



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



**NP Catherine
Beazley**
Nurse Practitioner
Hauora Hokianga

Saturday, June 10, 2017

(Room 8)

11:00 - 11:55 WS #116: Everything You Wanted to Know About POC Testing and Were Afraid to Ask

12:05 - 13:00 WS #128: Everything You Wanted to Know About POC Testing and Were Afraid to Ask (Repeated)



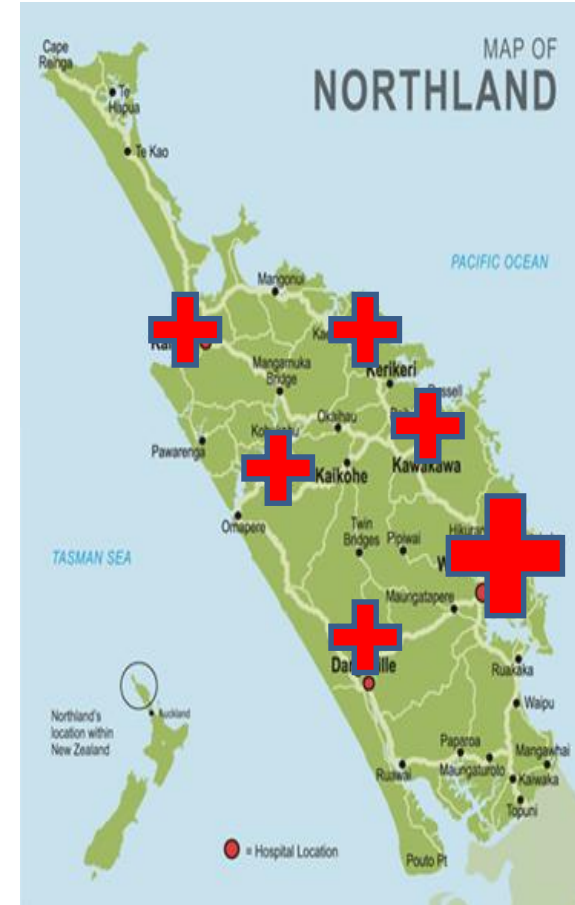
Everything you wanted to know about Point-of-Care Testing in Rural and General Practice but were afraid to ask!

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)

Middle Ages Uroscopy Wheel

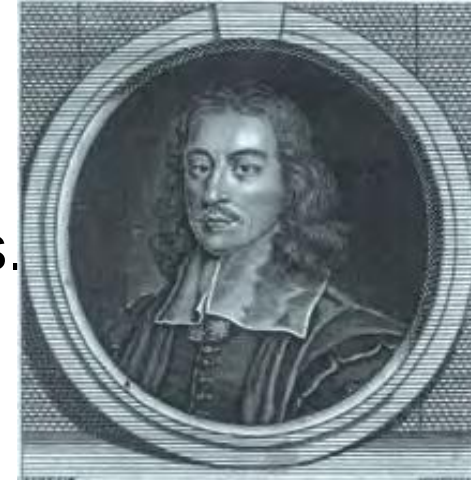


Uroscopy:
colour
odour
turbidity
volume
viscosity
taste
sweetness

Dr Thomas Willis (1621-1675)

Pharmaceutice rationalis (1674)

- Uroscopy at work!
- Willis was first to diagnose diabetes by the sweet taste of urine of diabetic patients.
- Proposed the sweetness first appeared in the blood and later the urine.
- *“we meet with examples of this disease ... the urine of the sick is wonderfully sweet or hath a honey taste...”*
- He was the first to add ‘mellitus’ to the word diabetes
 - Greek word for honey to distinguish it from diabetes insipidus



POC Diagnostic Testing

19th Century Guy's Hospital, London

- 1830 first UK hospital lab set up **in two designated ward side rooms** *Lancet* 1883; 1:956
- Diagnostic chemical analyses performed by medical students **near to the patient**
- Dr Richard Bright
- Dr Thomas Addison
- Dr Thomas Hodgkin



Dr Richard Bright 1789 -1858

Buttner 1992 Eur J Clin Chem Clin Biochem Vol 30 (10) 585-93

- 1827 Guy's Hospital correlated oedema, albuminuria, kidney pathology
- POC test using
“a candle and a teaspoon”
- “Bright’s disease” = glomerulonephritis
- 1842 research lab for renal diseases



Dr's Personal Travelling Kit Clinitest



20th Century Urine Test Results

Colour	Pale yellow to amber	Read at:
Blood	NIL	60 sec
Glucose	NEG	30 sec
Protein	NEG	60 sec
Nitrite	NEG	60 sec
Leucocytes	NEG	2 min



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 **I**ntant
Testing for **H**ealth



GP/ ED B-hCG
Creatinine



GP/ED
Troponin BNP



OR/Theatre
Blood Gases TEG



GP / Clinic:
HbA1c;
Alb/Cr ratio



GP / Pharmacy
Lipids / INR



GP/Home
Glucose

Key question for any POCT proposal

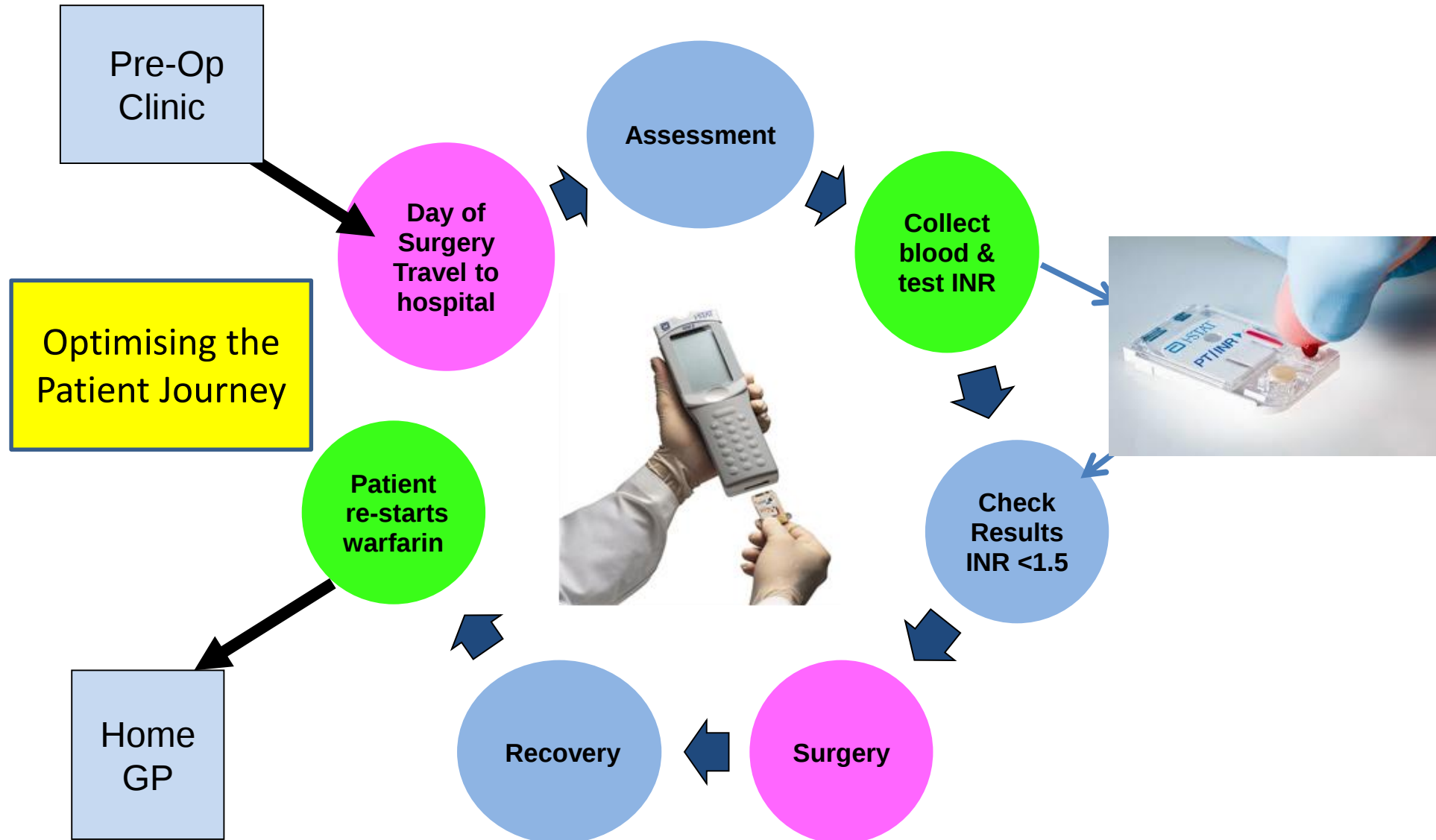
NZPOCTAG Best Practice Guidelines for POCT;2014

“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



Ethics and Patient's Perspectives of POCT: should we worry about access & accuracy?

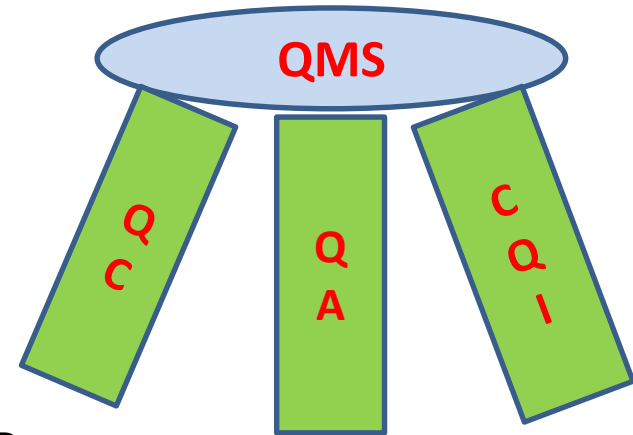
- **Patient Rights Documents:**
Australia, Canada, NZ, UK, US, WHO
- **POCT must comply with patient's rights (NZ):**
 - Right 1 Respect
 - Right 2 Freedom from discrimination
 - Right 3 Dignity
 - Right 4 Standards of care
 - Right 5 Effective communication
 - Right 6 Fully informed



Health and Disability Commissioner
Te Toihau Hauora, Hauātanga

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**

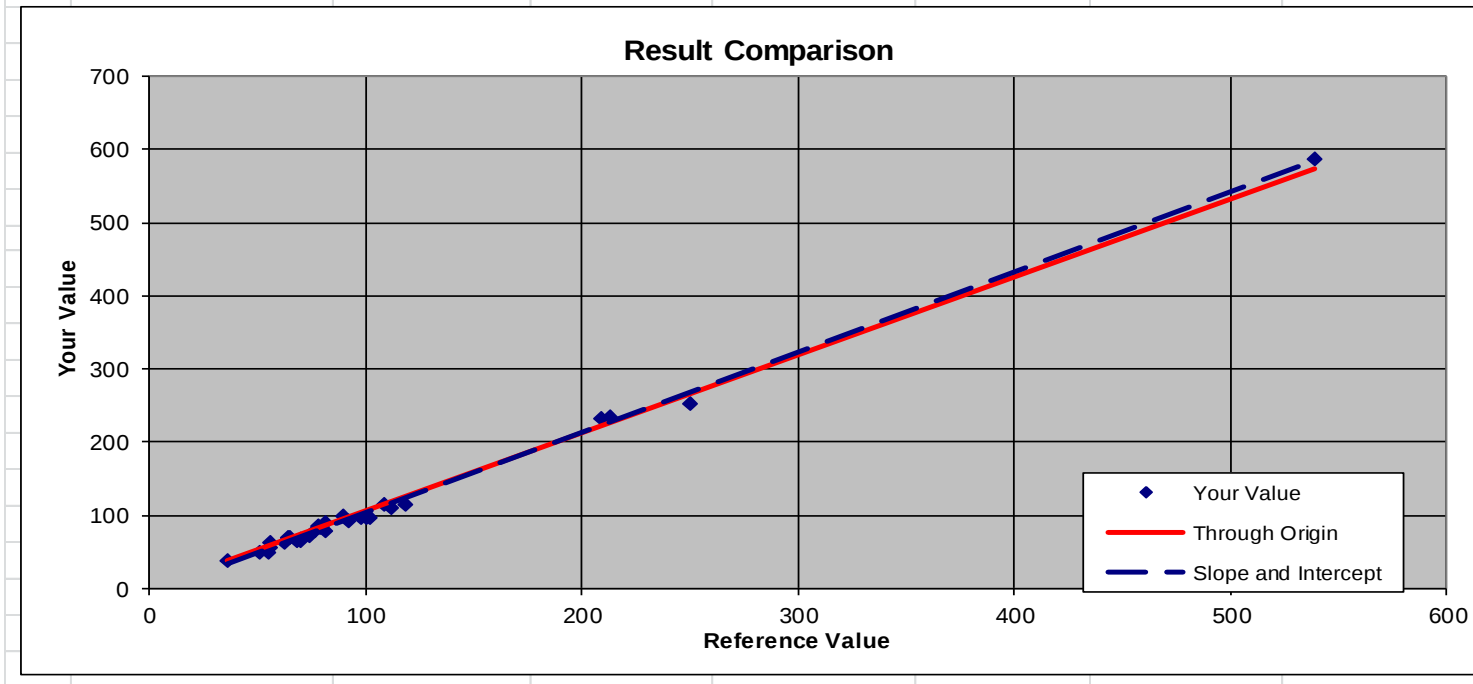


(1) Musaad and Herd *NZMJ* 2013; 126: No1383
(2) Herd and Musaad *NZMJ* 2015; 128: No1471

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)
- $n = 31$; $r^2 = 0.9968$; slope = 0.9119; intercept = 5.8
- Important range for safety decisions is 100 - 150 umol/L



NDHB POC HbA1c Waikato EQA Results: Siemens DCA Vantage x5 OPD Locations

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



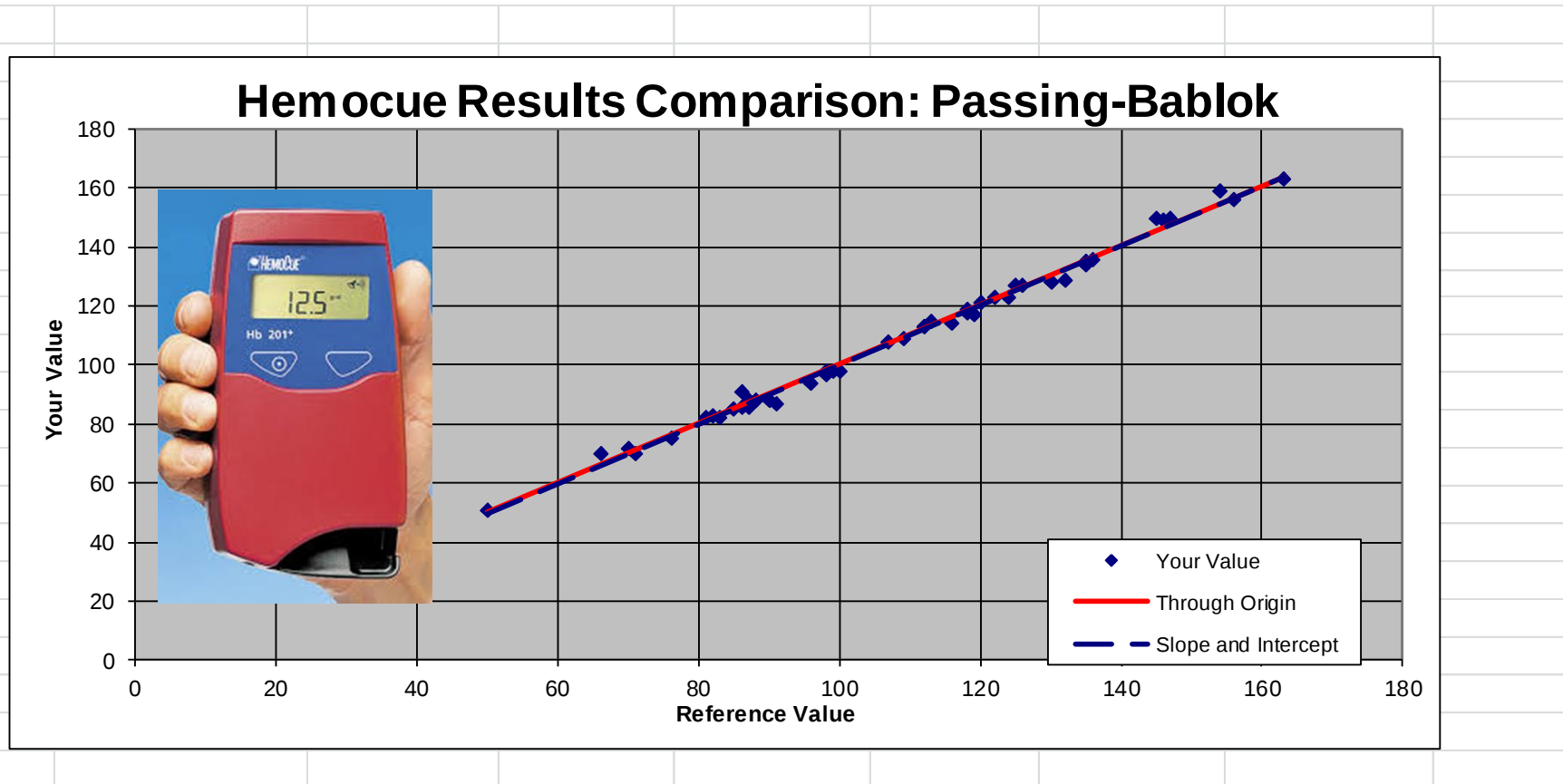
**POCT HbA1c results can be
accurate and reliable**

Method Validation: POCT Hemoglobin

Hemocue v Sysmex XT

Haemoglobin range 50 -163 g/L

- $n=50$; $r^2=0.9945$; slope=0.9909; int=0.7164



Australian POCT in GP Trial

Bubner et al 2009 MJA **190**; 624-626



- 18 month cluster RCT
- 53 practices: 4968 patients
 - 30 practices: 3010 patients – POCT
 - 23 practices: 1958 patients – control Lab T
- Patients:
 - T2 diabetes
 - Hyperlipidaemia
 - Warfarin
- POC tests:
 - HbA1c, urine ACR
 - Chol, HDL Chol, Trig
 - INR

Clinical effectiveness:

Bubner et al 2009 MJA **190**; 624-626

Percentage of patients with results within target range

POC Test	Intervention	Control	Difference
HbA1c	65.5	56.2	9.3
ACR	72.4	74.2	3.2
Total Chol	38.7	21.6	17.0
Trig	70.9	68.8	2.0
HDL Chol	73.5	82.7	-9.2
INR	57	61.5	-4.5

Australian POCT in GP Trial

Patient Satisfaction

Laurence et al 2010 BJGP 60; e98-e104

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



Current & Future Use of POCT in Primary Care Survey

Howick et al *BMJ Open* 2014;

- 2770 primary care respondents in 5 countries
- Common tests: glucose, urine dipstick & B-hCG
- POCT usage differs by country:
 - USA: 60% test for influenza v 7% in Aust
 - USA: 86% test for Group A Strep v 6% in Aust
 - USA: 83% test for FOB v 6% in Aust
 - 43 - 48% test for INR in UK, USA and Aust
 - 1% test for INR in Netherlands and Belgium

Current & Future Use of POCT in Primary Care Survey

Howick et al *BMJ Open* 2014;

- POCT usage depends on:
 - reimbursement
 - costs
 - space, logistics
 - staff time, expertise,
 - QA
- the POC Tests most needed were:
 - D-dimer,
 - cTN, BNP,
 - HbA1c,
 - Chlamydia,
Gonorrhoea

POCT in Primary Care

Survey results Howick 2014 & [WONCA 2014-15](#)

POC Tests most used

- Urinalysis
- Urine hCG
- Glucose
- INR
- Hemoglobin
- Lipids ([WONCA](#))

POC Tests most needed

- D-dimer
- Cardiac troponin & BNP
- Chlamydia & gonorrhoea
- CRP
- HbA1c ([WONCA](#))
- Cardiac markers
- FBC
- INR
- Electrolytes

Survey POCT in Primary Care

Turner et al Fam Pract 2016 Aug;33(4)388-394

- POCT which may help diagnosis

Condition	Percentage of all conditions (n)	Percentage of respondents
UTI	12.4 (521)	47.0
PE/DVT	11.4 (478)	43.1
Acute cardiac disease	9.2 (387)	25.4
INR	6.7 (282)	17.9
Pregnancy	4.2 (178)	16.1
Anaemia	3.9 (162)	14.6

Survey POCT in Primary Care

Turner et al Fam Pract 2016 Aug;33(4)388-394

- **POCT would help reduce referrals**

Condition	Percentage of all conditions (n)	Percentage of respondents
PE/DVT	21.4 (517)	46.6
Acute cardiac disease	11.2 (271)	24.4
Diabetes	5.5 (133)	12.0
COPD / Asthma	5.0 (122)	11.0
Heart Failure	4.8 (116)	10.5
INR	4.1 (100)	9.0

Survey POCT in Primary Care

Turner et al Fam Pract 2016 Aug;33(4)388-394

- POCT would help management & monitoring

Condition	Percentage of all conditions (n)	Percentage of respondents
INR	16.7 (547)	49.3
Diabetes	16.0 (527)	47.5
Acute & chronic renal failure	7.0 (230)	20.7
COPD / Asthma	6.8 (223)	20.1
Lipid disorder	4.7 (154)	13.9
Hyper/hypothyroidism	3.7 (121)	10.9

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

**POCT in GP & the Community
Improving Access to Care:
Group A Streptococcus Testing
to Help Prevent Rheumatic Fever**

Sore throats matter

if your **child** has a **sore throat** see a **doctor or a nurse**

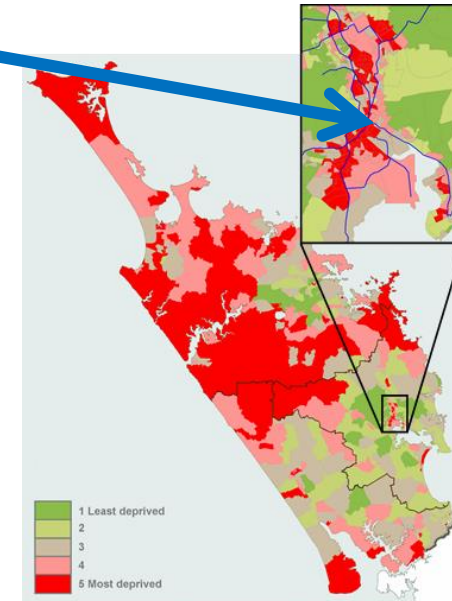
A Healthier Northland
He Hauora Mo Te Tai Tokerau

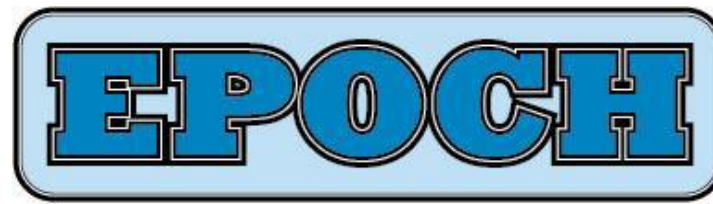
NORTHLAND DISTRICT HEALTH BOARD
Te Poari Hauora A Kōhe O Te Tai Tokerau



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





Wells et al 2016 PLOS in press

- Improving Access to Care: Aug14 – May 15
- 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 conventional laboratory services



Roche cobas b101 locations



New Zealand Community Pharmacy Anticoagulation Monitoring Service

“better, sooner more convenient”

- CPAMS Steering group **governance & oversight**
- **Training & certification system for staff with QC/QA**
- **Roche Coaguchek INR** now in 140 pharmacies
- INR OnLine to monitor results & calculate doses



CPAMS Review 2011: 671 pts

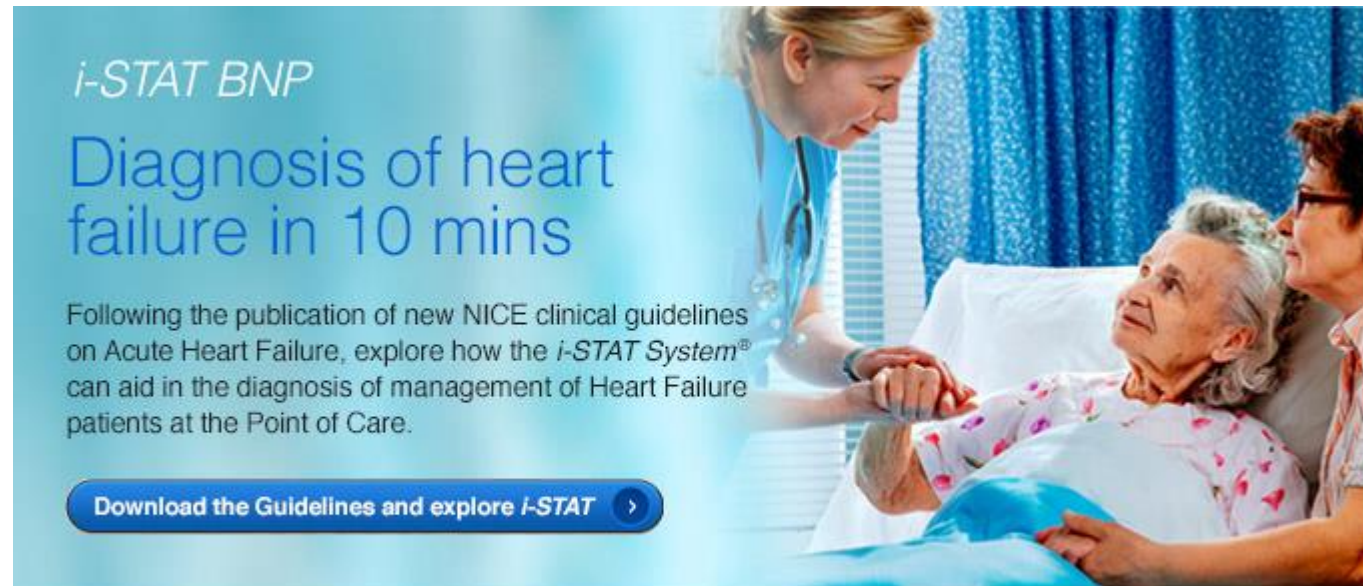
- **Mean Time in Therapeutic Range (TTR): 78.6%**
 - 79.4% for patients in CPAMS for 16 weeks
 - 80.2% for patients in CPAMS for 26 weeks
 - all pharmacy sites TTR range 71.4% to 84.1%
 - NB: recommended target TTR is > 60%.
- **Patient satisfaction surveys:**
 - 98% of patients preferred capillary blood test v venepuncture
 - 97% of patients found the service more convenient
 - 94% of patients stated that it saved time.
- **GPs ~ 89% felt that pharmacist could manage warfarin**
- **Less fragmentation of care, relationships strengthened**



Does POCT cost more than Lab ?

Example: Heart Failure BNP testing

Answer: Not always! c

An advertisement for the i-STAT BNP test. It features a photograph of a healthcare professional in a blue uniform attending to an elderly patient in a hospital bed, with a family member standing by. The background is a soft blue gradient. Text on the left side of the image provides information about the test and a link to download guidelines.

i-STAT BNP

Diagnosis of heart failure in 10 mins

Following the publication of new NICE clinical guidelines on Acute Heart Failure, explore how the *i-STAT System*[®] can aid in the diagnosis and management of Heart Failure patients at the Point of Care.

[Download the Guidelines and explore *i-STAT*](#) >

POCT BNP cost per test versus Lab

- **POCT BNP**

- cost per test \$25
- QC: x2 acceptance
- x2 QC tests / month
- 25 test box: \$625
- \$625 / 21 patient tests



- **\$30 per reportable**

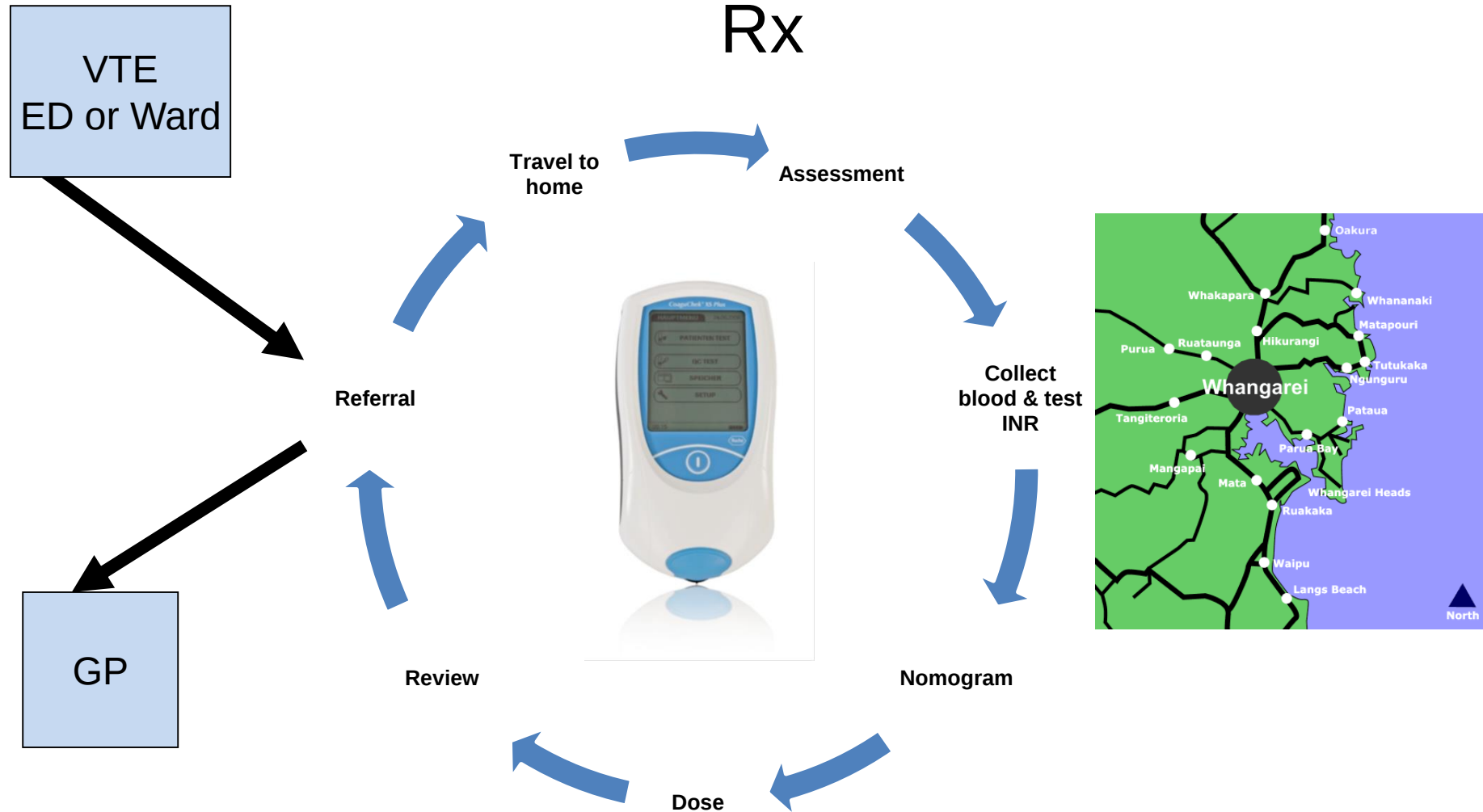
- **Lab BNP**

- cost per test \$25
- QC: two levels daily
- 60 QC tests / month
- 100 test kit: \$2500
- \$2500 / 40 patient tests



- **\$62 per reportable**

Cost-effectiveness and Optimising the Patient Journey: Community POC INR and Warfarin Rx

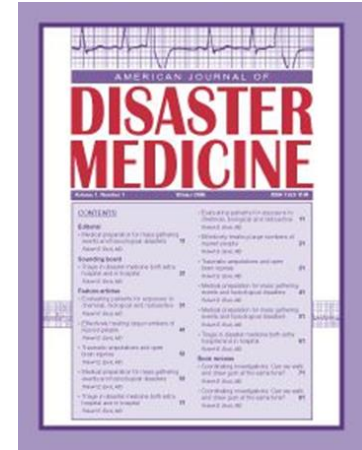


“better, sooner more convenient”

POCT Devices & Disaster Preparedness

CLSI Emergency and Disaster POCT: Approved Guideline 2014

- NDHB i-STAT analysers x9
- Glucose meters ~140
- Urinalysis & urine B-hCG
- BGas, Biochem, TnI, BNP, Coagulation



Location	i-STAT	Glucose meters
Kaitaia	x1	x20
Hokianga	x1	x5
Kawakawa	x1	x20
Dargaville	x1	x20
Whangarei	x5	x80



Kost, Tran et al *Am J Clin Pathol* 2006;126:513-520

Point of Care Testing Goes Bush

Melanie Adriaansen
Stephanie Williams

Waitemata DHB
May 2017

WDHB: POCT for 11 Rural Practices

Melanie Adriaansen & Stephanie Williams WDHB

- Goal to improve management of acutely unwell patients
- Troponin, D.dimer, INR, FBC
- 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. Kawau Bay Health
3. Kowhai Surgery
4. Kumeu Village Medical Centre
5. The Doctors (Huapai) Limited
6. Waimauku Doctors
7. Kaipara Medical Centre

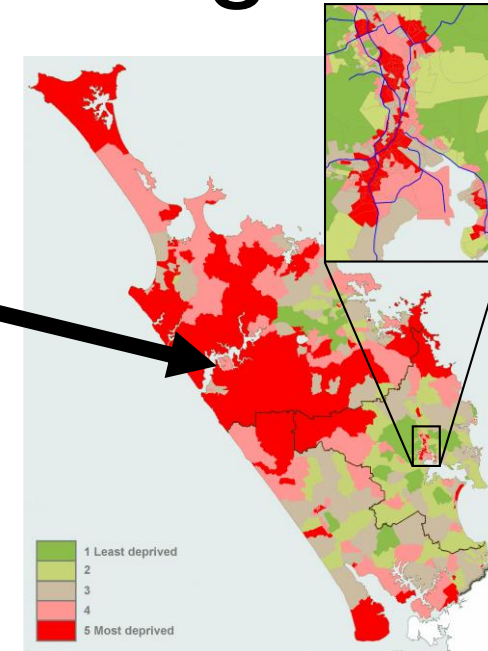
6 Satellite Practices:

1. Matakana
2. Maungaturoto
3. Paparoa
4. Snells Beach
5. Mangawhai
6. Silver Fern Medical



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.**



Blattner K, et al. Changes in clinical practice and patient disposition following the introduction of point-of-care testing in a rural hospital. *Health Policy* 2010a;96:7–12

Blattner K, et al Introducing point-of-care testing into a rural hospital setting: thematic analysis of interviews with providers. *J Primary Health Care* 2010b;2 (1):54–60.

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

P

Patient

O

Optimised

C

Controlled

T

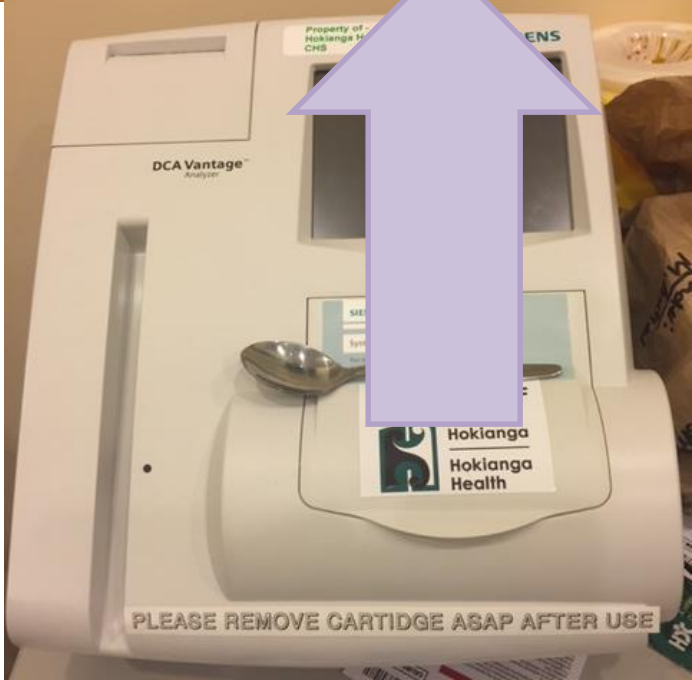
Testing

A scenic landscape featuring a large body of water, likely a lake or bay, with a range of mountains in the background. The sky is blue with scattered white clouds, and the sun is shining brightly, creating a shimmering reflection on the water's surface. In the foreground, there are green grassy areas and some dark, silhouetted trees and bushes. The overall atmosphere is peaceful and natural.

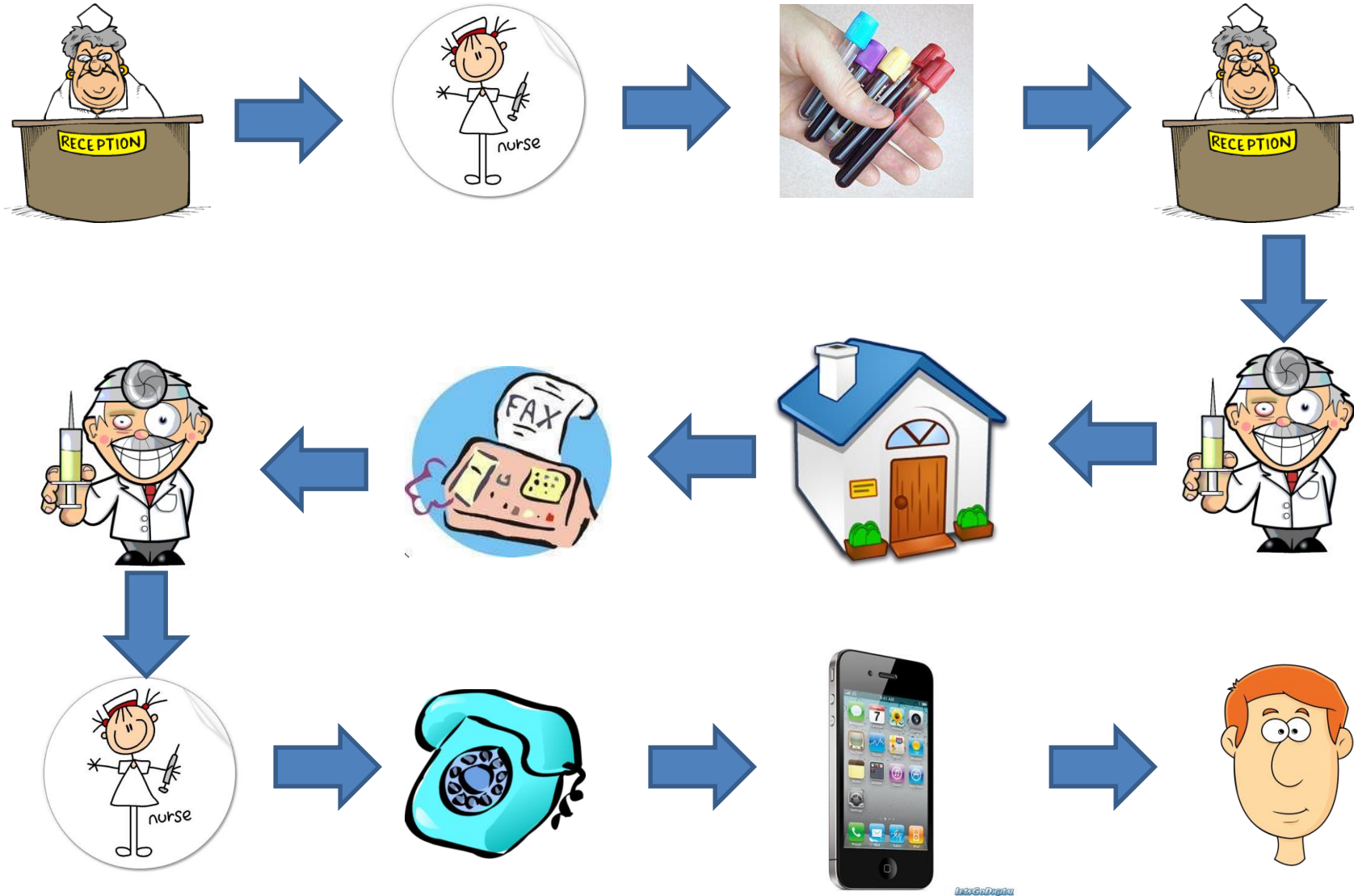
Point of care testing in Rural Northland

Nurse Practitioner Catherine Beazley
Hokianga Health

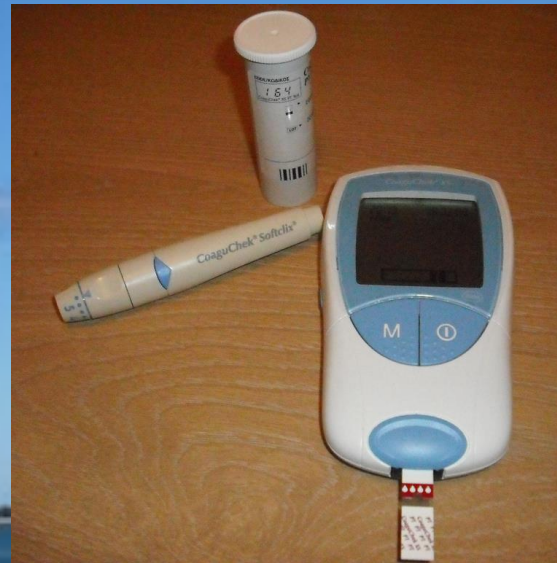




Historically



CoaguChek



DHB – Northland Health Services Plan

- “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

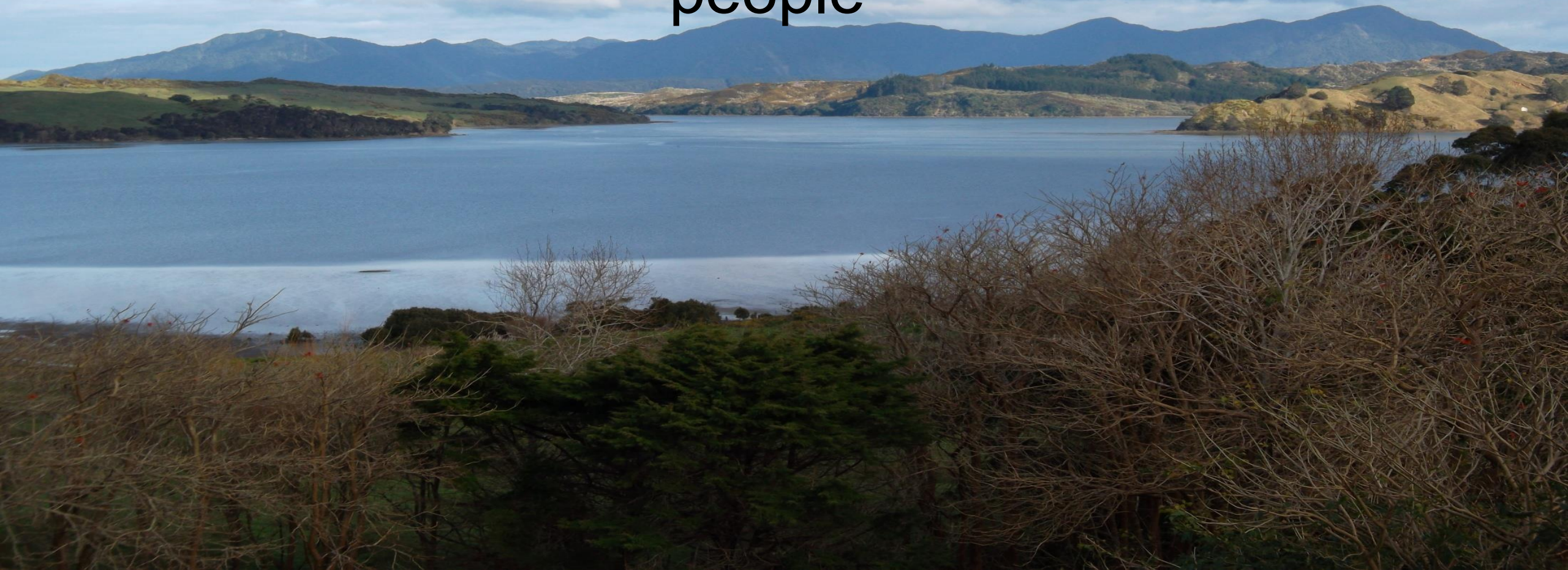
Associated costs

- 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
- 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

