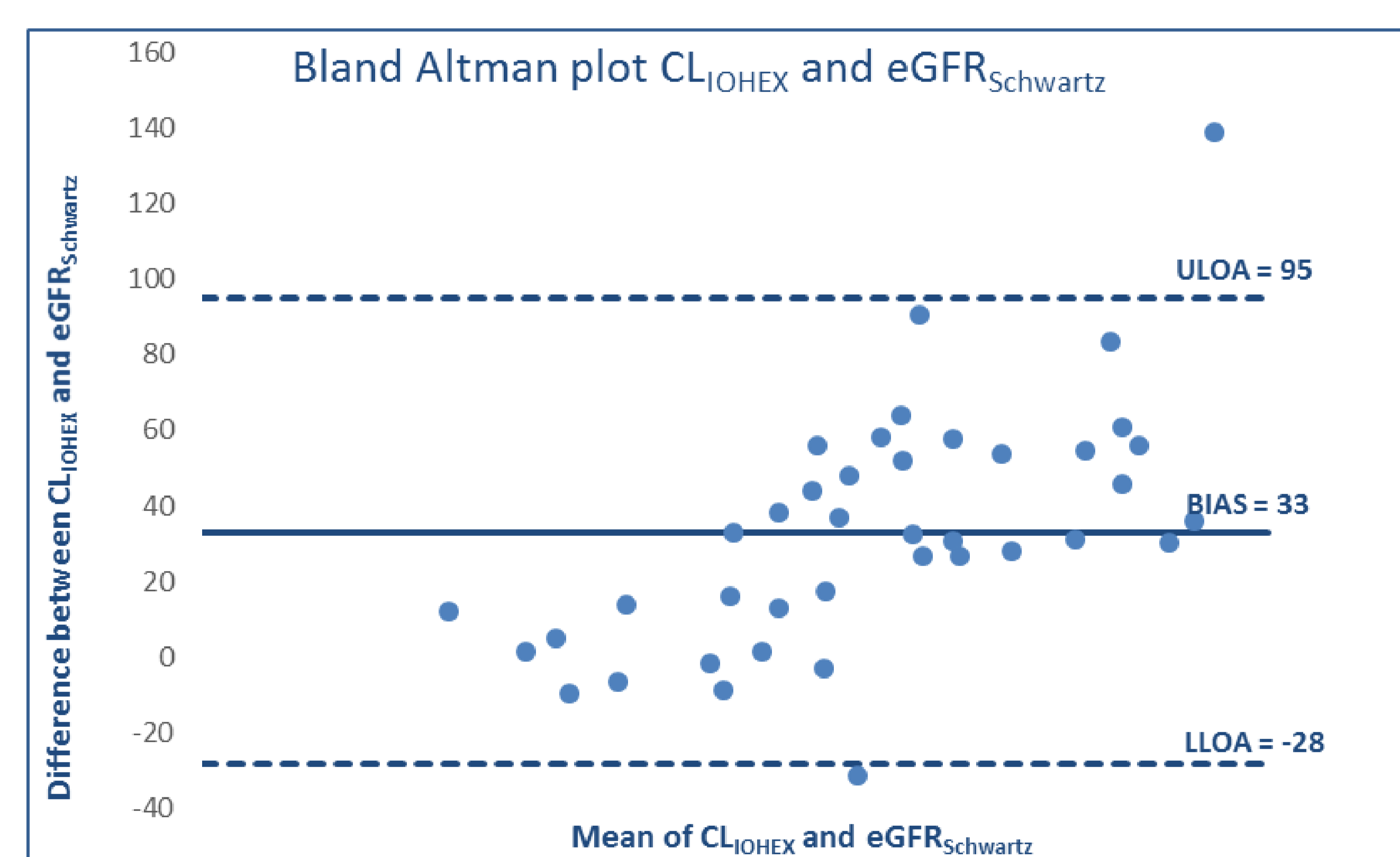
	Number (%) or median (IQR)
Male	29 (73)
Female	11 (27)
Age, months	16 (5-43)
Weight, kg	10 (7-13)
PRISM II Score	7 (0-12)
Primary reason for ICU admission	
Postoperative	15 (38)
Neurologic disorder	3 (8)
Respiratory disorder	11 (28)
Cardiovascular disorder	2 (5)
Burns	1 (3)
Hematologic/oncologic disorder	1 (3)
Trauma	5 (13)
Sepsis	2 (5)
PICU mortality	3 (8)
Serum creatinine day 1 <sup>a</sup> mg/dL	0.5 (0.38-0.52)
Serum creatinine <sup>b</sup> , mg/dL	0.42 (0.34-0.49)
$eGFR_{Schwartz}$ <sup>b</sup> , ml/min/1.73m <sup>2</sup> , (range)	83 (31-131)
$CL_{IOHEX}$ , ml/min/1.73m <sup>2</sup> , (range)	121 (43-221)
ARC <sup>b</sup> based on $CL_{IOHEX}$	20(50)
ARC <sup>b</sup> based on $eGFR_{Schwartz}$	1(3)

ICU, intensive care unit; PRISM II score, pediatric risk of mortality score  
<sup>a</sup> on day 1 of PICU admission, <sup>b</sup> on day of iohexol clearance

## RESULTS



Pearson's correlation coefficient  $r = 0,64$   $p < 0,01$



ULOA = upper limit of agreement; LLOA = lower limit of agreement  
 Bias = mean difference between  $CL_{IOHEX}$  and  $eGFR_{Schwartz}$

## CONCLUSIONS

$CL_{IOHEX}$  was safely used to assess true GFR in critically ill children. There was a relatively good correlation between  $CL_{IOHEX}$  and  $eGFR_{Schwartz}$ , however,  $eGFR_{Schwartz}$  systematically underestimates true GFR, especially in patients with ARC, and seems not reliable in this patients population.

Reference 1. Baptista JP, Neves M, Rodrigues L, Teixeira L, Pinho J, Pimentel J (2014) Accuracy of the estimation of glomerular filtration rate within a population of critically ill patients. J Nephrol 27: 403-410.