SP2 Bone mineral metabolism

The Scottish Renal Registry began collecting blood tests (serum calcium, phosphate (PO4) and parathyroid hormone(PTH)) of bone mineral metabolism in June 2009.

Pre dialysis blood samples were collected after a short interdialytic gap from all prevalent haemodialysis patients in Scotland. Any samples marked 'post haemodialysis' were excluded.

There have been many proposed changes to both the method of collection and the laboratory analysis of bone biochemistry to improve comparability of data between units. None of these changes had been implemented at the time of this audit which must be appreciated when considering the results.

The recommendations of the Working Group of Senior Scottish Clinical Biochemists on parathyroid hormone targets in the management of renal failure, which Scottish biochemists have agreed to adopt, are available on the SRR website.

http://www.srr.scot.nhs.uk/About/CA_Albumin_Background.doc

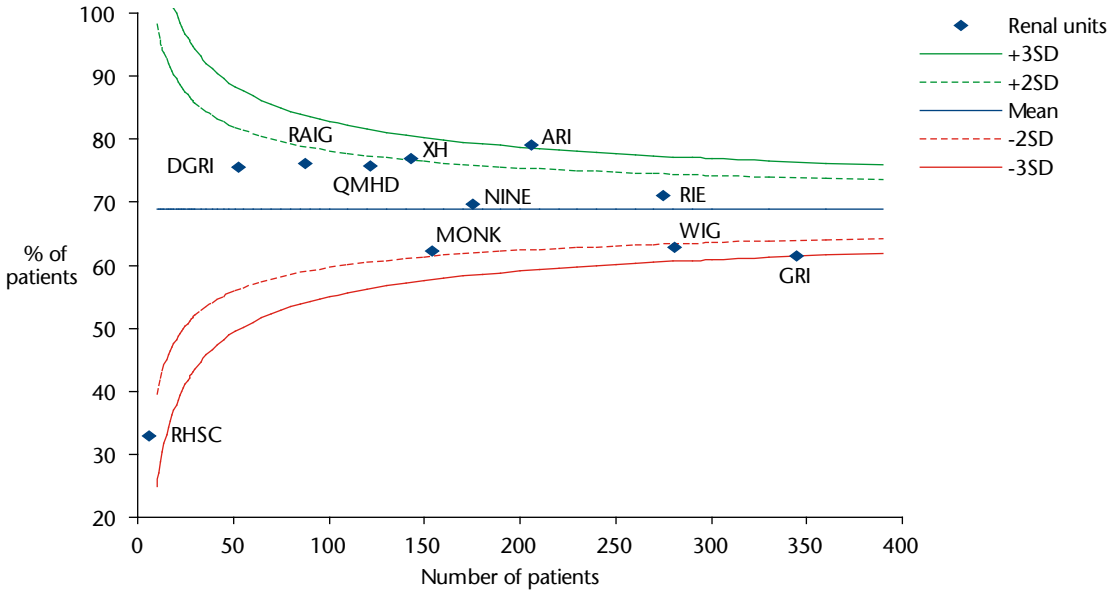
SP2.1 Mean phosphate, corrected calcium, PTH and achievement of audit standards in haemodialysis patients by renal unit June 2009

Renal Unit	Number of patients	% with PO4 result	Mean PO4 mmol/L	% with result <1.8 mmol/L	% with cCa result	Mean cCa mmol/L	% with cCa in normal range	% with PTH result	Mean PTH pmol/L	% PTH result 2-4x UL† normal
ARI	206	97.1	1.42	79.0	97.6	2.40	80.6	0		0
XH	143	88.1	1.51	77.0	88.8	2.36	80.3	1.3	9.3	50.0
DGRI	53	100.0	1.59	75.5	100.0	2.30	88.7	83.0	29.7	27.3
GRI	345	92.5	1.68	61.4	92.8	2.39	77.2	91.3	40.9	21.0
MONK	154	94.8	1.71	62.3	97.5	2.33	87.3	79.9	36.7	29.3
NINE	175	96.0	1.63	69.6	96.6	2.17	73.4	73.4	58.1	6.3
QMHD	122	94.3	1.52	75.7	97.5	2.40	92.4	82.0	21.0	30.0
RAIG	88	75.0	1.60	76.1	76.1	2.45	80.6	0		
RHSC	6	100.0	1.64	33.0	0			100.0	45.4	0
RIE	275	96.7	1.60	71.1	98.9	2.41	82.1	66.5	33.0	31.2
WIG	281	96.8	1.68	62.9	98.6	2.36	79.1	42.3	51.5	16.0
Scotland	1848	94.0	1.61	68.9	94.8	2.36*	81.0	49.1	37.8*	24.4

* The mean corrected calcium (cCa) and PTH values for Scotland do not take into account the different formulae/ analytical methods used between units

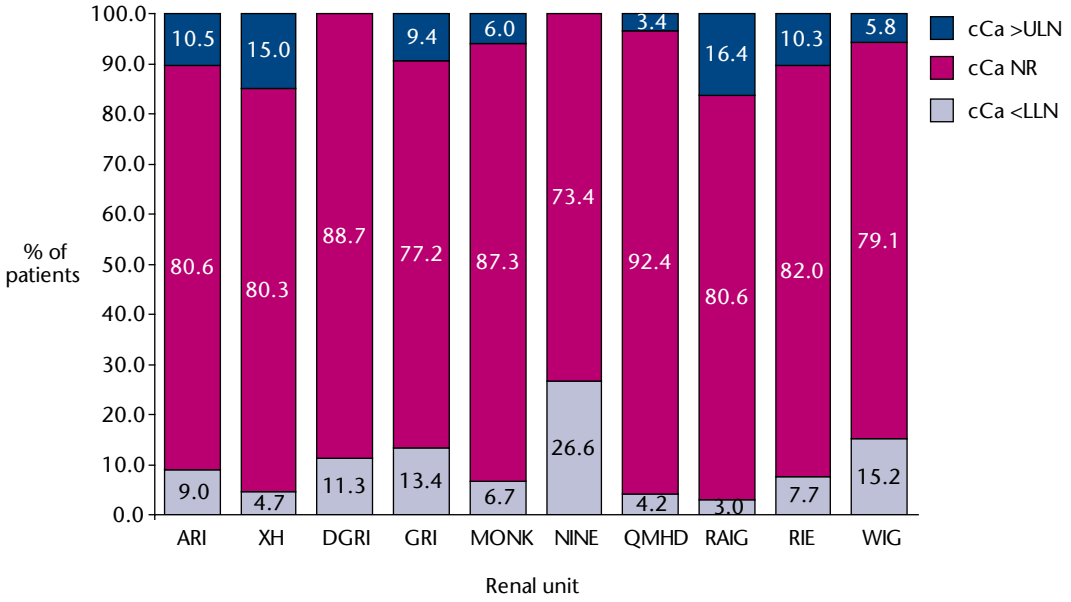
† UL-upper limit of normal

SP2.2 Percentage of patients achieving pre-HD PO4 target of <1.8 mmol/L by renal unit June 2009



Analytical methods for phosphate are fairly standard across Scotland and therefore results are comparable both between units, and against the UKRA recommended standard (Pre-HD PO4 <1.8 mmol/L).

SP2.3 Distribution of pre HD corrected serum calcium in haemodialysis patients by renal unit June 2009



The graph shows the percentage of patients within each unit, who were hypocalcaemic (cCa< lower limit of normal range (LLN)), normocalcaemic (cCa in normal range (NR)) and hypercalcaemic (cCa>upper limit of normal range (ULN)) according to the local assay ranges for the biochemistry laboratory serving each main renal unit.

The UKRA standard for calcium is not fixed, stating simply that the corrected calcium should be maintained within the normal range for that unit.

However,

- the normal range differs between units, therefore calcium values are not directly comparable between units.
- the standard is for the corrected calcium, therefore the albumin affects the result.

At the time of the audit there were 7 different correction factors in use across Scotland, each giving different results for any given uncorrected calcium value.

In addition, albumin assays become less accurate at very low levels which affects the corrected calcium result.

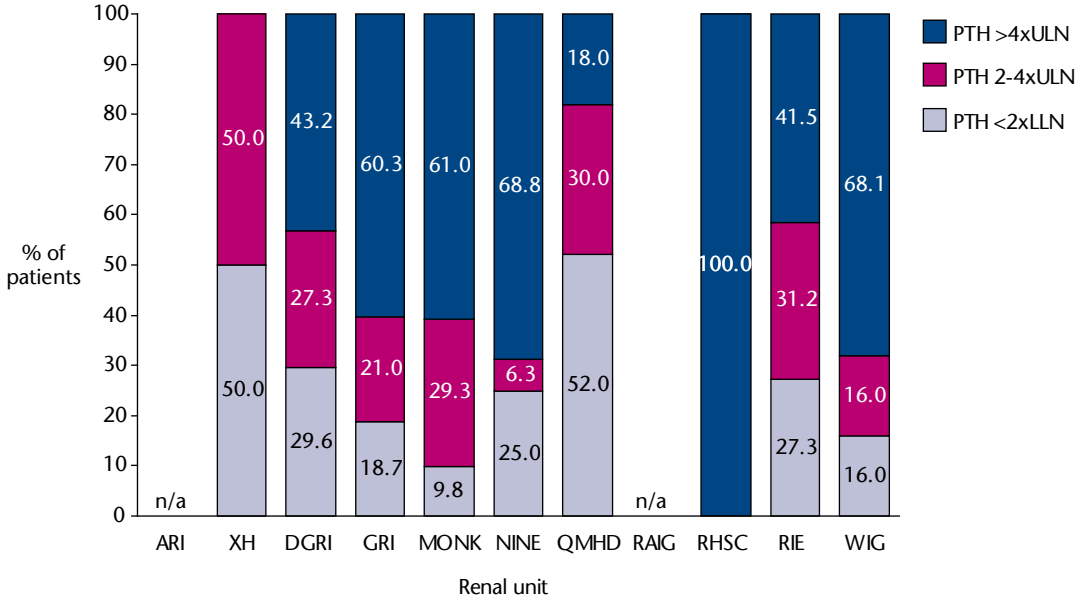
In 2010 the Scottish Biochemists society agreed to adopt the Oxford Textbook of Medicine formula to correct calcium in all laboratories.

- cCa = measured serum calcium + [(40-serum albumin (g/L)) x 0.02]

They also agreed that calcium should not be corrected if the albumin is <25 g/L.

Patients with very low albumin were included in the current report, accounting for 2.9% of cCa results.

SP2.4 Distribution of pre HD serum PTH in haemodialysis patients by renal unit June 2009



Results are stratified into 3 groups: more than 4 times greater than, 2-4 times greater than; less than twice the upper limit of normal, for the biochemistry laboratory serving each main renal unit.

The current UKRA standard is that PTH levels should be maintained between 2-4 times the upper limit of normal for the assay used.

The data are incomplete and must be interpreted with caution as discussed below, but less than a third of patients with data achieve the standard.

At the time of the audit there were 5 assays in use across Scotland, each with slightly different normal ranges and each performing very differently in detection of PTH.

Some satellite dialysis units send blood samples to laboratories with a PTH assay that differs from the parent unit. However the SRR is currently unable to identify where a sample has been analysed, and cannot differentiate between blood results of patients from the parent unit and those from their satellites. This introduces a substantial error in the analysis of these results which should be interpreted with caution.

In 2010 the Scottish Biochemists agreed to adopt the recommendations of the PTH Working Group which include assay specific target ranges for PTH in CKD 4 and 5 and the standard unit picomol/ litre (pmol/L) for reporting.

When these assay specific ranges are in place, identifying the assay used for each result will be crucial to avoid exacerbating the existing error.