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Connecting the Dots of Care: A pilot study linking Aboriginal and/or Torres Strait Islander peoples with diabetes care in hospital, using hospital pharmacists

Susan Welch [a,b,*], Rebekah Moles [b], Alexander Viardot [a,c], Pauline Deweerd [a], Scott Daly [a], Kylie Lee [d,e,f,g,h]

[a] St. Vincent's Hospital, 390 Victoria St., Darlinghurst 2010, Australia
[b] University of Sydney, School of Pharmacy, Faculty of Medicine and Health, Camperdown, Sydney, N.S.W 2006, Australia
[c] Garvan Institute, University of New South Wales, Randwick, Sydney, N.S.W. 2010, Australia
[d] University of Sydney, Addiction Medicine, Faculty of Medicine and Health, Camperdown, Sydney 2006, Australia
[e] The Edith Collins Centre, Camperdown, Sydney, 2006, Australia
[f] Centre for Alcohol Policy Research, La Trobe University, Bundoora, Vic 3083, Australia
[g] Burnet Institute, Melbourne, Vic 3004, Australia
[h] National Drug Research Institute, Curtin University, Perth, WA, 6045, Australia

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ABSTRACT

Background: Diabetes is common among Aboriginal and/or Torres Strait Islander peoples, yet often undetected in hospital.
Objective: To identify how urban hospital pharmacists can detect if Aboriginal and/or Torres Strait Islander patients have diabetes or a higher chance of getting diabetes.
Methods: A multi-methods study used data from patients, and researcher field notes. Aboriginal and/or Torres Strait Islander peoples admitted to hospital over 12-weeks (July–October 2021) were prospectively identified from admissions lists. A hospital pharmacist-researcher visited eligible patients. Consenting participants had their blood glucose and HbA1c checked. Participants with HbA1c > 6.5% (no known diabetes) or 7% (known diabetes) were referred for endocrinology review during their stay. Test results and resultant diabetes plan were shared with their general practitioner. Two days after discharge, participants were called to gauge views on their hospital-based diabetes care. Barcode technology recorded pharmacist time. Voice-recorded field notes were thematically analysed. Ethics approval was obtained.
Results: Seventy-two patients were eligible for inclusion, 67/72 (93%) consented to take part. Sixty-one (91%) patients returned a HbA1c < 6.5, of which, 4/61 (6.5%) returned a HbA1c, 6–6.4. They were contacted to yarn about diabetes prevention. Six of the 67 (9%) qualified for endocrine review, 5 had known diabetes, one newly diagnosed. None were known to endocrinology. All participants telephoned were satisfied with their hospital-based diabetes care. Pharmacist time for initial introductory yarn, consenting process, organisation of HbA1c and results discussion was 20 min or 40 min if referred for endocrine review. Field notes guided understanding of service implementation.
Conclusion: This novel pharmacist-led diabetes screening service for Aboriginal and/or Torres Strait Islander peoples appeared to provide a unique opportunity for screening and referral links in a holistic way. Future research is required to test this model by upscaling to include more pharmacists and other chronic disease screening and referral pathways.

* Corresponding author at: St. Vincent's Hospital, 390 Victoria St., Darlinghurst 2010, Australia.
E-mail addresses: susan.welch@sydney.edu.au (S. Welch), Rebekah.moles@sydney.edu.au (R. Moles), a.viardot@garvan.org.au (A. Viardot), Pauline.deweerd@svha.org.au (P. Deweerd), scott.daly@svha.org.au (S. Daly), kylie.lee@sydney.edu.au (K. Lee).

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1. Introduction

Globally, approximately 451 million people (18+ years) live with diabetes, with almost one in two of those undiagnosed (2017).[1] Type 2 diabetes (herein referred to as 'diabetes') is the most prevalent form of diabetes among First Nations peoples worldwide, affecting more than half of all First Nations adults in 2010 (35+ years).[2,3] Diabetes rates in First Nations peoples are profoundly impacted by colonisation, societal racism, institutional racism, child removals and intergenerational trauma.[2,4–7] The terminology which refers to Aboriginal and/or Torres Strait Islander peoples (the First peoples of Australia) will be used throughout this paper except when referring to existing resources which use other terminology to refer to Aboriginal and/or Torres Strait Islander peoples.

In Australia, Aboriginal and/or Torres Strait Islander peoples are diagnosed with diabetes nearly three times more often than other Australians.[8] Aboriginal and/or Torres Strait Islander community leaders and health workers have led longstanding programmes to address diabetes and other chronic diseases.[9,10] Such efforts have seen a 42% reduction in the burden experienced from diabetes among Aboriginal and/or Torres Strait Islander peoples (from 2003 to 2018).[11] Despite the interventions, diabetes remains the second leading cause of death overall among Aboriginal and/or Torres Strait Islander peoples.[8]

A number of diabetes-related issues exist in hospital settings, as diabetes is the second leading preventable cause for an admission among Aboriginal and/or Torres Strait Islander peoples.[12] One risk indicator for admission is having no HbA1c measurement in the past 6 months while taking hypoglycaemic medicines.[13] For those without a diagnosis, efforts to conduct routine glucose screening in an Australian emergency department (ED) has not been shown to increase detection.[14] However, it is not known if automatic measurement of HbA1c in hospital and subsequent referral to diabetes services, can lead to more inpatient endocrine reviews[15] In 2 studies, no improvement was found in documentation of follow-up plans in discharge summaries (range: 24–26% patients had follow up plan in discharge summary.[16,17] Calls to enable systematic documentation of newly diagnosed diabetes in hospital discharge summaries have been longstanding.[14]

Detecting diabetes among Aboriginal and/or Torres Strait Islander peoples is difficult in hospital contexts, due to a range of existing barriers, as outlined by the following examples. Many people do not know they have type 2 diabetes until they experience symptoms of complications.[3] People with diabetes also commonly report experiencing stigma and self-blame.[17–19] Known determinants of health, racism and discrimination are also contributors to the health disparity seen in relation to diabetes.[20,21] Furthermore, in busy hospital environments, providing holistic care[22,23] is often at odds with time management pressures.[24] This makes it challenging to provide culturally safe care in hospitals for Aboriginal and/or Torres Strait Islander peoples. Change is required to enable earlier detection and provision of diabetes care to Aboriginal and/or Torres Strait Islander peoples who are admitted to hospital. Hospital pharmacists could assist this process.

Guidelines in Australia, recommend annual blood testing for Aboriginal and/or Torres Strait Islander peoples to screen for diabetes (from aged 18+).[25] However, this is not always conducted.[26] Earlier detection, along with increased knowledge and education and effective management, is needed to reduce undiagnosed diabetes, prevent complications and morbidity, and improve quality of life in priority populations including Aboriginal and/or Torres Strait Islander peoples.[27–29] Greater investment is needed to prevent and detect diabetes earlier.[30] This is especially relevant as diabetes like other cardiometabolic diseases occur from a younger age[17] and risk increases with age in these groups.[11]

To target these shortfalls in care, a hospital admission could provide an opportunity for integrated holistic care, using a 'One Stop Shop' health care model.[31] It could be hypothesized that a hospital pharmacist could be ideally placed to screen Aboriginal and/or Torres Strait Islander peoples for diabetes and other chronic illness during a patient admission. Hospital pharmacists could then communicate test results and medically – derived care plans with inpatient and community-based services (i.e. to connect the dots of their patients' care). Pharmacists already have an established role in helping people with medications via the Medicines Management Pathway,[32] where they have a key role liaising with admitting teams and in patient advocacy.

In support of the role of pharmacists, the International Pharmaceutical Federation (FIP) recommends that all pharmacists address the global issue of diabetes.[33] However, few studies describe the role of hospital pharmacists in providing diabetes care for Aboriginal and/or Torres Strait Islander people during a hospital stay.[34] While pharmacist-led screening for diabetes has been described in community pharmacy settings in Australia,[35] it has not been documented in the hospital setting.

To address these knowledge gaps, this exploratory study sought to identify how an urban hospital pharmacist could detect if Aboriginal and/or Torres Strait Islander peoples who are admitted to hospital are at risk of, or have, a diagnosis of diabetes. Therefore, a pharmacist-led diabetes screening service was piloted, and the study aimed to:

1. Explore factors which enabled patients to be eligible for inclusion in this diabetes care service.
2. Identify the number of patients who had not previously been identified with diabetes and/or with insufficient glycaemic control prior to hospital admission.
3. Explore perceived patient satisfaction with diabetes care and information provided during their hospital stay.
4. Record the time taken to provide diabetes care during their hospital admission.

2. Method

This multi-methods study used data collected from patients and field notes by pharmacist-researcher (SW). SW is a hospital pharmacist and researcher (she/her) who has undergone cultural responsiveness training and had no prior relationship with eligible patients. Recruitment was conducted systematically with adjustments made iteratively during data collection as needed, to ensure eligible patients could be reached. The study procedures were approved via the Human Research Ethics Committees of the Aboriginal Health and Medical Research Council of New South Wales (Ref: #1709/20: 11/5/21) and the study hospital (Ref: #2020/ETH01314: 8/10/20).

2.1. Aboriginal leadership

All authors are employed on Gadigal land in Australia, except one non-Indigenous Australian researcher who lives on Wurundjeri land (KL). Two Aboriginal authors are from Yuin nation (PD and SD).

The project was co-designed by study investigators and the Aboriginal Health Unit (PD) at the study site. The Aboriginal Heath Unit provides support to Aboriginal and/or Torres Strait Islander patients, their families and carers. This team provided advice on study design, implementation, and dissemination of findings. Support was also provided from an Aboriginal health committee based at the study site. This committee comprised of Aboriginal representatives (community and hospital-based) and hospital staff.[36] It was set-up to promote service access and staff engagement with a view to improve the health of Aboriginal and/or Torres Strait Islander peoples.

2.2. Consent

All patients provided informed written consent. A one-page plain English infographic was given to patients to describe the study purpose and scope. It was designed for people with varying levels of literacy comfort. (Supplementary material 1.)

2.3. Setting

A major teaching hospital in metropolitan Sydney, New South Wales, Australia.

2.4. Participant recruitment

Participants included Aboriginal and/or Torres Strait Islander patients, aged 18 years or older, admitted to hospital (Monday to Friday) over a consecutive 12-week period (July to October 2021). Patients were identified via the hospital's Core Patient Administration System [COR-PAS]) during admission and were purposively selected.

All consenting patients had their HbA1c screened, and patients were eligible for referral to endocrinology if they met one of two criteria: (1) HbA1c 6.5% or more and no known diabetes; (2) HbA1c was more than 7% and a known diabetes diagnosis.

2.5. Procedure

The procedural steps taken by the lead pharmacist-researcher (SW) are outlined in Fig. 1.

A yarning communication style was used at all stages of patient contact. Yarning is a culturally appropriate method of communication used by Aboriginal and/or Torres Strait Islander peoples to connect and share information and stories.37 Yarning with Aboriginal and/or Torres Strait Islander peoples can help build rapport and enhance two-way communication.38,39

At the conclusion of the study, a planned strategic approach to feedback was used providing knowledge translation and dissemination of findings. All consenting patients were invited to a community barbeque held on hospital grounds and a one-page infographic given to attendees and sent to all other participants.

2.6. Data collection

Data were collected from prospective, consecutive patient enrolment, using REDcap (Research Electronic Data Capture) comprising of a participant questionnaire during hospital admission and on follow-up after hospital discharge (Table 1). Implementation data were also recorded (time taken to provide the diabetes care service, and field note observations) (Supplementary material 2, 3).

The participant questionnaire content and design were developed and informed through expert team discussions. No validity analyses were conducted on the questionnaire. However, each questionnaire was piloted tested for understanding, clarity, ease of use and face validity, with a patient in hospital who had diabetes, and with Aboriginal staff at the study hospital (including co-author PD), prior to data collection commencing. Data collected from participant questionnaires during hospital admission and at follow-up after hospital discharge (Table 1) included both demographic information and laboratory results (e.g. serum creatinine, estimated glomerular function rate, fasting and random blood glucose levels; medications; medication and diabetes management information; self-reported outcomes after hospital discharge). Open-ended questions were asked, and discussions ensued from participant questions if they arose during administration of participant questionnaires. Endocrine review data were collated from participant medical records and through discussions with the endocrine team (Table 1).

2.7. Implementation data

2.7.1. Quantitative

Pharmacist time (in minutes) recorded during the initial meeting (using barcode technology40) and follow-up discussion (using REDCap).

2.7.2. Qualitative

Field note observations were systematically voice recorded (by SW) after each patient interaction and where necessary at other times throughout the study. Methodological decisions made and changes identified during data collection were noted.

2.8. Data analysis

Quantitative and qualitative questionnaire data were extracted from REDCap into Microsoft Excel. Descriptive counts were made in Microsoft Excel.

Field notes were professionally transcribed (using Rev.com) and imported into NVivo version 12. SW reviewed all transcripts, and one-third were checked by RM, KL and then discussed as a group by web conference to reach consensus. Thematic inductive analysis was conducted to map themes to the Consolidated Framework for Implementation Research (CFIR)41 This helped to guide understanding of what worked or could be improved in the implementation of this pharmacist-led diabetes screening service.

This report was prepared in accordance with the CONSIDER42 and COREQ criteria.43 (Supplementary material 4,5).

2.9. Data statement

Data are not available due to ethical restrictions.

3. Results

3.1. Overview of participants

One hundred and ninety patients were identified for recruitment. Of these, more than 6 in 10 were excluded ($n = 118/190$, 62%). Reasons for exclusion included insufficient time to organise bloods and review due to imminent discharge ($n = 30$) and already discharged ($n = 36$; Fig. 2).

Of the patients who were eligible for inclusion in the study ($n = 72/190$; 38%), nearly all ($n = 67/72$; 93%) consented to take part, [female $n = 27$, average age: female = 41 (range: 21–78); male = 40 (range 21–87), Table 2]. Of the 5 patients who did not take part ($n = 5/72$; 7%), this was due to not wanting to be involved (n = 2) or because they felt well cared for in the community (n = 3).

During recruitment, just under one in 7 patients ($n = 25/190$, 13%) had more than one hospital admission. Each were assessed for eligibility at each admission. Of these 25 patients who were re-admitted, seven were already included in the study, 8 were newly included and 10 were excluded.

More than three-quarters of participants ($n = 51/67$; 76%) usually lived in metropolitan areas, followed by regional areas ($n = 9/67$; 13%), with 1 in 10 having no fixed address (n = 7/67; 10%).44

A range of biochemical results were conducted for participants during the study (Table 3).

Nearly one-quarter of participants ($n = 16/67$; 24%) had reduced estimated glomerular filtration rate (eGFR; <90 mL/min/1.73m2). Almost 1 in 10 had high random BGL >/= 11 mmol/L ($n = 6/67$; 9%).

3.2. Participant outcomes during hospital admission

3.2.1. Participants with HbA1c within range

Most participants ($n = 61/67$; 90%) had an HbA1c within range (< 6.5 with no known diabetes or </= 7 with previous diabetes diagnosis) and so did not fit the referral criteria for endocrinology. (Fig. 2.) Of these, 8 in 10 ($n = 49/61$; 80%) had no known diabetes, and 1 in 5 ($n = 12/61$; 20%) had a previous diabetes diagnosis. One participant had an HbA1c result within range, but it was considered invalid and the patient was excluded due to existing active leukemia. Four participants ($n = 4/61$; 6.5%) had an HbA1c between 6 and 6.4% and were referred to their GP to yarn about diabetes.

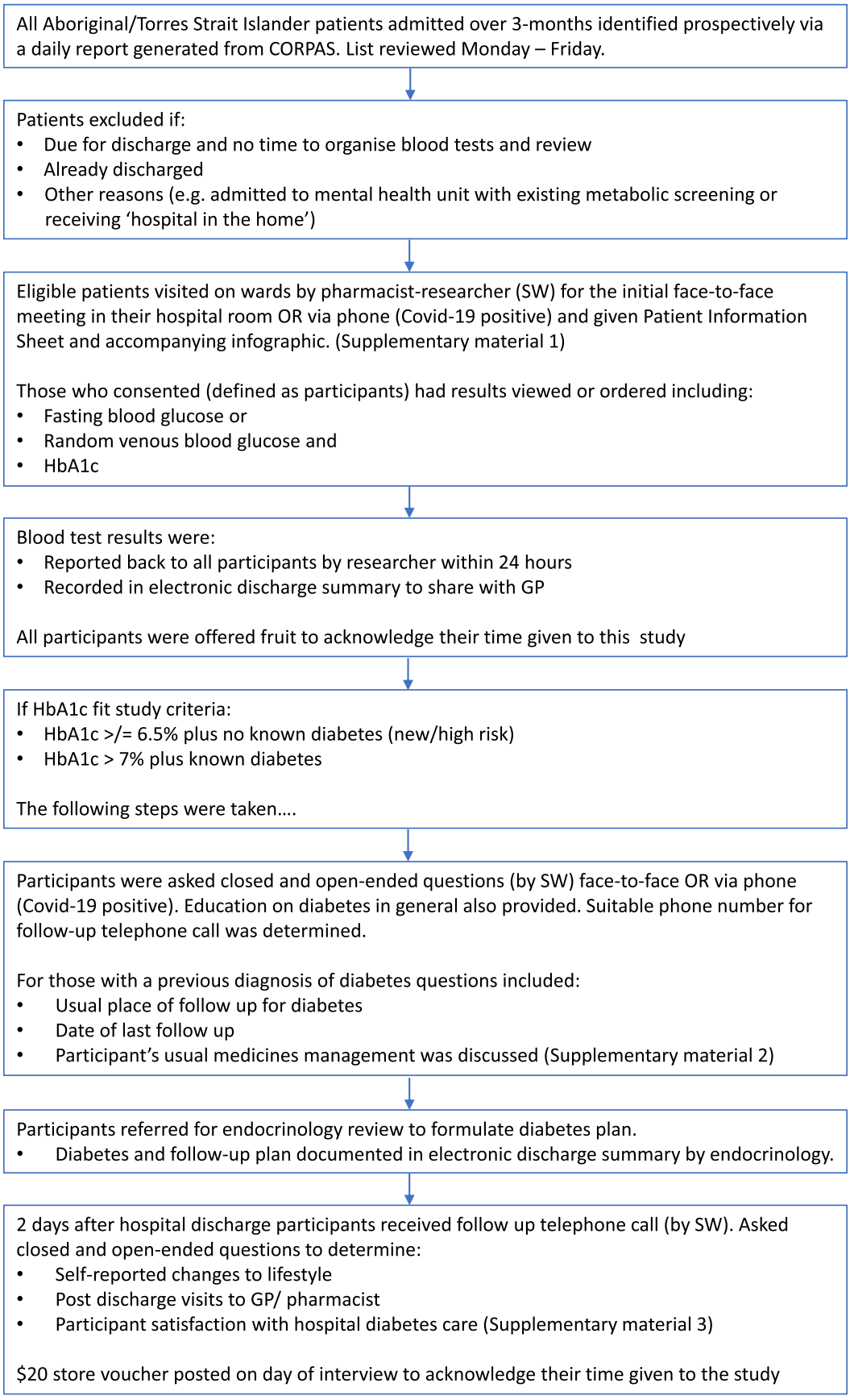

Fig. 1. Study participant recruitment process.

Table 1
Method: Quantitative and qualitative data collected by questionnaire during hospital admission and after hospital discharge.

1. Questionnaire during hospital admission	
1.1 Quantitative	
Data collection points	Data collected
For all patients on the daily admissions lists	• Age (mean age; age bands 18–24, 25–34, 35–44, 45–54, 55–64, 65+) • Gender (male, female, other) • Number of participants included and excluded • Reasons for exclusion
For eligible patients who were visited on the wards and consented to participate, additional data were collected:	• Home postcode, recorded as: metropolitan, regional, rural, remote • Serum creatinine (micromol/L), reported as (ref): o Female: < 88, 88–128, > 128 o Male: < 97, 97–137, > 137 • Estimated glomerular filtration rate (eGFR) (mL/min/1.73m^2) o <90, 90–150, > 150 • HbA1c (%): < 6, 6–6.4 (no known diabetes), >/= 6.5 (no known diabetes), > 7 (already had diabetes diagnosis) • Random blood glucose level (BGL) (mmol/L): < 5, 5–10, >/= 11 • Fasting blood glucose level (mmol/L): < 4, 4–7, >/= 8
For participants who consented, satisfied inclusion criteria, and were referred for endocrinology review, additional data were collected	• Diabetes medications prescribed, if any, collated from participant's notes: yes/no and specified. • Medications usually taken at home: yes/no • Had they been prescribed medications for diabetes: yes/ no • Did they see a doctor for their diabetes usually? If so, was this at a GP practice, Aboriginal Medical Service (AMS), specialist or others • Approximate date of last review before current hospital admission: < 1 week ago, within the last month, within the last 6 months, within 6–12 months, > 12 months • Usual medicines management at home: involvement of others/supports to assist, problems encountered with usage or storage of insulins, their use of daily dose administration aids (e.g. Webster packing) and any difficulties experienced. • Self-reported assessment of medication adherence: o If they ever forgot their medicines and how often (every day, once a week, once a month, other) o If they ever changed the way they took their medicines and how (skip doses, changes dose, takes less than prescribed, takes more than prescribed, other) o If they had existing medical complications from diabetes (related to eyes and feet), any visits made to an optometrist or ophthalmologist, and if laser or eye injections received.
Endocrinology review data:	• Number of participants referred and seen by endocrinology • Number of participants with endocrine/ diabetes plan documented in electronic discharge summary
1.2 Qualitative	
If consent declined	• patients were asked for reasons why
If participants had been prescribed medications for diabetes	• they were asked why they thought they had been prescribed these medicines, and about any concerns or worries about taking them. o Tips used to remember to take their medicines. o Tips used to change the way they took their medicines (if appropriate
2. Follow-up phone questionnaire after hospital discharge	
2.1 Quantitative	
Experienced issues/ problems with diabetes medicines since discharge from hospital	• yes/no
Visited chemist/pharmacy to fill scripts	• if needed; yes/no
Made an appointment to see their GP	• yes/no
Understood the information from the pharmacist about diabetes while in hospital	• yes/no
Understood the instructions for diabetes given to them by endocrine doctor in hospital	• yes/no
Satisfaction with diabetes care in hospital	• unsatisfied, satisfied, very satisfied
Any changes made to lifestyle since recent hospital discharge	• more exercise, changed diet, take medicines, measure BGL, other
Discussed with friends or family about diabetes	• yes/no
2.2 Qualitative – open -ended questions	
Issues faced in relation to their medicines, since discharge from hospital	
Help needed to access chemist/pharmacy to fill scripts	
Help needed to make an appointment to see GP	
Any questions asked about diabetes information provided by the pharmacist	
Any questions asked about instructions for diabetes given to them by the endocrinologist before leaving hospital	
Reasons for level of satisfaction with their diabetes care in hospital	
Any questions or worries about their diabetes care or medication management	

Nearly 1 in 5 participants (n = 12/67; 18%) were opportunistically referred to an Aboriginal health worker, clinical nurse educator or the admitting team to organise endocrine review outside of the study referral criteria (Table 4). All participants (n = 67) received a brief intervention (yarn about diabetes).

3.2.2. *Participants identified and referred for endocrine review by pharmacist-researcher*

Six participants were identified with high HbA1c (n = 6/67; 9%; n = 1 female; n = 5 with a previous diabetes diagnosis >7%; n = 1 with no known diabetes >/= 6.5%) and as such were referred for endocrine review (Fig. 3). Four of these participants (n = 4/6; 67%) had been taking diabetes medicines at home prior to admission, most commonly metformin. (Table 5). None were using insulin. Four of these participants (n = 4/6; 67%) had been seen by a doctor at least 6 months prior to admission to treat their diabetes, usually a GP. For all 6 of these participants, diabetes-related complications involving eyes and feet were discussed. Three of these (n = 3/6; 50%) reported visiting an optometrist or ophthalmologist in the past. Of the remaining participants, one reported problems with their eyes but had not been seeing an optometrist or ophthalmologist. Two participants reported foot complications related to their diabetes such as numbness and tingling (n = 2/6).

3.2.3. *Endocrine review data*

Five participants (n = 5/6; 83%) who were referred to endocrinology were seen before discharge from hospital. Of these, nearly all (n = 4/5; 80%) had an endocrine/diabetes plan documented in their electronic discharge summary. One participant was discharged before endocrinology could visit but their diabetes care plan was documented in their electronic discharge summary for discussion with the GP.

3.3. *Participant outcomes after hospital discharge*

Nearly 1 in 7 participants (n = 9/67; 13%) had left hospital before their results were returned. Of these (n = 7/9; 78%) were phoned to give

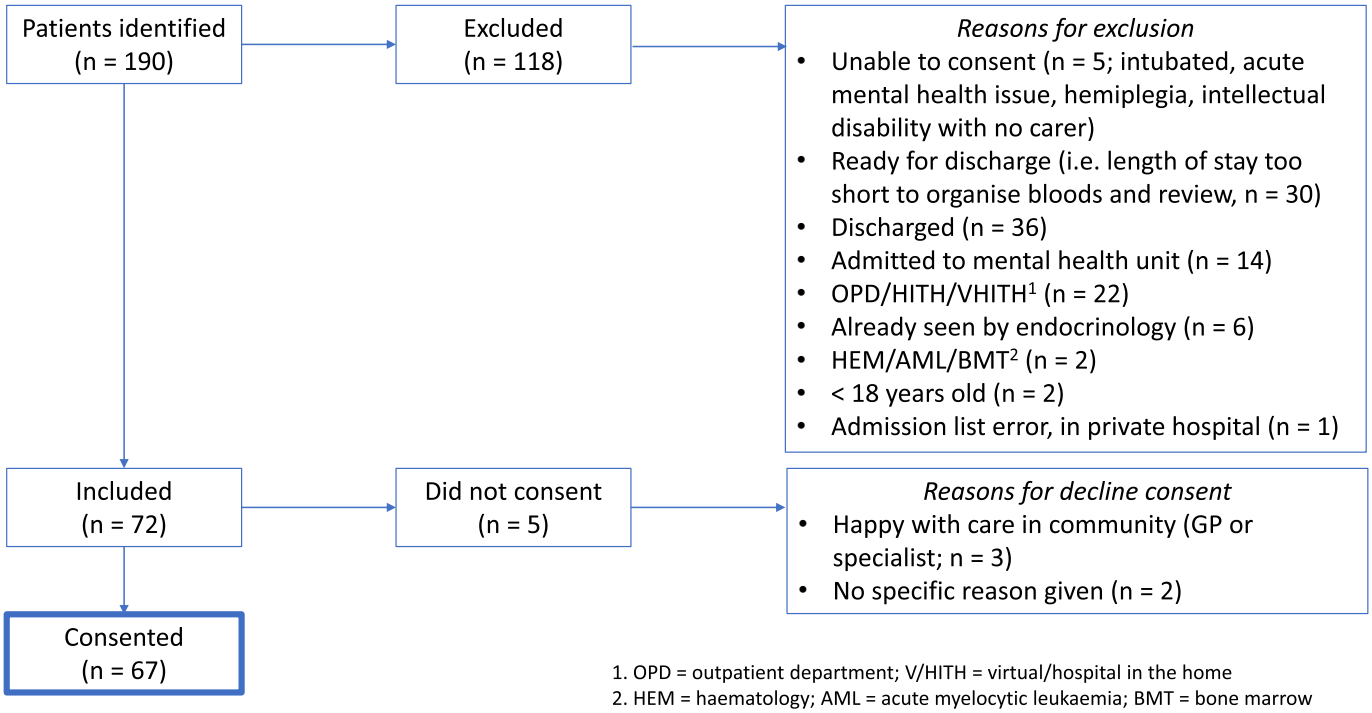

Fig. 2. Patient recruitment.

Table 2
Demographic data for consenting participants.

Age range (years)	Female (n = 27)	Male (*n* = 40)	Total (n = 67)
18–24	6	2	8
25–34	7	4	11
35–44	5	6	11
45–54	2	14	16
55–64	2	10	12
65+	5	4	9
Range	21–78	21–87	21–87
Average	41	51	46

Table 3
Biochemical data collected for consenting participants.

Data			Number (Total n = 67)
Serum creatinine (micromol/L)	Female (n = 27)	<88	26
		88–128	1
		>128	0
	Male (n = 40)	<97	38
		97–137	1
		>137	1
eGFR (estimated glomerular filtration rate, mL/min/1.73m^2)		< 90	16
		90–150	51
		>150	0
Glycosylated haemaglobin (HbA1c) (%)		Within range 6–6.4 (no known diabetes)	57 4
		>/=6.5 (no known diabetes)	1
		>7 (previous diabetes diagnosis)	5
Blood glucose level (mmol/L)	Random (1 did not have BGL taken)	<5.0	11
		5.0–10.9	46
		>/=11	6
	Fasting	<4.0	1
		4.0–7.9	2
		>/=8.0	0

test results (all normal range), and in 5 of these cases the GP was informed by phone. One participant was not able to be contacted and a phone message was left (normal result) and one was not contactable as their phone was disconnected (normal result), neither had a GP listed.

From follow-up phone interviews with patients who were referred for endocrine review by the research-pharmacist ($n = 6$), all participants who needed prescription medicines to be supplied from the local pharmacy reported they had collected these prescription medicines ($n = 4/4$, 100%). More than two-thirds of participants (n = 4/6; 67%) had made an appointment to see their GP and all but one ($n = 5/6$; 83%) had reported that they made lifestyle changes since leaving hospital. More than two-thirds of participants (n = 4/6; 67%) said they had yarned with their family or friends about diabetes since their stay in hospital (Box 1). The follow-up phone call also facilitated further discussions about issues experienced with medicines since discharge.

3.4. Perceived satisfaction

3.4.1. Participants

All participants who were referred by the pharmacist for endocrine review expressed satisfaction with the care received for diabetes in hospital (n = 6/6; 100%; Box 1; follow-up phone interview):

"I enjoyed speaking with the pharmacist and endocrine [team] *and felt that I was heard, as the junior doctor was writing things down while I spoke.* [male participant, ID21].

"I didn't understand about diabetes before, but then while in hospital I was given information and medicines to help me. The endocrinologist also rang me and made a telehealth appointment for next week to make a plan for diabetes treatment going forward as well as for eye and foot review". [female participant, ID144].

Table 4
Opportunistic referrals made by pharmacist.

Setting	Referral suggestions	Number of patients (n = 12)
Patient on dexamethasone – BGLs slightly high	Close pharmacist BGL monitoring/review and referral to endocrine if remained high (>10 for 24 h)	3
Patient had poor foot care	Asked team to review	1
Patient needed to be linked with new local doctor	Discussed with social work/ team/Aboriginal health workers to assist	3
Patients with known DM needed support	Asked team to refer for Diabetes clinical nurse educator visit	2
Known DM but did not fit study referral criteria but would benefit from endocrine involvement	Suggested team refer to endocrine for review.	1
		1
	• Foot infection with previous partial amputation	1
	• High BGL whilst taking dexamethasone	
	• Insulin infusion in Intensive Care then discharged to ward without endocrine review.	

"You [the hospital pharmacist and everyone] did what was needed to be done. A girl from the chemist came and spoke to me about diabetes as part of a uni study and gave me strawberries. I made them last as long as I could because it meant so much to me." [male participant, ID94].

3.5. Implementation

3.5.1. Pharmacist time

The initial meeting with patients took approximately 11 min (range: 5–25 min). It comprised of an introductory yarn, which was key to providing culturally safe care, the consenting process and requesting for the HbA1c to be added to existing bloods or new bloods to be taken.

Nearly 8 in 10 HbA1c tests were requested by the pharmacist-researcher (SW; n = 53/67; 79%), of which just a few participants required new bloods to be taken (n = 3/53, 6%). The remaining tests had already been requested by a junior doctor (n = 14/67; 21%).

Time taken to deliver the diabetes care service was approximately 10 min (range: 3–22 min). This included discussing the participant's results, answering their questions, completing medical notes, electronic discharge summary and alerting the admitting team. For the 6 participants who had high HbA1C results and were referred for endocrine review, approximately 29 min was spent talking to them about the interpretation of the result and their ongoing management (range: 20–60 min; Fig. 4).

3.5.2. Understanding of service implementation gained from field note observations

Seven themes were identified from field notes collected on service implementation: barriers (to recruitment; to service); culturally safe care45; satisfaction; my (pharmacist-researcher, SW) learning; role of pharmacist; overall study benefits and future directions. Illustrative quotes under each theme can be seen in Table 6.

Themes were mapped to the Consolidated Framework for Implementation Research (CFIR) (Table 6). Characteristics that effected the overall implementation of the study such as the ability of the pharmacist to provide culturally safe care contributed to a number of the domains and was key to successful service provision. Barriers to recruitment as a result of COVID-19 were included in the Outer Setting domain. Characteristics of the organisation e.g. processes required to obtain an HbA1c result and competing priorities of the endocrine team were examples of factors coded to the Inner Setting domain. Barriers to recruitment such as patient eligibility due to length of hospital admission could be affected by the level of cultural safety experienced by the patient during the hospital stay. As a result, these were also included as a contributing factor in the Inner Setting domain as well as being coded under Individual's Characteristics. The role of the pharmacist in connecting care within the hospital and across transitions of care was important in the Process of Implementation for the service.

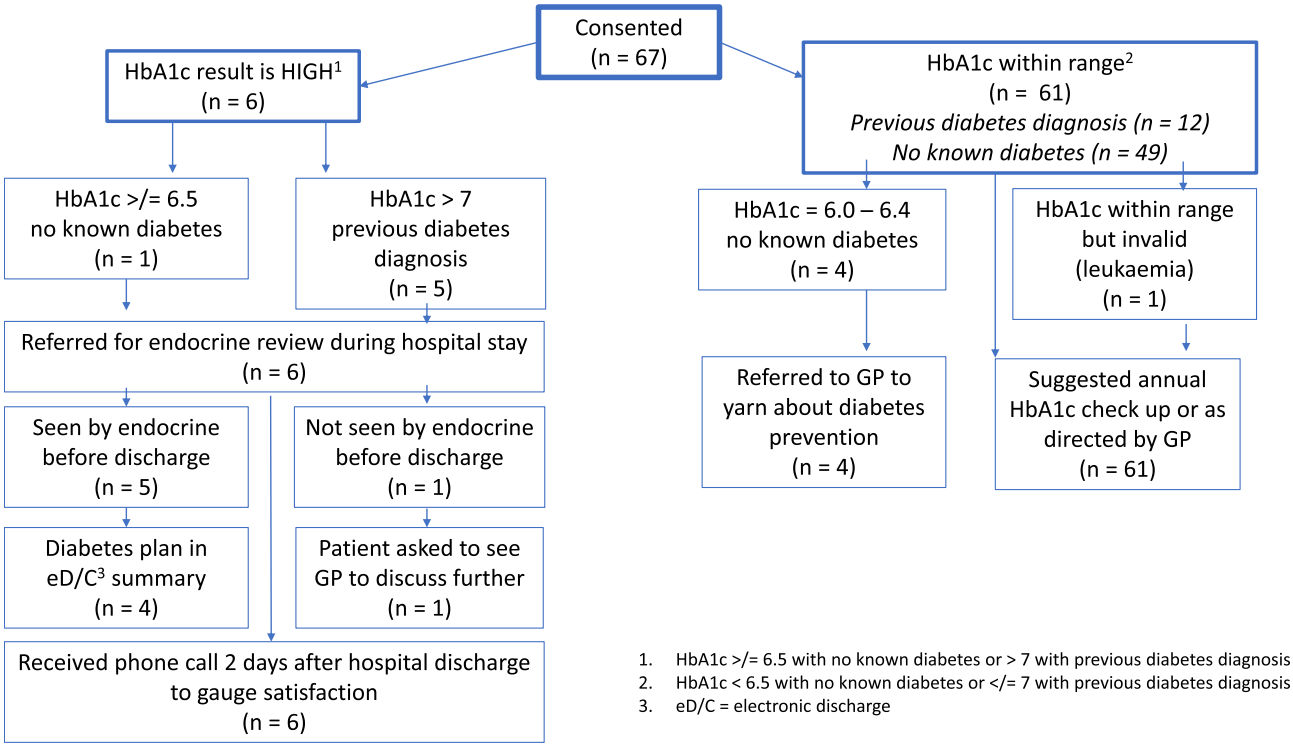

Fig. 3. Consenting participants' Journey.

Table 5
Additional data collected for participants who consented, satisfied inclusion criteria, and were referred for endocrinology review.

Diabetes and medication management data (from interview during admission)			Number (n = 6)
Known diabetes	Yes		5
	No		1
Diabetes medications prescribed (at home)	No		2
	Yes		4
	specify	metformin	4
		sitagliptin	1
		dapagliflozin	1
		Exenatide	1
		semaglutide	1
		insulin	0
Usually takes medications at home	Yes		6
	No		0
Usually sees a doctor for their diabetes	No		2
	Yes		4
	Where?	GP practice	4
		Aboriginal Medical Service (AMS)	0
		Specialist	0
		Other = Hospital cardiac clinic	1
Date of last diabetes review (approx.) (n = 4)	<1 week ago		1
	Within the last month		1
	Within the last 6 months		2
	Within 6–12 months		0
	>12 months		0
Usual medicines management at home (Self reported)			
Help with medicines at home?	No		5
	Yes		1
	Who?	Partner/spouse	1
Who collects your medicines from the pharmacy?	Me		5
	Other = medicines are delivered		1
Participants using dosing aid eg webster pack	Yes		1
	No		5
Experiencing problems using the dosing aid eg webster pack	Yes		0
	No		1
Do you ever forget to take your medicines?	No		4
	Yes		2
	How often?	Every day	0
		Once a week	0
		Once a month	1
		Other = rarely	1
Do you change the way you take your medicines sometimes?	No		5
	Yes		1
	How?	Take less than prescribed	1
Existing medical complications from diabetes (related to eyes and feet) (Self reported)			
Have you ever had any problems with your eyes?	No		5
	Yes		1
	Do you see an optometrist/ opthamologist?	Yes	3
		No	3 (includes 1 who has had problems)
	Have you ever had laser or eye injections?	Yes	0
		No	6
		Don't know	0
Do you ever get…	Foot numbness	Yes	2
		No	4
	Foot pain	Yes	0
		No	6
	Foot tingling	Yes	2
		No	4
	Foot infections	Yes	0
		No	6

4. Discussion

This study piloted a pharmacist-led model of care to detect risk of diabetes for Aboriginal and/or Torres Strait Islander peoples admitted to a metropolitan hospital in New South Wales (Australia). Overall, participants were positive about the diabetes care received from this new service, with nearly 1 in 10 participants referred for endocrine review during their admission (n = 6/67; 9%), and one patient (1.5%) newly diagnosed with diabetes. This service offered a unique opportunity for participants to 'yarn' about diabetes with a pharmacist ('brief intervention').

Diabetes screening and referral for specialist review – like what was offered in this novel pharmacist-led service, is not standard practice for Australian hospital-based pharmacists.[46,47] Screening for diabetes is available in the community pharmacy context in Australia[35,47] and internationally.[33,48,49] However, in a hospital setting, routine screening is not offered and referral for endocrine review typically requires a formal electronic referral to endocrinology by the admitting medical team. In the present study, pharmacists were permitted to directly contact endocrinology registrar and request a patient review during their hospital stay. This adjustment to the hospital process, circumvented the need for a medical referral to endocrinologists. In turn, it also enabled easier linkages between patients and clinicians, as well as specialist review during the hospital admission. It is well established that self-reporting of diabetes screening is not sufficient to ensure best care is provided.[50] This study highlighted the potential value of pharmacist-led screening programmes to detect diabetes risk earlier in patients attending hospital.

Brief intervention offered by hospital pharmacists have been conducted for tobacco smoking cessation,[51] intranasal naloxone (for patients at risk of harm from opiates),[52] and to improve health literacy in general.[53] However, we were unable to find published studies documenting implementation of hospital pharmacist-led diabetes brief intervention for Aboriginal and/or Torres Strait Islander peoples. The use of brief intervention for other health risks behaviours is well established (e.g. drug and alcohol),[54,55] as well as its use in primary care[56] and community pharmacy settings.[57] In the context of Aboriginal and/or Torres Strait Islander health and alcohol, a previous study described elements of 2-way yarning, using humour to build rapport, allowing time and sharing lived experiences to make connection and remove the power imbalance between client and clinician.[58] This process "acknowledges and brings together Aboriginal peoples' notion of health and healing with Western methods".[58] This is similar to the approach taken by Aboriginal-led, diabetes programmes offered in communities.[28] Such programmes which include opportunities for brief intervention have reported positive outcomes for individuals, families and whole communities. In this same community-based study, participants expressed "a feeling of belonging and optimism about their ability to improve their health."[28] Similarly, in the present study, brief interventions offered were tailored to each patient and their needs at the hospital bedside, for all participants to benefit, even those who did not require referral to endocrine. This provided participants with the opportunity to reflect on their health and lifestyle to promote behaviour change. Opportunities to 'yarn' with participants about a range of topics related to diabetes (a 'brief intervention') received positive feedback from participants. However, much more research is needed to examine acceptability, feasibility and effectiveness of pharmacist-led diabetes programmes in hospital settings.

This study took a holistic approach to diabetes care which considers each person's social, emotional, and cultural wellbeing and connects them earlier to appropriate care. Aboriginal and/or Torres Strait Islander peoples describe feeling stigma and blame in relation to obesity and a diabetes diagnosis.[18,19] The holistic and non-judgemental approach offered by this pharmacist-led diabetes service appeared to provide a unique opportunity to promote autonomy of patients in improving their understanding of their healthcare and available

Box 1
Follow-up phone questionnaire after hospital discharge (n = 6).

Satisfaction with diabetes care in hospital
[satisfied (n = 1/6), very satisfied (n = 5/6)]

Experienced issues/ problems with diabetes medicines since discharge from hospital
(*n* = 1/6)

Visited local pharmacy to fill scripts (if needed)
[yes (*n* = 4/6), have not needed (n = 2/6)]

Made an appointment to see their GP
[yes (*n* = 4/6)

Understood the information from the pharmacist about diabetes while in hospital
[yes (*n* = 6/6)]

Understood the instructions for diabetes given to them by Endocrine doctor in hospital (*n* = 5)
[yes (n = 3/5)]

Any changes made to lifestyle since recent hospital discharge?
(n = 5 had made changes – not mutually exclusive)
Changed diet (*n* = 2), Take medicines (n = 1), Measure BGL (n = 1), Other* (n- = 5)
Other* changes included:
"*watching day to day diet, BGL (measuring), (taking) meds – is sometimes a bit hard but you just have to deal with what you have.*" "*(I now) work with family to deal with everything.*"; Podiatrist follow-up had been booked.; "*I drink more water and more fruit. I feel better and had time to think and put mind in good place. Eating healthily and having time to think has really helped my anxiety as well.*" [female participant, ID144]

Discussed with friends or family about diabetes
[yes (n = 4/6)]

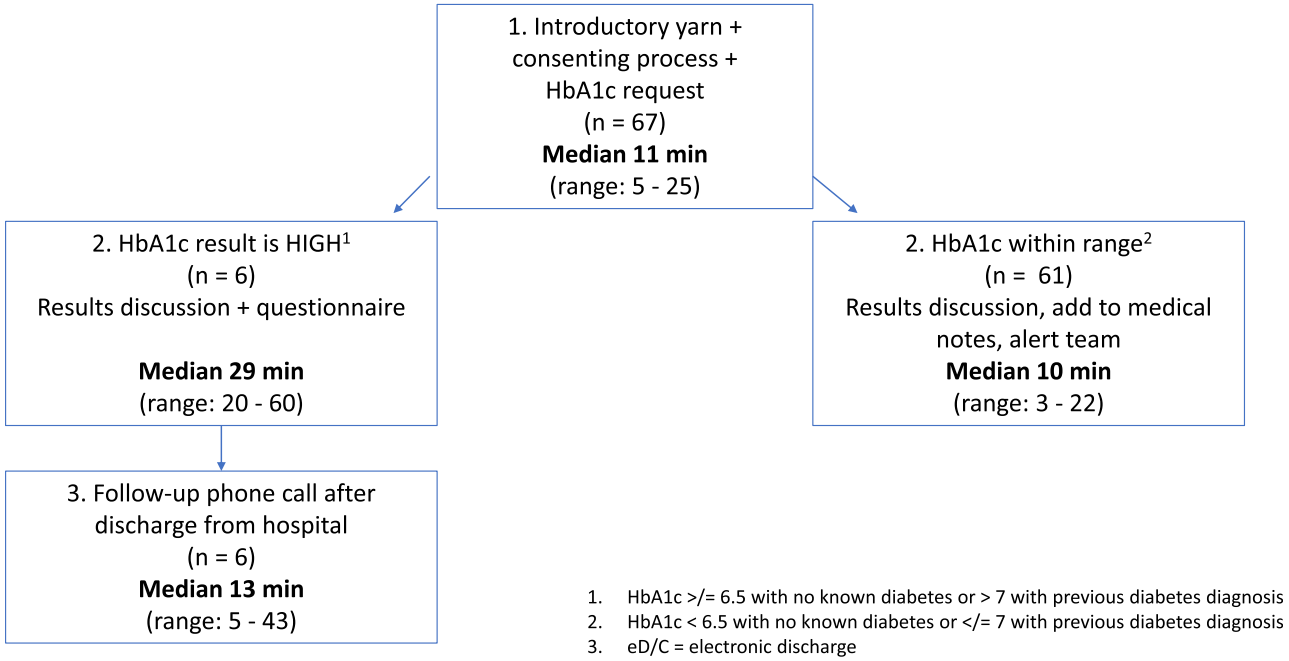

Fig. 4. Pharmacist's time.

prevention and treatment options.[59,60] There was an immediate benefit for the patient, e.g. an increase awareness of frequency of HbA1c testing, which benefits their family, community and future generations. However, it is also worth considering the time needed to offer a holistic bicultural care approach[58] in a busy hospital environment. For example, in the present study the initial introductory yarn, consenting process, organisation of HbA1c and results discussion took around 20 min or 40 min for individuals referred for endocrine review.

This study has a number of strengths and weaknesses that need mentioning. In terms of strengths, the study was designed with

Table 6
Themes derived from pharmacist-researcher (SW) field note observations mapped to Consolidated Framework for Implementation Research (CFIR) Domains.

Theme	Sub-theme	Sub-theme	Illustrative quotes
Barriers	Barriers to recruitment	COVID[b]	Initially in the early days of COVID, "I realized that COVID positive patients, can't be visited initially. So, their enrolment time frame is also delayed, to when they are not no longer positive and I can then go visit them. This is impacted on two patients so far" Following this, modifications were made so, e.g. "patient consent was obtained over the phone and she was happy to be involved. I was able to send her through the paperwork, to her phone so that she had the information sheets. She's a young girl and, she was keen to be involved as well. So, there was no problem and I'm glad that I was able to give her that opportunity, even though she was in the COVID (ward) and provide her with some education e.g. annual screening."
			"Participant has been in COVID, but she'll be going at some stage. So, I've given the diabetes leaflets to the pharmacist to add to the discharge bag. She is newly diagnosed with diabetes and the endocrine team are continually following her up."
		Patient eligibility[b,c,d]	"A number of patients are excluded after the weekend because I might see them Friday and there's no time between coming back on Monday and getting everything organized."
			"For one HbA1C (ID 37) the lab called me to say that because the patient had leukemia that affects the test and means that it's not valid. It was 4.6 and it was low, but it's not a true indication of glucose control."
	Barriers to service	HbA1c testing[c]	"HbA1c tests are done once a day….It's a real barrier to be able to coordinate care, especially for people who are not in hospital for that long at times, due to whatever indication they've come in for, then to be waiting for that test result to come back - only once a day is quite a rate-limiting step."
		Communicating with GP[b]	"I spoke with a guy and he was really happy that I had come to see him. He left unfortunately today, before I could speak to him, but I rang him and he answered and we had a chat on the phone. I said that everything was going fine. His result was normal. And he said it was no worries that I didn't see him before he left. I said his GP wasn't specified in the discharge summary and he (the patient) wasn't given a copy. So, I asked who his GP was, whether it's okay for us to send it to the GP. So, I added the note to the GP, spoke to the resident to be able to re-finalise it, and to make sure that it goes to the GP now that we know who the GP was. He was happy to do that.
		For healthcare review[c]	"Factors that can influence whether patients have been seen pre discharge include the fact that I work Monday to Friday, the HbA1c's are only done once a day with a 4-h turnaround time, patients have a short length of stay and the endocrine registrar may have competing patient prioritises."
Culturally safe care[a,c,d,e]	Module 2: Patient experience of health care45	Communication58	"I will be able to alert him of the result and try and encourage him to do annual testing. He didn't want to really take/use any treatment, even if he did have diabetes. As it turns out he doesn't, but it enabled me to have a discussion about not wanting to do anything. He'd rather just sit it out because he saw what his auntie had to go through and didn't want to do that. So, we had a chat about what the auntie had gone

(*continued on next page*)

Table 6 (*continued*)

Theme	Sub-theme	Sub-theme	Illustrative quotes
			was okay. He also had the opportunity to ask other questions about some of his concerns about his medicines."
Satisfaction[e]		Participant[d]	"I texted the participant, that the regional centre CNE will be calling him next week to check out how he is and to invite him back to their hospital outpatient clinic for diabetes, if he would like, and he texted back and said, that's great."
			"The phone call went well and patient was very happy with everything and he felt like that, when we spoke that he could feel really open that he could trust me."
			"One gentleman was really happy when I was consenting him, that he felt that he had a lot of sugar in his life and wanted to know whether he had diabetes or not. He was interested to know how quickly the result would come back. So, he felt good that he would be able to get that done. He said that it pleased him, that it would be done quickly while he was in hospital."
			"I had a chat with him and he wanted to be involved. His opinion was that it's good to know and act upon it early. So, he was happy to be involved."
			"I gave her results (normal) to her, and she was happy. I gave her the strawberries and she was overwhelmed. She said, it's really made her day."
		Investigator	"It's been really great to be able to educate people about diabetes including the need to get annual testing."
			"The pictorial version of the project has been really beneficial, in the consenting process to help people to understand what the project's about. It's been really simple to use and I'd really recommend others to use it…… The 1st patient couldn't read, so loved it."

Table 6 (*continued*)

Theme	Sub-theme	Sub-theme	Illustrative quotes
			through and he said that she ended up on insulin. So, it enabled us to talk about diabetes in general and how, even if it was a little bit high, then the early 'connecting with care' could actually mean that he might just be able to modify, e.g. his diet and exercise to prevent him needing to take medication. He seemed a bit more positive about that."
		Empowerment	"I had a chat with him. His opinion was it's good to know and act upon it if need be early. So, he was happy to be involved."
		Treated respectfully	"(He) consented to be part of that study and said, if I can help future generations by being involved in research, then that's a great thing. He was happy to be involved."
			"He said to me that he really felt the cultural support within the hospital had been great, e.g. his talks with the Aboriginal health worker…. and the pharmacist coming to see him with (my) yellow folder and the Aboriginal flag - that is really great. He was very supportive of the study being undertaken at the hospital."
		Family inclusion	"We had the chat about how his HbA1c & everything was fine…. it's just good for him to know, and how perhaps his family could have it done as well. He knew that his grandma had diabetes and so, he thought that was a good idea to check with the rest of his family, particularly his mum, although he felt that she was probably on top of it. He was keen to know about the result (to tell) his mum and the potential for how it could help his family."
			"Saw a gentleman this morning and gave him his normal result. He was really happy because he could now tell his family, who'd been pestering him to get checked, that he

(*continued on next page*)

Table 6 (*continued*)

Theme	Sub-theme	Sub-theme	Illustrative quotes
		Staff	"The endocrine CNE was happy with, how things had been working." "..registrar said that she saw my note in the discharge summary and she said it was good." "..it actually enables me to then give a clearer picture to the pharmacist, looking after the patient about the patient's story and any insight that I might've had about their background that they shared (with me), to help the pharmacist also provide culturally appropriate care to that patient. Pharmacists seem pleased with that insight."
Pharmacist-researcher (SW) learning[e]			"The level of patient consent in this project supports the fact that people really want to know whether they need to do anything to make their health better." "I gave her results (normal) to her, and she was happy with that. I gave her the strawberries and she was overwhelmed. She said, it's really made her day. This was a young person that has insecure living arrangements …this was really telling for me..I was glad she was involved." "It never ceases to amaze me how thankful people are to get a gift of strawberries. It really amazes me that such a small gesture can actually be so welcomed by people."
Role of pharmacist		Education[a,e] – patients, staff	"Education provided to patients when I went to see them about their diabetes. The tools used were the New South Wales, "Diabetes 10 ways to help your diabetes" leaflet and I also my hand drawn explanation of what is diabetes - using a cartoon style drawing. I wanted, to simplify the concept…I looked online to get a simplified cartoon explanation and used that to devise my drawing. " "For people that have normal results, even the education surrounding diabetes, risks and the requirement for annual HbA1c testing, and to answer any questions that they might ask, is good." "I spoke to her and realized that she couldn't be included in the study, but we went through the benefits of checking HbA1c annually and early identification and linking with care and the benefits of it. Also" what is diabetes" - using the drawing that I made. She was happy for me to make an addition to her discharge summary for the GP to follow-up on getting HbA1c and random blood glucose checked to monitor for diabetes."
		Connecting care[a,b,e]	"I needed to speak to the heart failure, doctor before ringing the patient as I needed to make an appointment in the diabetes and obesity clinic for him." "I called his GP, spoke to the practice nurse and left a message to report the blood results." "She has known diabetes, but she needed some extra education. So that's been coordinated with the CNE." "I checked his levels, all good. He was keen to hear, how it was. He never had any diabetes issues in the past, but it was good to know the result. He also wanted me to let the homeless health, know that he was here, which I was able to do."
Overall study benefits[c,d]			"I realize that my (SW) getting HbA1c tests done and speaking to the team can actually change practice in its own right. So, it's like an advertising campaign in the wards." "For (the person) to know that they had a normal test result was really, comforting. I could hear it in people,

(*continued on next page*)

Table 6 (*continued*)

Theme	Sub-theme	Sub-theme	Illustrative quotes
			that they were really happy to hear the result and some people even really verbalized what comfort that was to them and to their families."
			"It's been really great to be able to educate people on diabetes and the need to get annual testing. To identify, people that have poorly controlled diabetes and the one girl who was previously unknown to have type two diabetes. It's been really good to be able to educate the pharmacists as we go along, just being able to discuss their patients in more depth with regard to the diabetes risk. Also having opportunistic discussions about Aboriginal health with pharmacists and other team members, like doctors etc., when I'm explaining the study to them and giving them a broader knowledge about the diabetes risk for Aboriginal people and the need for annual checking. Also, just the gratitude of people to be involved in the study. People want to know, and actively be involved with their health."
Future			"Ensure it is clear for pharmacists when HbA1c is not an appropriate measure."
			"Where HbA1c is not an adequate marker, having random BGL >11 could also be a referral criteria for pharmacists to endocrine."
			"HbA1c's are currently only done once a day. In the setting of a short length of stay, this can be a rate-limiting step as to whether we can link them in with care or not. It can be requested as an urgent test but usually it's not regarded as an urgent test within the system. So, that might be something after this study that could be worked through."
			"Organise a pharmacist CE with patient and homeless health nurse about lived experience surrounding CTG and, other lived experience with regard to medications."
			"I just noticed that sometimes if I can't link people with endocrine, there's something I can do for them, such as referring them to outpatient CNE in the community, eg in regional areas or calling the GP with the results. I saw patient today and gave him the 10 tips leaflet. Even though I might not be able to complete all the points within the study for referral, due to timing, there seems to still be something that we can offer."

CFIR Domains41: a. Intervention characteristics, b. Outer setting – external factors, c. Inner Setting- organisational characteristics, d. Individuals' characteristics, e. Process of implementation.

Aboriginal co-investigators (PD, SD) who helped co-design the model of diabetes care offered and as a result, incorporates culturally safe practices.45 This was reflected by the high number of patients who consented to take part ($n = 67/72$; 93%) and the satisfaction expressed by patients referred to the endocrinology unit. This was a pilot study which developed and implemented a pharmacist-led diabetes screening model. To limit confounding variables in delivery of this new model, it was only conducted at one study site with one pharmacist. So, in relation to weaknesses, just one metropolitan study site was involved (New South Wales; NSW) and the pharmacist providing the service was also the lead researcher. While this Australian state (NSW) has the largest per capita proportion of Aboriginal and/or Torres Strait Islander Australians,61 the findings are not generalisable to regional or rural settings, or to other urban Australian sites, or may differ if provided by other pharmacists. Further, more than 6 in 10 patients were excluded from the study. The reasons for exclusion were related to the study being conducted in a busy metropolitan hospital environment – where short length of stay is a symptom of the public health service design. More work is needed to consider the benefits of this diabetes service and how it could be better aligned in the existing hospital setting. Despite these challenges, a willingness from clinicians to upscale this service is currently being considered at the study site.

4.1. Implications

Several implications have arisen from this study. This diabetes screen and care model could be adopted by other hospitals, with adaption for local context with communities and Aboriginal health professionals. To do so, the pharmacists would need to be trained to provide culturally safe care62 together with an understanding of the social and cultural determinants of health and the effect of colonisation on the prevalence of diabetes.63 This approach could also benefit other priority groups where stigma around life-style changes can be common (e.g culturally and linguistically diverse populations (CALD) and women who are pregnant).64–66 Pharmacist referral criteria were based on HbA1c result together with or without prior diagnosis of diabetes. On reflection,

a high BGL result (more than 10 mmol/L for more than 24 h) could also trigger a referral for endocrine review, as it currently does for medical teams. Accordingly, future research could consider expansion of the pharmacist referral criteria for endocrine review and include a high BGL. This work has the potential to change how people are cared for by pharmacists when they are in hospital and could be broadened to include other chronic disease screening and referral pathways.

5. Conclusions

This pilot of a pharmacist-led diabetes screening service, identified how a metropolitan hospital can detect if Aboriginal and/or Torres Strait Islander peoples who are admitted to hospital are at risk of, or have, a diagnosis of diabetes. This pilot showed that pharmacist-lead diabetes bi-cultural care provides screening and linking with care in a holistic manner. Future research is required to test this model by upscaling the service to include more pharmacists in the screening role and could be broadened to include other chronic disease screening and referral pathways.

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CRediT authorship contribution statement

Susan Welch: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Rebekah Moles:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – review & editing. **Alexander Viardot:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – review & editing. **Pauline Deweerd:** Conceptualization, Funding acquisition, Investigation, Methodology, Resources, Supervision, Visualization, Writing – review & editing. **Scott Daly:** Conceptualization, Funding acquisition, Investigation, Methodology, Resources, Supervision, Visualization, Writing – review & editing. **Kylie Lee:** Data curation, Formal analysis, Investigation, Methodology, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

No conflict of interests exist for SW, RM, KL, PD, SD, AV.

Appendix A. Supplementary data

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