Point of care creatinine testing in screening and monitoring of chronic kidney disease

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Background: Chronic kidney disease (CKD) is a common condition with an annual incidence rate of 1,701 per million. It is stratified on the basis of the estimated Glomerular Filtration Rate (eGFR), which is calculated using serum creatinine (sCr). Early recognition of CKD may enable the initiation of preventive measures that slow the progress of CKD together with the ensuing complications such as cardiovascular disease (CVD). NICE has placed emphasis on early detection through screening at risk groups such as patients with hypertension, diabetes and certain ethnic groups. **Method:** Participants: Subjects who participated in a CVD screening programme and in audit of the diabetic care pathway in the community, in collaboration with Hindu temples and patients with known CKD and post renal transplant under the care of the nephrology team at the Royal Free London. We compared point of care testing (POCT) sCr measurements (StatSensor meter™, Nova Biomedical, UK) with laboratory-based sCr measurement using an Isotope Dilution mass spectrometry (IDMS) traceable compensated (rate blanked) kinetic Jaffe assay and the enzymatic assay using a Roche Modular P® analyser and Roche® reagents (Roche, Maidenhead, UK). **Results**: The mean age of the participants in the CVD screening (n=279) group and CKD group (n=291) was 47.5 (10.6) years and 56.1 (17.4), respectively. The bias (Bland-Altman) in sCr measurements was -4.5 µmol/l (POCT was lower than the laboratory (Jaffe) value) for the CVD screening group. Similar pattern with negative bias of -18.4 µmol/l was observed in the CKD group. The results of SCr in both groups were divided into tertiles and Bland-Altman plots were used to assess agreement between methods (table 1).

		Creatinine in CVD screening and diabetic care process Group		
	POCT Creatinine *vs* Laboratory (Kinetic Jaffe method)			
Analyte	Tertile	Range (µmol/l)	Bias (µmol/l)	95% limits of agreement	p value
Creatinine	1	45-70	-1	(-17, 14)	0.153
	2	71-80	-6.60	(-30, 16)	0.001
	3	81-193	-8.3	(-36, 20)	0.001
		POCT Creatinine *vs* Laboratory (enzymatic method)			
Creatinine	1	45-70	-0.1	(-16, 16)	0.86
	2	71-80	-4.9	(-28, 18)	0.002
	3	81-193	-2.7	(-32, 26)	0.07
		Creatinine in CKD Group			
	POCT Creatinine *vs* Laboratory (Kinetic Jaffe method)			
Analyte	Tertile	Range (µmol/l)	Bias (µmol/l)	95% limits of agreement	p value
Creatinine	1	45-100	-1.4	(-26, 23)	0.23
	2	101-295	-5.8	(-50, 38)	0.003
	3	301-962	-49.2	(-275, 177)	0.006
		POCT Creatinine *vs* Laboratory (enzymatic method)			
Creatinine	1	45-100	-0.8	(-25, 23)	0.51
	2	101-295	-4	(50, 42)	0.05
	3	301-962	-37.6	(-296, 221)	0.06

In the CVD screening and CKD group the mean eGFR for the lab-based method was 83 (IQR 69.7, 90) and 49 (IQR 24, 75) ml/min/1.73m^2, respectively. The value for POCT was 87.0 (IQR 74, 90) and 50.0 (IQR 26, 77) ml/min/1.73m^2 for both groups, respectively. **Conclusion:** POCT measurements are comparable to laboratory measurements in the CKD diagnosis range. POCT sCr testing could facilitate early diagnosis of CKD via screening programmes, as well monitoring CKD patients in a clinic or community setting.