

Clinical and economic advantages of a PoCT laboratory in rural medical practice

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Introduction

Australia is a diverse country with many rural communities challenging the health sector to provide appropriate medical care. There are several issues that create obstacles to providing a successful private general practice clinic in rural Australia. This study will look at two of these (clinical and economic) to assess how a PoCT (Point of Care Testing) laboratory can help.

When ordering a test in rural Australia we must wait for that test to be transported to a major centre before it can be analysed and results obtained. This delay in testing is not as apparent in metropolitan areas. PoCT laboratories offer results in real time when they can have most meaning to both the patient and clinician. This is beneficial both in managing our chronic disease patient population, including completing their cycle of care; and in managing acute presentations including identifying influenza, confirming and treating anaemia and other haematological issues, and antibiotic stewardship.

A private GP clinic predominantly derives its income through that of its medical workforce. This means that without doctors billing there are no income streams. It has always been a challenge to recruit and maintain a doctor workforce in rural places to such an extent that the government has provided differing incentive options to help facilitate this. By not having a stable medical workforce this can create an issue towards managing the ongoing expenses of running a GP clinic. These expenses include rent, administration staff, nursing staff, electricity, phone, consumables, insurance and IT just to name a few. It is very important to diversify income stream as much as possible so as to secure a reliable and continual income stream to cover these expenses. A PoCT laboratory is one such way to achieve this.

Method

A PoCT laboratory in Ingham at Hinchinbrook Health Care was set up in April 2013. Ingham is situated 110kms north of Townsville and 240kms south of Cairns along the Bruce Highway. It has a rural population of approximately 12,000 with sugar cane being the main industry. Hinchinbrook Health Care is a modern, private general practice clinic in the heart of town ranging from 5-7 FTE doctors. The PoCT laboratory offers cholesterol, INR, HbA1c, CRP and Full Blood Count (with 3-part differential) as well as swab testing for Influenza and RSV, and urine tests for ACR. 3 clinical outcomes will be assessed to determine its effectiveness in Rural Practice:

- use of Tamiflu to treat Influenza and the benefits of positive influenza identification
- rates and Outcomes of HbA1c testing in established diabetic populations
- use of CRP in acute presentations in clinical practice.

The economic outcomes will be analysed via a year by year income vs expense with net profit.

Clinical outcomes

Use of Tamiflu to treat influenza

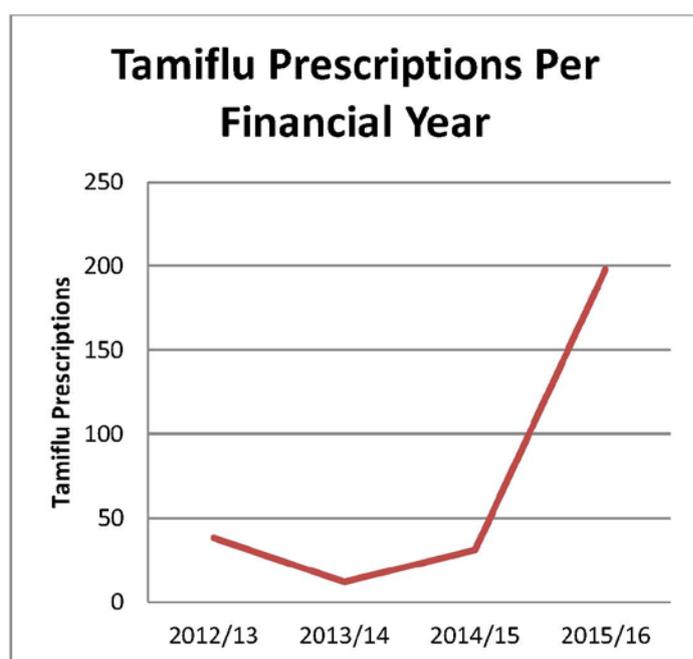
Tamiflu (oseltamivir) is used to treat Influenza A and B infections in people who have had symptoms for 2 days or less and who are older than 2 weeks of age. It only has effect against Influenza A and B—it will not work for other viruses including the common cold. Tamiflu may also be used to prevent influenza in those who have been exposed to it (55%).¹ Tamiflu has been shown to make the symptoms of influenza less severe, shorten the recovery time and reduce the risk of severe complications (44%) and hospitalisation (63%)ⁱⁱ. However, Tamiflu may also have complications including nausea, vomiting, headache and pain (common), and allergy, confusion, shaking, problems with speech, hallucinations and seizures (rare). However, Tamiflu does not reduce hospitalisations or other complications when analysing all people who went to the doctor because of flu-like symptoms.² This means that if your doctor prescribes Tamiflu without giving you a flu test, it is less likely to help you get better. That's because many patients who think they have the flu have a cold instead, and they will not benefit from Tamiflu.

In Ingham, using traditional laboratory methods of flu swab would take 3 to 5 days to get a result. This would mean that use of Tamiflu would be limited due to results not being available within the treatment window period. Hinchinbrook Health Care commenced use of the Sofia Fluorescent Immunoassay Analyser in July 2015. The data of Tamiflu use year by year is shown below.

Table 1 Tamiflu prescriptions year by year

Year	Tamiflu prescriptions
July 2012 – June 2013	38
July 2013 – June 2014	12
July 2014 – June 2015	31
July 2015 – June 2016	198

Chart 1 Tamiflu prescriptions per financial year



This data clearly highlights the benefits to PoCT of Influenza in the rural setting. We are now able to offer real public health measures in the setting of a general practice clinic. We can treat influenza appropriately and offer preventative measures as well. We are able to isolate appropriate patients for appropriate times and limit the spread of influenza in our community.

Rates and outcomes of HbA1c testing in established diabetic populations

There are currently 1.7 million Australians living with diabetes, which is forecast to rise to 3.5 million by 2033. 275 Australians get diagnosed with Type 2 diabetes every day, and by 2023, Type 2 diabetes is expected to be the leading cause of disease burden for men, and the second leading cause of disease burden for women.³

Adults with diabetes are at risk of microvascular disease (retinopathy, neuropathy, and nephropathy), macrovascular disease and cardiovascular disease. Sixty-eight per cent of adults with diabetes will die of heart disease or stroke, and the risk for stroke is 2 to 4 times higher. Sixty-seven per cent have high blood pressure.⁴

By monitoring, responding to information, and then reducing HbA1c levels, the risk of complications associated with diabetes can be reduced.

UKPDS: Tight Glycaemic Control Reduces Complications

Epidemiological extrapolation showing benefit of a 1% reduction in mean HbA_{1c}

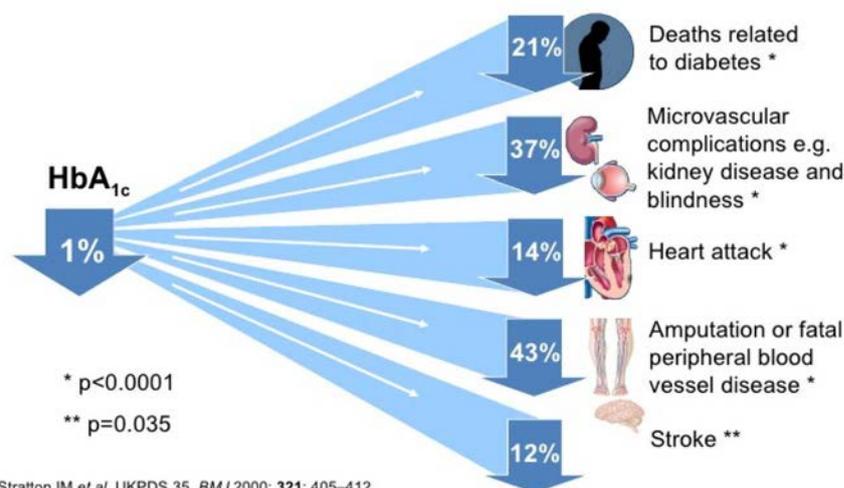


Table 2 looks at HbA1c tests performed for the year 2015 in Australia and at Hinchinbrook Health Care PoCT laboratory.

Table 2 HbA1c tests performed in 2015

Location	Australia	Hinchinbrook Health Care
HbA1c tests performed PoCT	–	579
HbA1c tests performed other labs	–	347
Total HbA1c tests performed	1,161,359 ⁵	926
Populations with diabetes	1,700,000	672
Ratio	0.68	1.38

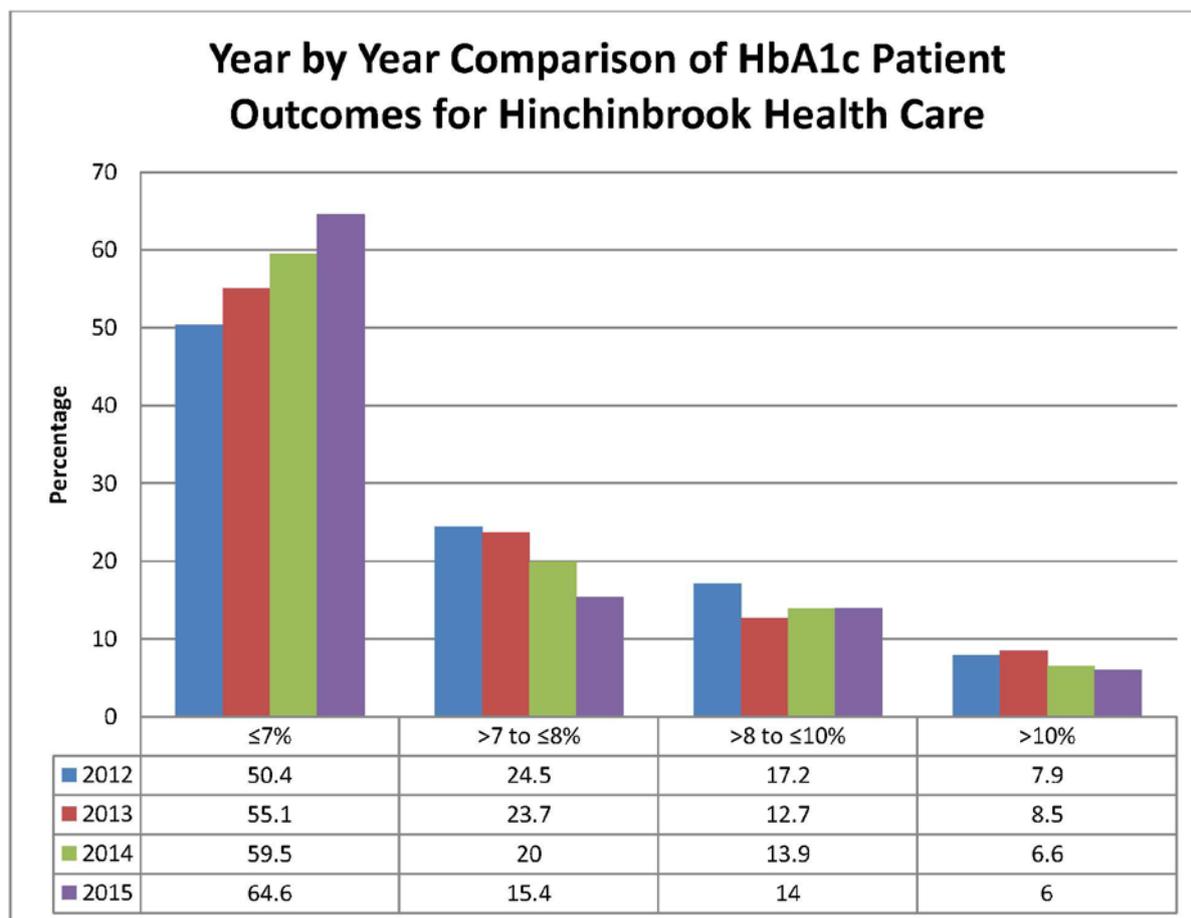
This shows that a PoCT laboratory can be utilised more often for the management of diabetes than the traditional pathology model alone. Greater monitoring of HbA1c allows more opportunity to improve overall diabetic control and reduce secondary complications. The other advantage to use of a PoCT laboratory lies in the fact that the patient is still in the practice when the result is available. This allows for immediate feedback of results which, in the event of a well-controlled patient, allows for positive feedback and encouragement to continue with the good work. In the event of a poorly-controlled patient, modifications to management and education can be immediately undertaken.

The data below shows HbA1c outcomes in the diabetic population of Hinchinbrook Health Care year by year. The data is per patient, not per HbA1c test.

Table 3 HbA1c outcomes for Hinchinbrook Health Care

Year		2012		2013		2014		2015	
		Total	%	Total	%	Total	%	Total	%
HbA1c result	≤7%	255	50.4	279	55.1	324	59.5	419	64.6
	>7 to ≤8%	124	24.5	120	23.7	109	20	100	15.4
	>8 to ≤10%	87	17.2	64	12.7	76	13.9	91	14
	>10%	40	7.9	43	8.5	36	6.6	39	6
Total number of diabetic patients tested		506		506		545		649	

Chart 2 HbA1c outcomes for Hinchinbrook Health Care



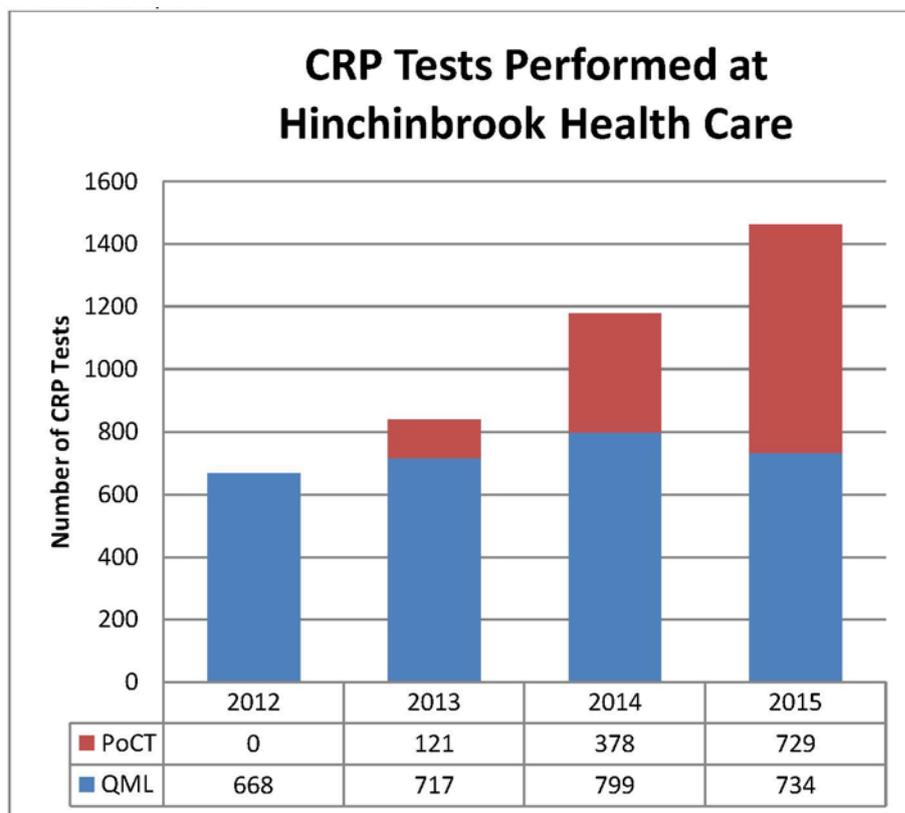
It is clear to see when combining this data that PoCT laboratories allow for greater testing of HbA1c in diabetic patients than the traditional model; and that this increased testing and better access to patients with the results allows for marked improvements in HbA1c levels overall. As the data from the UKPDS trial shows this creates significant improvements in patient outcomes.

Use of CRP in acute presentations in clinical practice

C-Reactive Protein (CRP) is a marker of inflammation and infection in the body. It is not specific and as such rises can be caused by many things including infection and chronic disease. CRP begins to rise within two hours of the onset of inflammation and peaks at 48 hours. It has a constant half-life of 18 hours which allows it to be used to monitor response to treatment.

Whilst CRP testing has had its uses in rural general practice in monitoring chronic diseases such as Rheumatoid arthritis, its use in the acute setting has been limited by the time it takes to get the result. Given that its value changes so quickly—waiting for 2 days for a result offers very little in the acute clinical setting. Chart 3 shows the number of CRP tests performed year by year at Hinchinbrook Health Care both via the traditional laboratory and PoCT laboratory.

Chart 3 CRP tests year by year



This chart shows that the use of CRP has changed little year on year in the traditional laboratory model. This can be explained by its use being mainly for chronic disease monitoring and the PoCT laboratory has not altered this. Where the PoCT laboratory offers a role in use of CRP is as a diagnostic aide with the acute patient. Uses to PoCT CRP include:

- determining types of infections and need for antibiotics:
 - CRP 10-40 favour viral infections

- CRP 40-200 favour bacterial infections
- monitoring response to treatment over time
- aiding diagnosis of some acute presentations—a normal result is very reassuring whilst a high result can alter clinical management.

Another very important clinical reason to look at CRP testing in the PoCT laboratory is that of antibiotic resistance. One obstacle in curtailing antibiotic prescribing in private practice is concerns about adverse effects on patient satisfaction as shown in a study in the UK.⁶ This study concluded that patients were less satisfied in practices with frugal antibiotic prescribing and a cautious approach to antibiotic prescribing may require a trade-off in terms of patient satisfaction. However, another study has shown that when patients are managed with CRP testing antibiotic prescribing is less (43.4% to 56.6%), recovery similar but satisfaction with care was higher in the CRP tested group.⁷ When looking at this study in relation to Hinchinbrook Health Care we found similar results as shown below in Table 4.

Table 4 Antibiotic prescribing rates for Hinchinbrook Health Care

Year	Pre-PoCT laboratory			Post-PoCT laboratory		
	2010	2011	2012	2013	2014	2015
Number of antibiotics* prescribed	3,720	3,888	3,463	2,856	2,689	2,909
Number of visits	9,465	9,150	9,150	9,046	9,047	8,961
Ration (%)	39.3	42.4	37.8	31.6	29.7	32.5
Average (%)		39.8			31.3	

* cephalixin, roxithromycin, cefuroxime, clarithromycin, amoxicillin, cefaclor, doxycycline, ceftriaxone, clindamycin, erythromycin

This shows that antibiotic prescribing has dropped from an average of 39.8% in the 3 years before the PoCT laboratory to an average of 31.3% in the 3 years following its implementation. This is clinically significant with a p-value of <0.01.

Economic outcomes

Rural general practice faces some unique challenges from an economic front. Rural areas are generally lower socio-economic areas and therefore have a higher percentage of pensioners and Health Care Card holders than metropolitan areas. This results in a higher bulk billing rate than clinics in these metropolitan areas. This means that income stream is limited significantly by Medicare rebate levels which have not increased since 2013 and are looking unlikely to increase in the foreseeable future. Added to this, most rural areas are designated “Districts of Workforce Shortage Areas” due to the difficulty of obtaining and retaining medical practitioners. This also places stress on a general practices ability to survive in these areas. Expenses of running a general practice does not stop increasing despite the income stream being limited. These expenses include but are not limited to rent, administration staff, nursing staff, electricity, phone, consumables, insurance and IT. It is important that rural clinics diversify their income stream as much as possible to continue to be sustainable. Table 5 shows the income, expense and net profit from running a PoCT laboratory.

Table 5 Economic results of PoCT laboratory at Hinchinbrook Health Care

Financial year	Income	Expenses	Net profit
2013/14	\$33,392.05	\$5,261.69	\$28,130.36
2014/15	\$74,149.40	\$53,352.40	\$20,797.00
2015/16	\$86,258.65	\$56,502.45	\$29,756.20

This shows that a PoCT laboratory can increase the profit of a rural clinic by between \$20,000 and \$30,000 per year. This has the ability to increase further as test range increases and cost per test decrease.

Conclusions

PoCT laboratories have a significant role to play in both clinical and economic performance of rural general practice. PoCT offers undeniable clinical advantages with acute and chronic disease management, community preventative health and antibiotic usage.

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