Mr Geoff Herd
Point-of-Care Testing Coordinator
Northland District Health Board
Whangarei

NP Catherine Beazley
Nurse Practitioner
Hauora Hokianga

Saturday, June 10, 2017
17:30 - 18:00 Point of Care Testing in Your Practice
Everything you wanted to know about Point-of-Care Testing in Rural and General Practice but were afraid to ask!

Geoff Herd & Cathy Beazley
GPCME Conference Rotorua
8 -11 June 2017
Introduction

• Definitions and Applications of POCT:
  – History lesson(!)
  – POCT & With-Patient Testing

• Quality & Risk Management

• Community POCT Experience
  – Scope & Scale of POCT in GP
  – Optimising the Patient Journey
  – Cost effectiveness
  – Improving access to care in the Hokianga
POCT: the Oldest Form of Clinical Laboratory Medicine

• 1350 BC Ancient Egyptians: pregnancy test urine B-hCG germinates barley or wheat (!)

• 1500 BC Indian physicians: ants attracted to urine from patients with boils (?diabetes)
Point-of-Care or With-Patient Testing

• medical lab testing with the patient (bedside or decentralised testing)
• reduces Therapeutic TAT e.g.:
  – critical care: blood gas analysis, glucose
  – emergency care: Lactate, cTN, B-hCG
  – clinics & GP: CRP, HbA1c, BNP, INR, etc
• POCT is complementary to medical lab testing
  – should be integrated with clinical pathways
  – varies between hospitals & between countries
• POCT can help to improve access and outcomes
POCT = WITH patient testing

Whole of life Instant Testing for Health
“What is the clinical problem that needs to be solved by point of care testing that cannot be solved by conventional laboratory testing?”
Solving a Clinical Problem
POC INR Testing Prior to Surgery – 5 min

1. **Assessment**
   - Collect blood & test INR

2. **Day of Surgery**
   - Travel to hospital

3. **Patient re-starts warfarin**

4. **Check Results**
   - INR < 1.5

5. **Pre-Op Clinic**

6. **Optimising the Patient Journey**

7. **Home GP**

8. **Recovery**

9. **Surgery**

---

**Note:**
- Surgery to be postponed if INR is not within therapeutic range.
Pre & Post Analytical POCT Error

- Poor quality Sample → Best Quality POCT Device or Analyser → Poor Quality Results
- Good quality sample → Best Quality POCT Device or Analyser → Transcription Error

Patient Harm
Quality Management Systems

• **Patient safety is paramount**
• Governance provides executive authority to implement POCT supported by QMS\(^1,2\)
• QMS in health is a strategic tool to improve patient outcomes

• **QMS for POCT comprises** -
  – **Quality Control:** Sampling, IQC, EQA, ILCP,
  – **Quality Assurance:** Staff Training; Accreditation
  – **Continuous Quality Improvement:** clinical audit, PDSA

• **QMS is A Sustainable POCT Risk Management System**

(1) Musaad and Herd *NZMJ* 2013; 126: No1383
(2) Herd and Musaad *NZMJ* 2015; 128: No1471
## NDHB POC HbA1c Waikato EQA Results: Siemens DCA Vantage x5 OPD Locations

<table>
<thead>
<tr>
<th>Sample Number</th>
<th>Date</th>
<th>BOI</th>
<th>CHC</th>
<th>DLC</th>
<th>DRG</th>
<th>KTA</th>
<th>NDHB mean</th>
<th>Waikato Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Mar-14</td>
<td>97</td>
<td>99</td>
<td>95</td>
<td>100</td>
<td>100</td>
<td>98.2</td>
<td>102</td>
</tr>
<tr>
<td>102</td>
<td>Apr-14</td>
<td>98</td>
<td>96</td>
<td>93</td>
<td>93</td>
<td>91</td>
<td>94.2</td>
<td>93</td>
</tr>
<tr>
<td>103</td>
<td>May-14</td>
<td>82</td>
<td>80</td>
<td>81</td>
<td>80</td>
<td>81</td>
<td>80.8</td>
<td>81</td>
</tr>
<tr>
<td>104</td>
<td>Jun-14</td>
<td>77</td>
<td>74</td>
<td>75</td>
<td>74</td>
<td>75</td>
<td>75</td>
<td>75</td>
</tr>
<tr>
<td>105</td>
<td>Jul-14</td>
<td>87</td>
<td>84</td>
<td>80</td>
<td>79</td>
<td>82</td>
<td>82.4</td>
<td>81</td>
</tr>
<tr>
<td>106</td>
<td>Aug-14</td>
<td>82</td>
<td>75</td>
<td>77</td>
<td>74</td>
<td>77</td>
<td>77</td>
<td>77</td>
</tr>
<tr>
<td>107</td>
<td>Sep-14</td>
<td>97</td>
<td>97</td>
<td>97</td>
<td>100</td>
<td>103</td>
<td>98.8</td>
<td>100</td>
</tr>
<tr>
<td>108</td>
<td>Oct-14</td>
<td>69</td>
<td>68</td>
<td>66</td>
<td>69</td>
<td>62</td>
<td>66.8</td>
<td>68</td>
</tr>
<tr>
<td>109</td>
<td>Nov-14</td>
<td>73</td>
<td>75</td>
<td>77</td>
<td>79</td>
<td>78</td>
<td>76.4</td>
<td>76</td>
</tr>
<tr>
<td>110</td>
<td>Dec-14</td>
<td>65</td>
<td>70</td>
<td>65</td>
<td>67</td>
<td>70</td>
<td>67.4</td>
<td>66</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>83</td>
<td>82</td>
<td>81</td>
<td>82</td>
<td>82</td>
<td>82</td>
<td>81.9</td>
</tr>
</tbody>
</table>

POCT HbA1c results can be accurate and reliable
Are POCT results accurate? Example: whole blood Creatinine

NDHB data July 2015

- i-STAT whole blood v cobas 6000 plasma
- POCT enzymatic v Lab picrate (umol/L)
- $n = 31; r^2 = 0.9968; \text{slope } = 0.9119; \text{ intercept } = 5.8$
- Important range for safety decisions is 100 - 150 umol/L
POCT which may help diagnosis

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage of all conditions (n)</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>UTI</td>
<td>12.4 (521)</td>
<td>47.0</td>
</tr>
<tr>
<td>PE/DVT</td>
<td>11.4 (478)</td>
<td>43.1</td>
</tr>
<tr>
<td>Acute cardiac disease</td>
<td>9.2 (387)</td>
<td>25.4</td>
</tr>
<tr>
<td>INR</td>
<td>6.7 (282)</td>
<td>17.9</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>4.2 (178)</td>
<td>16.1</td>
</tr>
<tr>
<td>Anaemia</td>
<td>3.9 (162)</td>
<td>14.6</td>
</tr>
</tbody>
</table>
Survey POCT in Primary Care
Turner et al Fam Pract 2016 Aug;33(4)388-394

• POCT would help reduce referrals

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage of all conditions (n)</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE/DVT</td>
<td>21.4 (517)</td>
<td>46.6</td>
</tr>
<tr>
<td>Acute cardiac disease</td>
<td>11.2 (271)</td>
<td>24.4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>5.5 (133)</td>
<td>12.0</td>
</tr>
<tr>
<td>COPD / Asthma</td>
<td>5.0 (122)</td>
<td>11.0</td>
</tr>
<tr>
<td>Heart Failure</td>
<td>4.8 (116)</td>
<td>10.5</td>
</tr>
<tr>
<td>INR</td>
<td>4.1 (100)</td>
<td>9.0</td>
</tr>
</tbody>
</table>
Survey POCT in Primary Care
Turner et al Fam Pract 2016 Aug;33(4)388-394

- POCT would help management & monitoring

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage of all conditions (n)</th>
<th>Percentage of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>INR</td>
<td>16.7 (547)</td>
<td>49.3</td>
</tr>
<tr>
<td>Diabetes</td>
<td>16.0 (527)</td>
<td>47.5</td>
</tr>
<tr>
<td>Acute &amp; chronic renal failure</td>
<td>7.0 (230)</td>
<td>20.7</td>
</tr>
<tr>
<td>COPD / Asthma</td>
<td>6.8 (223)</td>
<td>20.1</td>
</tr>
<tr>
<td>Lipid disorder</td>
<td>4.7 (154)</td>
<td>13.9</td>
</tr>
<tr>
<td>Hyper/hypothyroidism</td>
<td>3.7 (121)</td>
<td>10.9</td>
</tr>
</tbody>
</table>
Barriers to POCT for Rural & GP
WONCA SIG 2016

• Cost of devices
• Lack of reimbursement
• Staffing issues, training & time
• Perceptions about test accuracy
• Logistics, space and storage
• Cost of QC & Accreditation requirements
• Lack of knowledge: how to set up POCT?
• (Perceived) lack of support from suppliers
Australian POCT in GP Trial
RCT 53 Practices 4968 patients
Laurence et al 2010 BJGP 60; e98-e104

- Patient Satisfaction Statements: p value
  - Prefer finger prick test < 0.001
  - Labs have better hygiene(!) < 0.001
  - Confidence in results < 0.010
  - No need to travel to lab < 0.009
  - Extra time & transport costs 0.510
  - Immediate feedback important < 0.003
  - More motivated with POC Tests < 0.001
  - Strengthened Pt/GP relationship 0.010
POCT in GP & the Community
Improving Access to Care:
Group A Streptococcus Testing
to Help Prevent Rheumatic Fever
Improving Access to Care:
Rapid Group A Streptococcus Testing in GP

- Urban General Practice in Whangarei
- Social deprivation; high health needs
- Crowding patient follow-up difficult
- **Trial POCT Group A Strep testing**
  - NDHB lab validation completed
  - T/S test with *QuikRead go*
  - treat positives with penicillin
  - “one stop shop”
  - rapid tracing of contacts
  - community engagement
• **Evaluation of POCT in Heart Health (EPOCH)**

• Research question: to determine if POCT could improve the number of completed CVD assessments in GP setting

• Primary Goal to compare numbers of completed assessments in 20 practices:
  – 10 practices use Roche cobas b101
  – 10 control practices use lab service

  – **POCTests: HbA1c & Lipids**
Roche cobas b101 locations

Kaitaia
Kaeo
Kerikeri
Kaikohe
Kawakawa
Whangarei (x3)

200 km

Kaitaia
Whangarei
Waipu
WDHB: POCT for 11 Rural Practices
Melanie Adriaansen & Stephanie Williams WDHB

- Goal to improve management of acutely unwell patients
- Troponin, D.dimer, INR, FBC under evaluation
- Improve diagnostic certainty
- Avoid unnecessary ED visits/hospitalisations
- Inform care plans: right care at the right time
- Increase knowledge and skills
- Improve access to lab testing for rural patients
- Reduce anxiety / waiting for test results
- Reduce patients need for travel & treat close to home
13 Practices in WDHB…

7 Main Practices:
1. Wellsford Medical Centre
2. K Kawau Bay Health
3. Kowhai Surgery
4. Kumeu Village Medical Centre
5. The Doctors (Huapai) Limited
6. Waimauku Doctors
7. Kaipara Medical Centre

6 Satellite Practices:
1. Matakana
2. Maungaturoto
3. Paparoa
4. Snells Beach
5. Mangawhai
6. Silver Fern Medical
Challenges for Rural & Community POCT

- **Usability** of devices
- **Acceptability** in the clinical setting
- **POCT needs QMS to be sustainable**
  - supplier support for devices/QC etc
  - novelty value diminishes
  - staff changes & workload increases
  - willing to use the instrument & do QC
- **POCT must be integrated**:  
  - with patient pathway
  - results integrated with EMR
- **POCT must be affordable &**
- **POCT must improve the patient experience**
POCT Evaluation in Hokianga

- Rawene Hospital 2 hours to Whangarei
- High deprivation; no lab service
- i-STAT Analyser:
  - Blood gases Biochemistry, TnI, BNP
  - POCT implemented with NDHB QMS:
    - Staff Training & QC programme
    - Oversight by NDHB
  - Outcome:
    - Improved patient disposition & diagnostic certainty
    - Cost to Rawene $90K incl some longer bed stays
    - Net saving to NDHB in reduced transfers/costs $362K p.a.

Point-of-Care Testing: a new definition, a new paradigm

Point-of-Care Testing
Patient
Optimised
Controlled
Testing
Point of care testing in Rural Northland

Nurse Practitioner Catherine Beazley
Hokianga Health
Historically
CoaguChek
• “We need to do things differently to address the impending tsunami of escalating demand for services. Specifically, we need to be dealing with health needs more effectively ‘upstream’, in the primary and community setting.”

(NDHB, 2012)
iSTAT

- Chemistry
- cTnI
- INR
- BNP
- Blood gases
Quality Control

• All tests require evidence and ongoing monitoring
• Nurse led
• INR – six monthly
• iSTAT – daily simulator check; quality testing with new supplies
Associated costs

- INR – test strips (<$10)
- iSTAT – cartridges ($10 - $35)
- Question who covers the costs
- Time to encourage funding into primary care to support development
Hokianga
Te Kohanga o Te Tai Tokerau
‘Nesting place of Northern people’
“Everything you wanted to know about Point-of-Care Testing in Rural and General Practice but were afraid to ask!”

- Vast scope & scale of POC testing
- Diverse applications & settings
- Seek advice about devices, tests & QA
- New technologies easy to use & reliable
- Can help diagnosis, referral & monitoring
- Patients are more engaged & motivated
- Can improve access & improve outcomes
Acknowledgements

• Dr Peter Chapman Smith
• Organising Committee Rotorua General Practice Conference and Medical Exhibition
• Melanie Adriaansen, WDHB
• Stephanie Williams, WDHB