Anaemia of CKD

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Purpose of All Wales Audit

- Governance: are reconfigured services robust?
- Contractual: inform procurement obligations
- Critical appraisal: what’s done well or not?
- Defining National standards: registry shortfalls
- Practice development: consider our treatment approaches
- Future opportunities: procurement & clinical
Anaemia of Chronic Kidney Disease

Treated when HB consistently below 10g/dl with:

➢ Iron repletion:
  • Ferritin > 200 ng/ml    TSAT >20%

➢ ESAs
  • Hb 10-12 g/dl

Treatment is effective BUT expensive AND also labour intensive because of the need for tight target control

• HB: ‘too low’ is harmful & ‘too high’ harmful
  • We need to use ESAs sparingly & with care
Clinical targets & guidelines

- Set by the UK Renal Association for:
  - Hb
  - Ferritin (shift 2011)
  - TSAT

National Standards

- Determined by the Renal Registry for:
  - Hb
  - Ferritin
  In HD and PD patients.

- All Wales audit 2012:
  - Hb, Ferritin, TSAT

In Pre-dialysis & Tx
Audit: Methodology

- Audit of routine monthly / quarterly bloods March 2013
- Inclusion/exclusion criteria
- Excel data proforma

- N = ~ 3000 patients (~ 2700 after QC)
- Analysis: compliance with national targets
- Excel calculator developed for analysis
Inclusion criteria

Inclusion: Haemodialysis = All pts  Peritoneal / Tx / Pre-dialysis = only ESA pts

Timeline:
- Study PERIOD
  - January
  - February
  - March
- Study MONTH
  - ESA dose
  - Venofer
- Cosmofer / Monofer / Ferinject / Rienso
- Blood results = latest recorded
The Proforma

### Eprex

<table>
<thead>
<tr>
<th>Weekly Dose</th>
<th>Sum IV</th>
<th>% Sum IV</th>
<th>Sum SC</th>
<th>% Sum SC</th>
<th>Mean Weekly Dose IV</th>
<th>Mean Weekly Dose SC</th>
<th>Mean Frequency</th>
<th>Median Frequency</th>
<th>Modal Frequency</th>
<th>No. patients on brand</th>
</tr>
</thead>
<tbody>
<tr>
<td>8152.54</td>
<td>51.00</td>
<td>86.44%</td>
<td>8.00</td>
<td>13.56%</td>
<td>8764.71</td>
<td>4250.00</td>
<td>2.56</td>
<td>3</td>
<td>3</td>
<td>59</td>
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<tr>
<td>9028.61</td>
<td>175.00</td>
<td>52.71%</td>
<td>157.00</td>
<td>47.29%</td>
<td>9034.29</td>
<td>9022.29</td>
<td>2.18</td>
<td>2</td>
<td>2</td>
<td>332</td>
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<tr>
<td>9781.25</td>
<td>63.00</td>
<td>98.44%</td>
<td>1.00</td>
<td>1.56%</td>
<td>9460.32</td>
<td>30000.00</td>
<td>2.83</td>
<td>3</td>
<td>3</td>
<td>64</td>
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<tr>
<td>10136.86</td>
<td>293.00</td>
<td>100.00%</td>
<td>0.00</td>
<td>0.00%</td>
<td>10136.86</td>
<td>10136.86</td>
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<td></td>
<td></td>
<td>293</td>
</tr>
<tr>
<td>6764.71</td>
<td>10.00</td>
<td>11.76%</td>
<td>75.00</td>
<td>88.24%</td>
<td>11800.00</td>
<td>6093.33</td>
<td>2.30</td>
<td>2</td>
<td>2</td>
<td>85</td>
</tr>
<tr>
<td>9183.19</td>
<td>592.00</td>
<td>71.07%</td>
<td>241.00</td>
<td>28.93%</td>
<td>9648.82</td>
<td>8039.42</td>
<td>2.26</td>
<td>2</td>
<td>3</td>
<td>833</td>
</tr>
</tbody>
</table>


Data return issues – the code breakers

- 1 x per 3 weeks
- 1 x per fortnight
- 1 x per Month
- 1 x per week
- 2 x per week
- 3 x per week
- 4 x per week
- 5 x per week
- 7 x per Week

= 2 x Month

= 1 x per day

1000
1000mg
1gm
1gms
1-gram
1g
1g
The data analysis
<table>
<thead>
<tr>
<th>Data Return</th>
<th>Hospital No.</th>
<th>Unit Hub</th>
<th>CKD Status</th>
<th>Date dialysis initiated</th>
<th>Incident vs Prevalent</th>
<th>ESA Brand</th>
<th>ESA Route</th>
<th>Weekly ESA dose</th>
<th>Freq of administration</th>
<th>Monthly / Quart. Iron dose</th>
<th>IV Iron brand</th>
<th>Supp. oral Iron</th>
<th>HB</th>
<th>Ferritin</th>
<th>TSAT</th>
<th>CRP</th>
<th>Pre and Post urea</th>
<th>URR</th>
<th>Vascular access</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

10/21/2013
The Results — making sense of the format
### Patient Group
(e.g. Haemo)

### Target:
Parameter (e.g. Hb)

**RR Standard:** UK X % Wales X%

**Wales 2012 Standard:** X %

<table>
<thead>
<tr>
<th>Unit HD</th>
<th>% return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>100.0%</td>
</tr>
<tr>
<td>Cardiff</td>
<td>100.0%</td>
</tr>
<tr>
<td>Rhyl</td>
<td>100.0%</td>
</tr>
<tr>
<td>Swansea</td>
<td>100.0%</td>
</tr>
<tr>
<td>Wrexham</td>
<td>97.5%</td>
</tr>
<tr>
<td>All Wales</td>
<td>99.8%</td>
</tr>
</tbody>
</table>

**Mean Hb (g/dl):**

- % above target (>12g/dl)
- % in target (10-12g/dl)
- % below target (<10g/dl)
- Mean

### Patient Numbers

- Patient Numbers: 67, 418, 69, 348, 79, 981
- % Patients in Hb range
- Mean Hb (g/dl)
The Results
Unit Haemodialysis (I & P)*
Target: HB 10-12 g/dL

*RR Standard: UK 56% Wales 59%
Wales 2012 Standard: 55%
Unit Haemodialysis (I & P)*

Target: **HB 10-12 g/dL**

*RR Standard: UK 56% Wales 59%

Wales 2012 Standard: 55%

61%  62%  57%  **Wales 2013**

56%  60%  46%  **Wales 2012**

67%  59%  58%  **RR 2011**

56%  66%  59%

56%  50%  55%

55%  49%  59%

---

Percentage of HD patients with Hb ≥ 10 and ≤12 g/dl by centre in 2011
### Ferritin Levels

**Target:** Ferritin 200-500 (800) ng/ml

**RR Standard UK:**
- $> 100 = 96 \%$
- $F 200-500 = 47 \%$

**RR Wales:** 58\%  Wales 2012 54\%

<table>
<thead>
<tr>
<th>Location</th>
<th>Patient Numbers</th>
<th>% in target (200-500ng/ml)</th>
<th>% above target (501-800ng/ml)</th>
<th>% above target (&gt;800ng/ml)</th>
<th>% below target (&lt;100ng/ml)</th>
<th>% below target (100-199ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>74</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiff</td>
<td>456</td>
<td>96%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyl</td>
<td>77</td>
<td>100%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swansea</td>
<td>325</td>
<td>98%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrexham</td>
<td>93</td>
<td>98%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Wales</td>
<td>1025</td>
<td>97%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Image of a graph showing % Patients in ferritin range and Mean Ferritin ng/ml]
Unit Haemodialysis

Ferritin > 100 mcg/L

*RR Standard: UK 96% Wales 95%

Wales 2012 Standard: 95%

Wales 2013
99%

Wales 2012
99%

RR 2011
99%

Bangor
99%

99%

100%

97%

94%

97%

100%

97%

96%

91%

95%

91%

95%

Rhyl

Cardiff

Swansea

Wales

Iron Dose
mg

mg

mg

mg
Unit Haemodialysis *  
Ferritin > 200 < 500 mcg/L  
*RR Standard: UK 47% Wales 59%
Wales 2012 Standard: 54%

<table>
<thead>
<tr>
<th>Location</th>
<th>2011 RR</th>
<th>2012 Wales</th>
<th>2013 Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiff</td>
<td>64%</td>
<td>58%</td>
<td>50%</td>
</tr>
<tr>
<td>Rhyl</td>
<td>63%</td>
<td>55%</td>
<td>46%</td>
</tr>
<tr>
<td>Bangor</td>
<td>57%</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>Swansea</td>
<td>71%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wales</td>
<td></td>
<td></td>
<td>56%</td>
</tr>
</tbody>
</table>

Percentage of HD patients with ferritin >200 μg/L and ≤500 μg/L by centre in 2011
Unit Haemodialysis *
Ferritin > 800 mcg/L

*RR Standard: UK % Wales %
Wales 2012 Standard: 5.2%

2.6% 14% 13% 3.2%
Wales 2013

2.9% 3% 7% 4.6%
Wales 2012

7.7%
Wales
Unit haemodialysis (I & P)

Target: **TSAT >20%**

**UK Standards : None**

**Wales 2012 : 63%**
Commentary on Unit HD

- HB: Targets > UK benchmarks
- Consistent across Wales
- HB: Improvement from 2012

- Ferritin: target > UK benchmarks
- Appropriate iron strategies

- Maintaining standards – 2013 RRR looks bright
- Similarities: same outcomes
- Differences: management strategies
Home Haemodialysis *
Target: HB 10-12 g/dL

*RR Standard: UK 56% Wales 59%
Wales 2012 Standard: 50 %

<table>
<thead>
<tr>
<th>Location</th>
<th>Patient Number</th>
<th>% Patients in Hb range</th>
<th>Mean Hb (g/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>13</td>
<td>61.5%</td>
<td>11.2</td>
</tr>
<tr>
<td>Cardiff</td>
<td>36</td>
<td>38.9%</td>
<td>10.7</td>
</tr>
<tr>
<td>Rhyl</td>
<td>3</td>
<td>33.3%</td>
<td>10.5</td>
</tr>
<tr>
<td>Swansea</td>
<td>25</td>
<td>56.0%</td>
<td>10.9</td>
</tr>
<tr>
<td>Wrexham</td>
<td>2</td>
<td>100.0%</td>
<td>11.3</td>
</tr>
<tr>
<td>All Wales</td>
<td>79</td>
<td>49.4%</td>
<td>10.8</td>
</tr>
</tbody>
</table>

Mean Hb (g/dl):
- Bangor: 11.2 g/dL
- Cardiff: 10.7 g/dL
- Rhyl: 10.5 g/dL
- Swansea: 10.9 g/dL
- Wrexham: 11.3 g/dL
- All Wales: 10.8 g/dL

% above target (>12g/dL): 11.2%
% in target (10-12g/dL): 56.0%
% below target (<10g/dL): 32.8%
Home haemodialysis (I & P)*
Target: Ferritin 200-500 (800) ng/ml

RR Standard UK: > 100 = 96%
F 200-500 = 47 %
F 200-500 RR Wales: 59 % Wales 2012 41%

<table>
<thead>
<tr>
<th>Location</th>
<th>Patient Number</th>
<th>% Patients in ferritin range</th>
<th>Mean Ferritin ng/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>13</td>
<td>100%</td>
<td>334</td>
</tr>
<tr>
<td>Cardiff</td>
<td>36</td>
<td>89%</td>
<td>280</td>
</tr>
<tr>
<td>Rhyl</td>
<td>3</td>
<td>100%</td>
<td>355</td>
</tr>
<tr>
<td>Swansea</td>
<td>25</td>
<td>100%</td>
<td>438</td>
</tr>
<tr>
<td>Wrexham</td>
<td>2</td>
<td>100%</td>
<td>188</td>
</tr>
<tr>
<td>All Wales</td>
<td>79</td>
<td>95%</td>
<td>342</td>
</tr>
</tbody>
</table>

 bangor 13 100%
cardiff 36 89%
rhyl 3 100%
swansea 25 100%
wrexham 2 100%
all wales 79 95%
Home haemodialysis
Target: TSAT >20%

UK Standards: None
Wales 2012: 22%

Patient Numbers for test result

<table>
<thead>
<tr>
<th>Location</th>
<th>Patients</th>
<th>% in target (≥20%)</th>
<th>% below target (&lt;20%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>13</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Cardiff</td>
<td>36</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Rhyl</td>
<td>3</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Swansea</td>
<td>25</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Wrexham</td>
<td>2</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>All-Wales</td>
<td>79</td>
<td>37%</td>
<td></td>
</tr>
</tbody>
</table>
Commentary on Home HD

- Surly more Home HD patients achieve target?
- HB, Ferritin and TSAT:
  In target : Home HD < Unit HD
- This must be because they over achieve target?
Peritoneal dialysis *  
Target: HB 10-12 g/dL

*RR Standard: UK 53% Wales 47% 
Wales 2012 Standard: 62 %
Peritoneal dialysis

Target: Ferritin 200-500 (800) ng/ml

RR Standard UK: > 100 = 86%
F 100-500 = 65%

F100 -500 RR Wales: 56 % F200 -500 Wales 2012 37%

Mean Ferritin ng/ml

Patient Numbers

Bangor 10 100%
Cardiff 43 65%
Rhyl 8 88%
Swansea 51 84%
Wrexham 12 100%
All Wales 124 81%
**Peritoneal dialysis**

**Target:** TSAT >20%

**Wales 2012:** 71%

**UK Standards:** None

---

**Patient Numbers**

<table>
<thead>
<tr>
<th>Location</th>
<th>Numbers</th>
<th>% Patients in TSAT range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>10</td>
<td>0%</td>
</tr>
<tr>
<td>Cardiff</td>
<td>43</td>
<td>0%</td>
</tr>
<tr>
<td>Rhyl</td>
<td>8</td>
<td>0%</td>
</tr>
<tr>
<td>Swansea</td>
<td>51</td>
<td>92%</td>
</tr>
<tr>
<td>Wrexham</td>
<td>12</td>
<td>0%</td>
</tr>
<tr>
<td>All-Wales</td>
<td>124</td>
<td>38%</td>
</tr>
</tbody>
</table>

---

**Mean TSAT %**

- **Bangor:** 63.8%
- **Cardiff:** 63.8%
- **Rhyl:** 63.8%
- **Swansea:** 63.8%
- **Wrexham:** 63.8%
- **All-Wales:** 63.8%

---

**% in target (>=20%)**

- Bangor: 0%
- Cardiff: 0%
- Rhyl: 0%
- Swansea: 92%
- Wrexham: 0%
- All-Wales: 38%

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**% below target (<20%)**

- Bangor: 0%
- Cardiff: 0%
- Rhyl: 0%
- Swansea: 0%
- Wrexham: 0%
- All-Wales: 0%

---

**Mean**

- Bangor: 23
- Cardiff: 23
- Rhyl: 23
- Swansea: 23
- Wrexham: 23
- All-Wales: 23
Commentary on Peritoneal

- HB: Targets > UK benchmarks
- Less consistent across Wales (vs HD)
- HB: similar to 2012

- Ferritin: New target by authorities
- Ferritin: target > UK benchmarks
- Significant improvement to 2012
Pre dialysis ACKD

Registry: Peritoneal D
Registry: Incident HD
Registry: Prevalent HD
All Wales Audit
What do we not about our repatriated Pre-D and Tx pts?
Why repatriated to a tertiary care service?
ESA repatriation to Secondary care: the rational

1. Increasing prevalence & patient no. Increasing recognition & referral

2. Tighter clinical targets

3. Increasing options & complexity

4. Increasing costs & need to reduce expenditure
The benefits of Repatriation: Fact or fiction
### Transplant

**Target:** HB 10-12 g/dL

**Wales 2012 Standard:** 53%

<table>
<thead>
<tr>
<th>Location</th>
<th>Patient Numbers</th>
<th>% Patients in Hb range</th>
<th>Mean Hb (g/dL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>4</td>
<td>100%</td>
<td>10.1</td>
</tr>
<tr>
<td>Cardiff</td>
<td>98</td>
<td>83%</td>
<td>11.0</td>
</tr>
<tr>
<td>Rhyl</td>
<td>9</td>
<td>100%</td>
<td>10.6</td>
</tr>
<tr>
<td>Swansea</td>
<td>46</td>
<td>100%</td>
<td>11.0</td>
</tr>
<tr>
<td>Wrexham</td>
<td>0</td>
<td>#DIV/0!</td>
<td>11.0</td>
</tr>
<tr>
<td>All Wales</td>
<td>157</td>
<td>89%</td>
<td>11.0</td>
</tr>
</tbody>
</table>

**RR Standard:** none

---

**Mean Hb (g/dL):**
- Bangor: 10.1
- Cardiff: 11.0
- Rhyl: 10.6
- Swansea: 11.0
- Wrexham: #DIV/0!
- All Wales: 11.0
Transplant
Target: **Ferritin 200-500 (800) ng/ml**

RR Standard UK: **none**
Wales 2012: **40%**

<table>
<thead>
<tr>
<th>Location</th>
<th>Ferritin Range</th>
<th>% Patients in Ferritin Range</th>
<th>Patient Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>0.0% - 100.0%</td>
<td>0.0%</td>
<td>4</td>
</tr>
<tr>
<td>Cardiff</td>
<td>0.0% - 100.0%</td>
<td>0.0%</td>
<td>98</td>
</tr>
<tr>
<td>Rhyl</td>
<td>0.0% - 100.0%</td>
<td>100.0%</td>
<td>9</td>
</tr>
<tr>
<td>Swansea</td>
<td>0.0% - 100.0%</td>
<td>0.0%</td>
<td>46</td>
</tr>
<tr>
<td>Wrexham</td>
<td>#DIV/0!</td>
<td>0.0%</td>
<td>0</td>
</tr>
<tr>
<td>All Wales</td>
<td>0.0% - 100.0%</td>
<td>68.0%</td>
<td>157</td>
</tr>
</tbody>
</table>

Mean Ferritin ng/ml:
- Bangor: 467 ng/ml (Mean 467 ng/ml)
- Cardiff: 304 ng/ml (Mean 304 ng/ml)
- Rhyl: 354 ng/ml (Mean 354 ng/ml)
- Swansea: 358 ng/ml (Mean 358 ng/ml)
- All Wales: 330 ng/ml (Mean 330 ng/ml)
Transplant
Target: **TSAT >20%**

UK Standards: None
Wales 2012: **38%**

<table>
<thead>
<tr>
<th>Location</th>
<th>Patient Numbers</th>
<th>% Patients in TSAT range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>4</td>
<td>100.0%</td>
</tr>
<tr>
<td>Cardiff</td>
<td>98</td>
<td>0%</td>
</tr>
<tr>
<td>Rhyl</td>
<td>9</td>
<td>0%</td>
</tr>
<tr>
<td>Swansea</td>
<td>46</td>
<td>87%</td>
</tr>
<tr>
<td>Wrexham</td>
<td>0</td>
<td>#DIV/0!</td>
</tr>
<tr>
<td>All-Wales</td>
<td>157</td>
<td>26%</td>
</tr>
</tbody>
</table>

**Mean TSAT %**
- Bangor: 4 (25%)
- Cardiff: 98 (0%)
- Rhyl: 9 (0%)
- Swansea: 46 (87%)
- Wrexham: 0 (#DIV/0!)
- All-Wales: 157 (26%)
Pre-dialysis

Target: HB 10-12 g/dL

Wales 2012 Standard: 59 %

Patient Numbers

% Patients in Hb range

Mean Hb (g/dl)

% above target (>12g/dl)
% in target (10-12g/dl)
% below target (<10g/dl)

Bangor 100 98%
Cardiff 451 91%
Rhyl 138 100%
Swansea 459 97%
Wrexham 205 100%
All Wales 1353 96%
Pre dialysis
Target: Ferritin 200-500 (800) ng/ml

RR Standard UK: none
Wales 2012: 35%

<table>
<thead>
<tr>
<th>Location</th>
<th>Patient Numbers</th>
<th>% Patients in ferritin range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>100</td>
<td>63%</td>
</tr>
<tr>
<td>Cardiff</td>
<td>451</td>
<td>58%</td>
</tr>
<tr>
<td>Rhyl</td>
<td>138</td>
<td>99%</td>
</tr>
<tr>
<td>Swansea</td>
<td>459</td>
<td>69%</td>
</tr>
<tr>
<td>Wrexham</td>
<td>205</td>
<td>66%</td>
</tr>
<tr>
<td>All Wales</td>
<td>1353</td>
<td>68%</td>
</tr>
</tbody>
</table>

Mean Ferritin ng/ml

- % above target (>800ng/ml)
- % above target (501-800ng/ml)
- % in target (200-500ng/ml)
- % below target (100-199ng/ml)
- % below target (<100ng/ml)
- Mean

Diagram showing patient numbers and percentage distribution across different locations.
Pre-dialysis
Target: TSAT >20%

UK Standards: None
Wales 2012: 52%

Patient Numbers

<table>
<thead>
<tr>
<th>Location</th>
<th>Total</th>
<th>% Below Target (&lt;20%)</th>
<th>% in Target (&gt;=20%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>100</td>
<td>9%</td>
<td>91%</td>
</tr>
<tr>
<td>Cardiff</td>
<td>451</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Rhyl</td>
<td>138</td>
<td>49%</td>
<td>51%</td>
</tr>
<tr>
<td>Swansea</td>
<td>459</td>
<td>73%</td>
<td>27%</td>
</tr>
<tr>
<td>Wrexham</td>
<td>205</td>
<td>49%</td>
<td>51%</td>
</tr>
<tr>
<td>All-Wales</td>
<td>1353</td>
<td>38%</td>
<td>62%</td>
</tr>
</tbody>
</table>
Commentary on Pre-dialysis

- HB, Ferritin & TSAT: Improvement on All Wales 2012 benchmarks
- HB: consistent across Wales
- New thinking: from ESA to Iron
Purpose of this talk

- Share the results of our All-Wales audit of ESA for ACKD
- Demonstrate the levels of target achievement in accordance with current national standards & comparative benchmarks
- Consider what we do with these results and how to make best use of this information
- How we go forward from here on an All Wales level
What do we know about Iron?

[Image of pharmaceutical products and a map of Wales and southern England with cities like Swansea, Carmarthenshire, and Pembrokeshire highlighted, along with a subtitle: 'Outreach facilities.']
## Iron – What do we really know

<table>
<thead>
<tr>
<th>Location</th>
<th>% Pt on IV iron</th>
<th>Venofer</th>
<th>Cosmofer</th>
<th>Monofer</th>
<th>Ferinject</th>
<th>Rienso</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangor</td>
<td>14%</td>
<td>14%</td>
<td>7%</td>
<td>0%</td>
<td>79%</td>
<td>0%</td>
</tr>
<tr>
<td>Cardiff</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rhyl</td>
<td>31%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
<td>95%</td>
<td>0%</td>
</tr>
<tr>
<td>Swansea</td>
<td>12%</td>
<td>96%</td>
<td>0%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Wrexham</td>
<td>11%</td>
<td>96%</td>
<td>0%</td>
<td>0%</td>
<td>4%</td>
<td>0%</td>
</tr>
</tbody>
</table>

10/21/2013
Example of confounding analysis

Influence of CRP on Hb levels - Unit HD
‘The pessimist sees difficulties in every opportunity. The optimist sees opportunities in every difficulty’

Winston Churchill