Northern Territory Point-of-Care Testing Program

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CQI Collaborative, Darwin
14 November 2017

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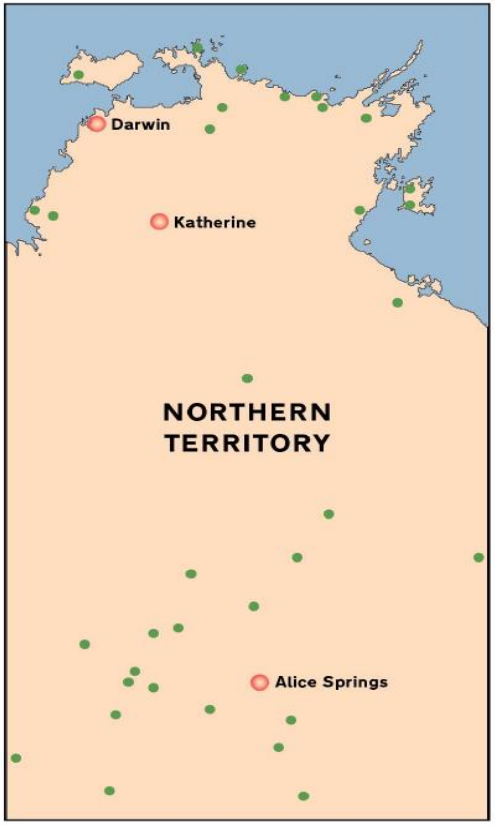
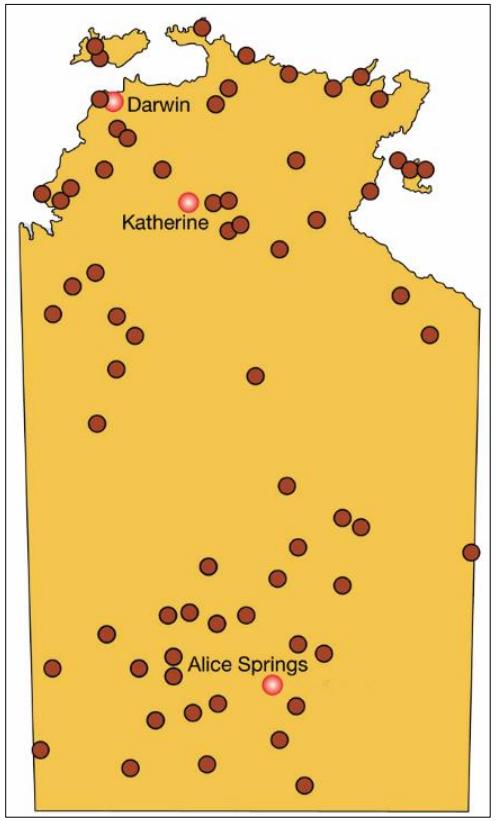
NT POCT Program – Impact & Growth



2008-2015

The Program started with 25 Remote Health Services in 2008
Expanded to 34 Services by 2015
(30 DoH & 4 ACCHS)

In 2015 approximately **1000 i-STAT tests** per month across Territory



2016 - 2018

After coroner's recommendation
Every NT remote health service included in the Program
72 Remote Health Services
50 DoH (25 CA and 25 TE)
+ 22 ACCHS

In 2017 almost **3000 i-STAT tests** per month across Territory

CG4+ = 10%
Troponin I = 17%
Chem8+ = 20%
INR = 43%

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NT POCT Program – Workforce Capacity

Annual number of operators trained has more than doubled since expansion of program

- 2008 to 2015 = 125 staff trained on average
- 2016 = 328 staff trained
- 2017 = 322 staff trained (to October 2017)
- Total over 1400 staff trained since 2008

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NT POCT Program – Current CQI Activities

POC Training & Competency Assessment - involves a theoretical and practical assessment to comply with best practice guidelines for POCT in Australia*

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I-STAT POINT-OF-CARE TESTING PROGRAM

i-STAT WRITTEN COMPETENCY ASSESSMENT FOR NEW STAFF

Your Name:	
Contact email address:	
Health Service Name/ Position:	
Preferred (4-digit) i-STAT Operator ID:	

Please tick your selected answer(s).

Q1. **Which of the following statements is FALSE?**
- ❑ A cartridge must be warmed up to room temperature for at least 5 minutes before use
- ❑ A cartridge can be returned to the fridge after it has been at room temperature
- ❑ A cartridge can be stored at room temperature for up to 14 days

Q2. **What is the preferred sample type for an INR test?**
- ❑ Venous whole blood in an EDTA tube
- ❑ Capillary sample, after wiping the first drop away
- ❑ Capillary sample, using the first drop

Once complete submit to fax: 08 8201 7666 or email: i-stat@flinders.edu.au

Q3. **What action do you take if your QC result is in the RED zone?**
- ❑ Proceed with caution
- ❑ Continue patient testing
- ❑ Stop testing and call the Flinders iCPOCT unit to discuss results and troubleshooting

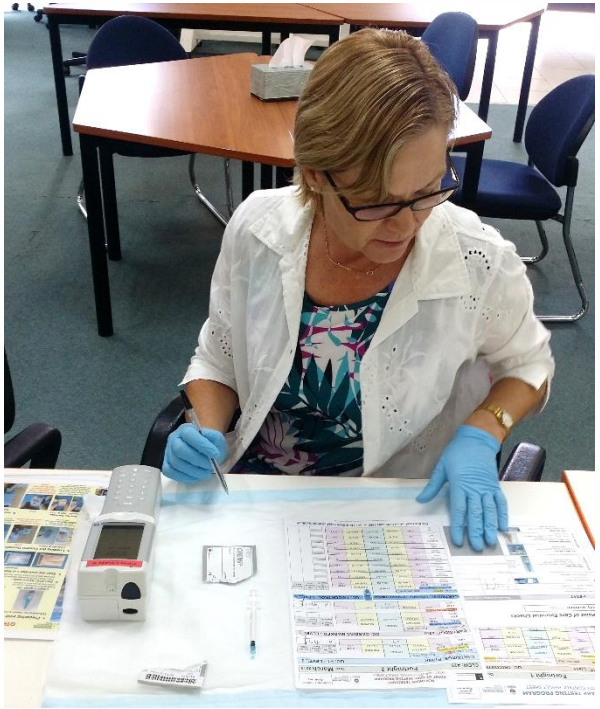
Q4. **What is the preferred patient sample type for a test on the Chem8+ cartridge?**
- ❑ Venous whole blood in an EDTA (purple top) collection tube
- ❑ Venous whole blood in a lithium heparin (green top) collection tube
- ❑ Capillary sample, using the first drop
- ❑ Removing the needle & loading directly from the syringe

Q5. **A Troponin I test was performed on a patient suspected of having a cardiac event. The result obtained was 0.09ng/mL. This result is:**
- ❑ Clearly negative, the person has not had a cardiac event
- ❑ Clearly positive, and should be reported to the doctor immediately
- ❑ 'Indeterminate', so the patient needs to have their troponin I tested serially

Q6. **Which of the following statements is TRUE?**
- ❑ A cartridge can be removed from the i-STAT when it is turned OFF
- ❑ A cartridge can be removed from the i-STAT ONLY when "Remove Cartridge" is visible on the screen
- ❑ Both of the above

Q7. **What is the operational temperature range of the i-STAT device?**
- ❑ 16 to 30ºC
- ❑ 1 to 50 ºC
- ❑ Any temperature, there is no operational temperature range for the i-STAT device

Q8. **When performing the INR QC test, once the activator liquid is added to the powder how long should the solution be mixed for?**
- ❑ 3 minutes
- ❑ 30 seconds
- ❑ 90 seconds



*Badrick T, Badman S, Burnet L, Demediuk N, Faoagali J, Harman P, Griffen A, Harrison M, Martin C, McKenzie P, Shephard M, Tirimaaco R, Wale J, Stewart P, Whiley M. 2015. Guidelines for Point of Care Testing. (First edition 2015). NPAAC Best practice guidelines. Australian Government Department of Health, Canberra, Australia.

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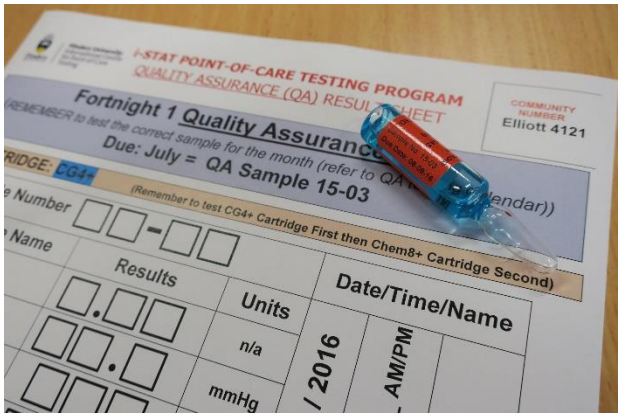
NT POCT Program – Current CQI Activities

Testing both Quality Control (on every i-STAT device) and External Quality Assurance Testing (at selected hubs) complies with National POCT guidelines*

Table – Representative example of Quality Control testing results for the i-STAT

Analyte	n	Target	i-STAT QC Mean	i-STAT QC CV%	Lab Median CV%
Sodium	233	122.0	121.5	0.6%	0.9%^
Potassium	233	2.9	2.9	0.8%	1.4%^
Chloride	235	72	73	1.2%	1.2%^
Glucose	231	15.0	15.1	1.0%	2.1%^
Urea	233	19.3	19.3	2.6%	2.5%^
Creatinine	234	335.5	336.8	2.9%	2.7%^
pH	230	7.04	7.05	0.2%	1.4%*
Lactate	229	7.1	6.9	2.4%	4.6%*
Troponin I	196	0.34	0.31	7.0%	7.7%^



*Badrick T, Badman S, Burnet L, Demediuk N, Faoagali J, Harman P, Griffen A, Harrison M, Martin C, McKenzie P, Shephard M, Tirimaaco R, Wale J, Stewart P, Whiley M. 2015. Guidelines for Point of Care Testing. (First edition 2015). NPAAC Best practice guidelines. Australian Government Department of Health, Canberra, Australia.

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NT POCT Program – Current CQI Activities

POC connectivity enables surveillance of all i-STAT tests conducted across the Territory, which allows monitoring and reduces wastage/errors + improves patient safety.

Date - Time	Patient ID	Location	Operator ID	Serial Number	Panel	Received Date - Time
10/03/16 10:49:31	0534342	Milingimbi	2009	309806	PT	10/03/16 11:03:31
10/03/16 11:15:00	21091968	Yulara	8245	330802	CHEM8+	10/03/16 11:17:00
10/03/16 11:18:41	0295984	Oenpelli	3802	327117	PT	10/03/16 11:44:41
10/03/16 11:36:33	0616153	Engawala	8055	373502	PT	10/03/16 11:52:33
10/03/16 12:34:04	17071950	Balgo KAMSC	3569	359354	PT	10/03/16 12:39:04
10/03/16 10:24:21	0530656	Gapuwiyak	2341	309814	PT	10/03/16 12:39:21
10/03/16 11:08:32	0654168	Titree	7086	309813	PT	10/03/16 13:23:32
10/03/16 13:19:12	0450091	Oenpelli	7952	327117	cTnI	10/03/16 13:30:12
10/03/16 13:04:19	0450091	Oenpelli	7952	327117	CHEM8+	10/03/16 13:30:19
10/03/16 13:51:18	0438176	Angurugu	8095	305652	PT	10/03/16 13:56:18
10/03/16 14:01:18	301066	Titree	7086	309813	CHEM8+	10/03/16 14:06:18
10/03/16 13:55:46	301066	Titree	7086	309813	CG4+	10/03/16 14:06:46
10/03/16 14:36:28	0288754	Oenpelli	7903	327117	PT	10/03/16 14:42:28
10/03/16 14:20:07	0036673	Palumpa	3632	375616	PT	10/03/16 14:48:07
10/03/16 14:28:18	0204305	Palumpa	3632	375616	PT	10/03/16 14:48:18
10/03/16 12:49:09	0503647	Numbulwar	2943	309803	cTnI	10/03/16 15:10:09
10/03/16 12:44:28	0503647	Numbulwar	7790	309803	CHEM8+	10/03/16 15:10:28
10/03/16 13:49:30	0503647	Numbulwar	2943	309803	CG4+	10/03/16 15:10:30
10/03/16 13:06:40	0507575	Numbulwar	2943	309803	cTnI	10/03/16 15:10:40

Method: i-STAT

Viewer last updated: 31Oct2017 15:22

Total results in viewer: 35554

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NT POCT Program – Current CQI Activities

Monthly Feedback Reports to HCMs and DMs provides CQI recommendations to each health service on patient testing, training, errors, QC and QA testing
+ assists with ordering i-STAT stock (reduces wastage)

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i-STAT Feedback Report

Jul-16

XX Health Centre

Total Tests by Cartridge Type (current month)

Total Cartridges	Errors	Chem8+	CG4+	PT/INR	Troponin I
50	2	10	5	25	8

Average Monthly Usage (past 3 months)

Total Cartridges	Chem8+	CG4+	PT/INR	Troponin I	
50	12	6	24	8	(Use for monthly ordering)

Total Tests by Operator

	Operator Name	Total Cartridges	Successful Tests	Unsuccessful Tests/Errors	% Errors	Competency Expiry Date	
	Jane Doe	25	23	2	8%	25/07/2018	
	Joe Bloggs	20	20			1/05/2016	(if RED update training is required)
Temp ID User	Fred Flinstone	5	5			25/07/2018	
	Temp ID Usage	5	5	0	0		
	Total Tests	50	48	2	4%		
Percentage of untrained operator use		10%					

Total Errors by Type

Cartridge Handling	Insufficient Sample	Overfilled Cartridge	Unable to Position Sample	Underfilled Cartridge	Thermal Contact	Environment	OTHER	TOTAL ERRORS
				2				2

"Other" Errors described below. A summary of each of these error types is contained at the end of this report.

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NT POCT Program – Current CQI Activities

Publications:

- Shephard MS, Spaeth B, Mazzachi BC, Auld M, Schatz S, Loudon J, Rigby J, Daniel V, 'Design, **implementation** and initial assessment of the Northern Territory Point-of-Care Testing Program', *Australian Journal of Rural Health*, 2012; 20(1):16-21.
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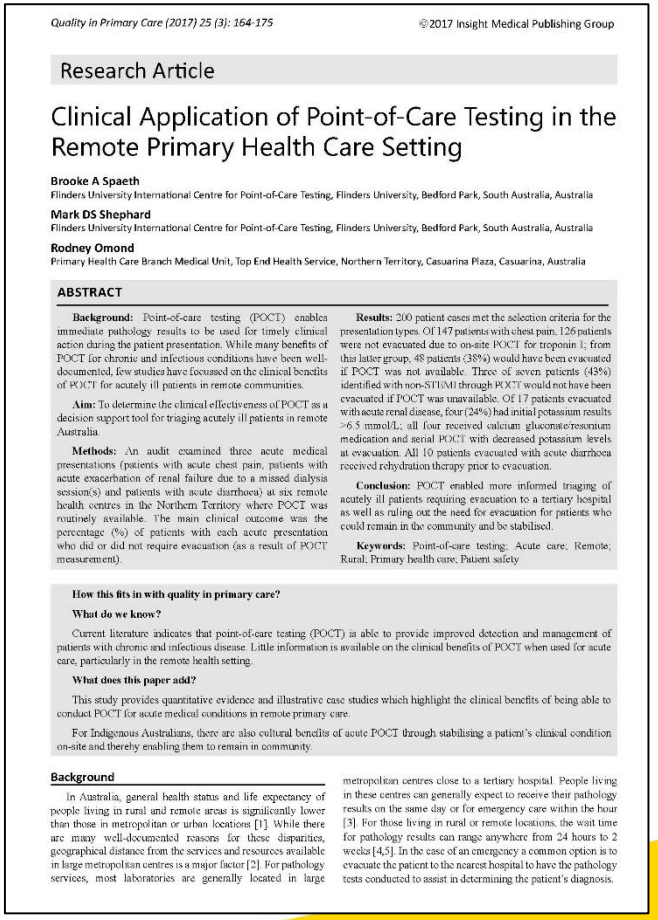
- Spaeth BA, Shephard MDS, Schatz S, 'Point-of-care testing for haemoglobin A1c in remote Australian Indigenous communities **improves timeliness** of diabetes care', *Rural and Remote Health,* 2014; 14: 2849.
- Spaeth BA, Shephard MDS, '**Clinical and Operational Benefits** of International Normalised Ratio Point-of-Care Testing in Remote Indigenous Communities in Australia's Northern Territory', *Point of Care*, 2016; 15(1): 30–34.
- Spaeth B, Shephard MDS, Auld M, Omond R, '**Immediate pathology** results now available for all remote Northern Territorians', Proceedings of the 14th National Rural Health Conference, editor Leanne Coleman, Cairns, Queensland, 26-29 March 2017. Canberra: National Rural Health Alliance, 2017.
- Spaeth B, Shephard MDS, Omond R, '**Clinical Application** of Point-of-Care Testing in the Remote Primary Health Care Setting', *Quality in Primary Care*, 2016; 25(3): 164-175.
- Spaeth B, Kaambwa B, Shephard MDS, Omond R, '**Economic Assessment** of Point-of-Care Testing in the Remote Primary Health Care Setting', submitted to *BMC Health Services Research* 2017.



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Research Article

Clinical Application of Point-of-Care Testing in the Remote Primary Health Care Setting

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ABSTRACT

Background: Point-of-care testing (POCT) enables immediate pathology results to be used for timely clinical action during the patient presentation. While many benefits of POCT for chronic and infectious conditions have been well-documented, few studies have focussed on the clinical benefits of POCT for acutely ill patients in remote communities.

Aim: To determine the clinical effectiveness of POCT as a decision support tool for triaging acutely ill patients in remote Australia.

Methods: An audit examined three acute medical presentations (patients with acute chest pain, patients with acute exacerbation of renal failure due to a missed dialysis session(s) and patients with acute diarrhoea) at six remote health centres in the Northern Territory where POCT was routinely available. The main clinical outcome was the percentage (%) of patients with each acute presentation who did or did not require evacuation (as a result of POCT measurement).

Results: 200 patient cases met the selection criteria for the presentation types. Of 147 patients with chest pain, 126 patients were not evacuated due to on-site POCT for troponin I; from this latter group, 48 patients (38%) would have been evacuated if POCT was not available. Three of seven patients (43%) identified with non-STEMI through POCT would not have been evacuated if POCT was unavailable. Of 17 patients evacuated with acute renal disease, four (24%) had initial potassium results >6.5 mmol/L; all four received calcium gluconate/resonium medication and serial POCT with decreased potassium levels at evacuation. All 10 patients evacuated with acute diarrhoea received rehydration therapy prior to evacuation.

Conclusion: POCT enabled more informed triaging of acutely ill patients requiring evacuation to a tertiary hospital as well as ruling out the need for evacuation for patients who could remain in the community and be stabilised.

Keywords: Point-of-care testing; Acute care; Remote; Rural; Primary health care; Patient safety

How this fits in with quality in primary care?

What do we know?

Current literature indicates that point-of-care testing (POCT) is able to provide improved detection and management of patients with chronic and infectious disease. Little information is available on the clinical benefits of POCT when used for acute care, particularly in the remote health setting.

What does this paper add?

This study provides quantitative evidence and illustrative case studies which highlight the clinical benefits of being able to conduct POCT for acute medical conditions in remote primary care.

For Indigenous Australians, there are also cultural benefits of acute POCT through stabilising a patient's clinical condition on-site and thereby enabling them to remain in community.

Background

In Australia, general health status and life expectancy of people living in rural and remote areas is significantly lower than those in metropolitan or urban locations [1]. While there are many well-documented reasons for these disparities, geographical distance from the services and resources available in large metropolitan centres is a major factor [2]. For pathology services, most laboratories are generally located in large metropolitan centres close to a tertiary hospital. People living in these centres can generally expect to receive their pathology results on the same day or for emergency care within the hour [3]. For those living in rural or remote locations, the wait time for pathology results can range anywhere from 24 hours to 2 weeks [4,5]. In the case of an emergency a common option is to evacuate the patient to the nearest hospital to have the pathology tests conducted to assist in determining the patient's diagnosis.

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NT POCT Program – Clinical & Cost Effectiveness

Research Project Title: Point-of-Care Testing for Better Management of Acutely Ill Remote Patients (Sponsored by Emergency Medicine Foundation -EMF)

- Investigated clinical and cost effectiveness of using the i-STAT as a decision support tool for triaging acutely ill patients
- Focussed on 3 common acute clinical presentations in 200 patients (chest pain [n=147], missed dialysis [n=28] and acute diarrhoea [n=25])
- 6 remote health centres (small, medium, large) with access to POCT
- POCT enabled early diagnosis and treatment for those appropriately evacuated (n=21)
- Access to POCT resulted in the prevention of 60 medical evacuations
- Health Economist extrapolated results to provide Territory-wide estimates of cost savings
- Territory-wide **cost saving of $20.93 million per annum for NT health system** through prevention of unnecessary medical evacuations for just these 3 presentations.
- POCT also delivered **improved clinical outcomes for acutely ill patients** in remote communities.

Emergency Medicine Foundation

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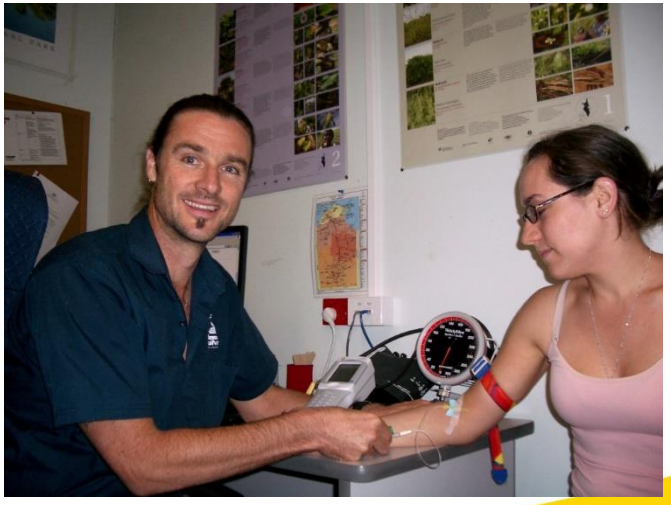
i-STAT – Use in Duty RMP Consultations

Priorities for Duty RMP consultations

- Problem - determines order
- Clinical Observations - T, P, RR, BP
- Other clinical information
- POCT information
- ECG, CXR
- Ring Duty RMP



qaams

- Siemens DCA Vantage POCT device
- HbA1c for diabetes management & diagnosis
- Urine ACR for detection of early kidney disease
- Results in < 7 minutes
- Primarily AHP/AHW trained as operators
- Medicare Rebates Available
- Significant improvements in diabetes control if integrated into clinical practice*

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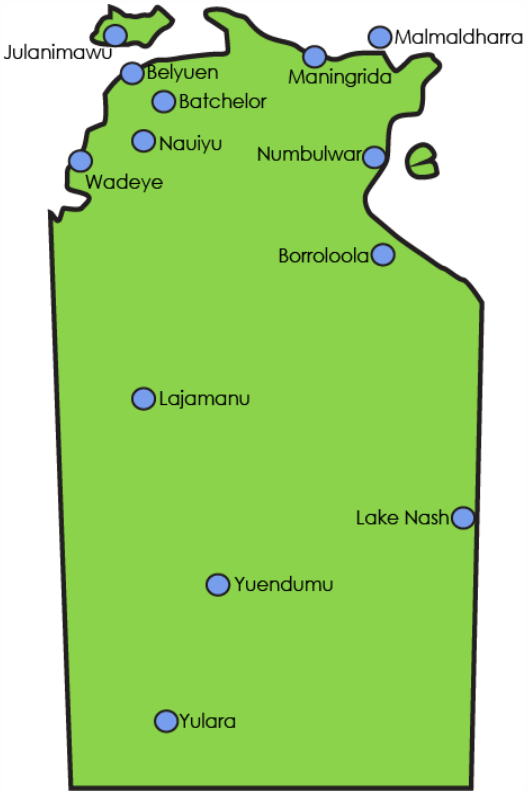
*Spaeth BA, Shephard MDS, Schatz S, 'Point-of-care testing for haemoglobin A1c in remote Australian Indigenous communities **improves timeliness** of diabetes care', *Rural and Remote Health,* 2014; 14: 2849.

NT POCT Program – Future Directions

HemoCue WBC DIFF

- Total and 5-part differential white cell count
  (Lymphocytes, Neutrophils, Monocytes, Basophils, Eosinophils)
- Result in < 5minutes
- Analytically sound in remote environment*
- 2017 evaluation in 13 remote health services in NT to research clinical, operational and cost effectiveness



Reference: Spaeth BA, Shephard MDS, McCormack B, Sinclair G, 'Evaluation of HemoCue white blood cell differential counter at a remote health centre in Australia's Northern Territory', Pathology, 2015; 47(1): 91-95.

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HemoCue WBC DIFF Trial Results

Clinical Effectiveness / Patient Safety:

- Sepsis
- Respiratory infections
- Appendicitis
- Fever + undifferentiated symptoms
- Monitoring Clozapine medication

Cost benefit:

- Cost savings through prevented evacuations = $500,000 across 13 sites over 6 month period

Operational benefits:

- High satisfaction / ease of use
- 37% of FBE pathology reports returned with WCC not reliable / not reported (+ cost benefit)

Quote from Rural Medical Practitioner:
"[The HemoCue WBC DIFF] is a piece of equipment that should be in every remote community."

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NT POCT Program – Future Directions

HemoCue Hb 201+

- Currently no training or quality structure in place (as for the i-STAT)
- Concerns raised regarding reliability of Hb results
- No clinical protocol available to assist with results that do not fit clinical picture
- Confusion between test methods available (HemoCue, i-STAT, Pronto, laboratory)

Thank you to…. all the members of NT POCT Program Management Team

NT DoH

- Dr Rodney Omond
- Dana Dabrowska
- Malcolm Auld
- Tina Quirk
- Casey Vandermeer
- Steve Schatz

+ many other past members

AMSANT

- Margie Cotter

Flinders ICPOCT

- Prof Mark Shephard (chair)
- Brooke Spaeth
- Lauren Duckworth
- Bek Milloss
- Janet Richards

Discussion and Questions?

i-STAT

- Operationally effective
- Cost benefit to NT
- Improved patient safety
- Anything else to investigate?

Other POC tests?

- HemoCue WBC DIFF
- HemoCue Hb 201
- Others e.g. Syphilis, Strep A, Influenza, CRP, Lipids……

QAAMS / DCA Vantage

- How to better incorporate into routine clinical practice?
- Issues with current use?

Thank you