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ABSTRACT

Aim: To describe vascular risk factors in Australian adults with diabetes attending an Indigenous primary-care nurse-led diabetes clinic

Design: A cross-sectional descriptive single-site study

Methods: Vascular risk factor data were extracted from the electronic health records of participants in the nurse-led integrated Diabetes Education and Eye disease Screening (iDEES) study at a regional Victorian Indigenous primary healthcare clinic between January 2018 and March 2020.

Results: Of 172 eligible adults, 135 (79%) provided data. Median (IQR) age was 56 (46 – 67) years; 89% were Indigenous; 95% had Type 2 diabetes of median (IQR) duration 6 (2-12) years and 48 (36%) were male. Median HbA1c, blood pressure, cholesterol (total-; LDL-; HDL-), triglycerides, eGFR, CRP and BMI were 8.0% (64mmol/mol), 127/78mmHg, 4.2; 1.9; 1.1 mmol/L, 2.3mmol/L, 89 mL/min/1.73 m², 7.0 mg/L and 32.4kg/m². Of nine clinical risk factors, the median (IQR) number of risk factors at target were 4 (3-5) for women and 3 (2-5) for men, $p_{\chi 2} = 0.563$. Clinical targets for BMI, HbA1c, blood pressure, triglycerides, total cholesterol, LDL-cholesterol, urine albumin:creatinine ratio, HDL-cholesterol and smoking were met by 14%, 34%, 38%, 39%, 44%, 52%, 54%, 62% and 64%, respectively.

Conclusion: A nurse-led model of integrated clinical risk factor assessment and diabetes education identified suboptimal levels of clinical risk factor control for avoiding diabetes chronic complications among Australian adults with diabetes in an Indigenous primary care setting.

Impact: A nurse-led model of diabetes care integrating clinical risk factor assessment into a diabetes education service is achievable. Understanding by stakeholders, including people with diabetes, their clinicians and health services, of the importance of regular monitoring of

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risk factors impacting diabetes complications is important. The novel nurse-managed iDEES primary-care model of care can assist.

Trial registration: Australian and New Zealand Clinical Trials Registry (ACTRN12618001204235)

KEYWORDS: nurse, Indigenous, diabetes, risk factors, HbA1c, blood pressure, lipids, BMI, CRP, kidney

1 INTRODUCTION

People with diabetes are at risk of microvascular and macrovascular complications for which there are both genetic and acquired risk factors. Recognised modifiable risk factors for these complications include adiposity, smoking, poor glucose control, hypertension, dyslipidaemia and inflammation. As well as lifestyle factors which modulate these risk factors, an increasing range of medications for glucose, blood pressure and lipid control are available. In addition for people with Type 2 diabetes and existent diabetic retinopathy, independent of lipid levels, the once daily oral lipid lowering drug fenofibrate can retard diabetic retinopathy progression (Keech et al., 2007; Chew et al., 2014) As Indigenous peoples globally and in Australia are at high risk of both diabetes and its complications (Hotu et al., 2018) and for premature mortality (Hyde et al., 2018) attention to vascular risk factors is important for both primary and secondary prevention. Many people with diabetes do not have well-recognised risk factors treated to recommended levels (Australian Institute of Health and Welfare, 2015). However, important nurse-led models for diabetes complications mitigation are emerging globally, such as Australian credentialled diabetes educators, nurse practitioners with prescribing rights and nurse-led intra-ocular injection clinics in the UK for preservation of vision in people with sight-threatening diabetic retinopathy.

2 BACKGROUND

Relative to their non-Indigenous peers, Indigenous Australians are at four-fold higher risk of developing diabetes (Australian Institute of Health and Welfare, 2021; Keel et al., 2017), which is most commonly Type 2 diabetes, and are at three-fold higher risk of developing diabetic retinopathy (Foreman et al., 2020).The presence of diabetic retinopathy signals increased risk of other microvascular complications, such as diabetic kidney disease (Sabanayagam et al., 2019), and also of cardiovascular disease and premature mortality (Pongrac Barlovic et al., 2018). Indigenous Australians have an 8-year shorter life expectancy than non-Indigenous Australians (Department of the Prime Minister and Cabinet, 2018) with cardiovascular disease being a major contributor. To help mitigate risk of adverse outcomes from diabetes, there are national guidelines for assessment and treatment of traditional vascular risk factors and subsidised access to screening and medications. These risk factor targets relate to glucose control, usually reflected by HbA1c levels, body weight (usually reported as BMI), blood pressure, lipids (usually total-, LDL- and HDL-cholesterol and triglyceride levels), kidney function (usually both kidney filtration function as reflected by estimated glomerular filtration rate (eGFR) and urinary albumin loss (usually reflected by the urine albumin creatinine ratio) and smoking. Some clinics serving Indigenous Australians also measure the systemic inflammation marker CRP due to high levels, which are associated with increased risk of heart disease, being common. Most people with Type 2 diabetes are cared for in primary care, hence risk factor assessment and monitoring programs must be applicable to this setting, not just specialty clinics. To meet recommended risk factor targets the risk factors must first be measured and if abnormal intervention must be offered and taken up, with input needed by both clinicians and the patient. Often multiple drug classes may be needed to reach recommended glucose, blood pressure and lipid targets. It is recognised that even though many glucose, blood pressure and lipid drugs are available, many people are not prescribed or do not take the prescribed medications.

3 THE STUDY

3.1 Aims

As part of a nurse-led model of diabetes care, to determine the traditional vascular risk factor status of Australian adults with diabetes attending an Indigenous Australian run primary care practice in regional Australia.

3.2 Design

A cross-sectional study of Australian adults with diabetes attending the Rumbalara Indigenous primary care clinic in regional Australia, who were eligible to participate in the nurse-led integrated diabetes education and diabetes eye screening (iDEES) study. The protocol has been published previously (Atkinson-Briggs et al., 2021). Briefly, this novel nurse-led iDEES model of diabetes care integrates two essential services, diabetes education and eye disease screening, into a single service and incorporates retinal photos as a complementary diabetes education tool to facilitate lifestyle and clinical risk factor self-management discussions and goal-setting during diabetes education sessions. The sub-studies comprising the iDEES project and related results manuscripts include assessment of 1) lifestyle risk factors via a survey tool, 2) clinical risk factors for diabetes complications as recorded in the clinic's electronic health record, 3) diabetic retinopathy screening coverage, including coverage sustainability, of the clinical target population i.e. patients with diagnosed diabetes 4) diabetic retinopathy prevalence and vision status. This manuscript presents the results of the nurse-managed clinical risk factor assessment at the one site where the nurse PI was authorised to extract relevant clinical data from participant electronic health records.

3.3 Participants

Australian adults with diagnosed diabetes who participated in the iDEES study.

3.3.1 Sample size

Of 172 eligible participants, 135 (79%) consented to extraction of relevant vascular risk factor data from electronic clinical records.

3.4 Variables and outcome measures

Clinical and biochemical risk factors were obtained from the electronic medical records, including: age, sex, known diabetes duration, nurse measured height and weight (for BMI calculation), smoking status, blood pressure, lipids (total-, LDL- and HDL-cholesterol, and triglycerides, with LDL-cholesterol calculated by the Friedewald equation (Friedewald et al., 1972). Kidney function (serum creatinine, estimated glomerular filtration rate [eGFR]), and a spot urine albumin: creatinine ratio (ACR), based on the Royal College of Pathologists of Australia estimation formula (The Royal College of Pathologists of Australia, 2021). Diagnoses of hypertension and dyslipidaemia and medications were also recorded. The cut-points for risk factors levels in adults with diabetes as recommended by the Royal Australian College of General Practitioners general practice management of type 2 diabetes (2016-2018) were: BMI<25kg/m^2; non-smoking; blood pressure <130/80mmHg; HbA1c ≤7%; (<53 mmol/mol), eGFR >90ml/min/1.73m^2; urine ACR <3.5mg/mmol for women and <2.5 mg/mmol for men, lipids: total cholesterol <4 mmol/l, triglycerides <2 mmol/l, LDL-cholesterol <2 mmol/l and HDL-cholesterol >1 mmol/l (Royal Australian College of General Practitioners, 2016) . If a person with diabetes had had a cardiac event the recommended LDL-cholesterol target was <1.8 mmol/l (Royal Australian College of General Practitioners, 2016) and is currently <1.4mmol/l (Royal Australian College of General Practitioners, 2020). C-reactive protein (CRP) cut-points for CVD risk are as recommended by the American Heart Association with the healthy level being <1.0 mg/L ((Pearson et al., 2003) Pfützner & Forst, 2006)

3.5 Data collection

Data were extracted by the study nurse from the general practice's electronic medical records. As well as risk factors, prescribed medication data were collected. Risk factor levels were related to nationally recommended treatment targets for people with diabetes.

3.6 Ethics considerations

The study was approved by the University of Melbourne Human Research Ethics Committee (ID: 17505904), and the trial registered with the Australian and New Zealand Clinical Trials Registry (ACTRN12618001204235). The ethics committee and governance board of the study site, which included Indigenous Australian community representatives, approved the iDEES study, including survey suitability for the target population.

3.7 Data analysis

Data management and analysis used Excel® (Microsoft, Redmond, WA, USA) and IBM SPSS® (IBM, Armonk, NY, USA) version 27. Descriptive data were reported as count (percent) for frequencies, mean or median for measures of central tendency and 95% confidence intervals or interquartile ranges for measures of data variability, as appropriate. Univariate analyses (ANOVA for between-groups analysis of normally distributed continuous dependent variables, Mann-Whitney U Test for between-groups analysis of non-normally-distributed continuous dependent variables and Chi-Square Tests for between-groups analysis of categorical variables) were performed using complete case analysis. Non-parametric analyses and statistics were used when assumptions for parametric methods were violated. Significance was assumed at p values < 0.05.

3.8 Validity and reliability/rigour

Diabetes was diagnosed by biochemical testing of venous blood for glucose and / or HbA1c levels, not by self-report, nor by finger-prick testing. Height and weight were measured by clinic staff for BMI calculation, rather than being by self-report. Height and weight measurements were made with patients wearing normal clothing and no shoes. Weight was

measured using flat scales (model Seca875 - product number 875 7021 094) and height was measured using a wall-mounted 2 metre stadiometer (No.26SM). Smoking status was by self-report. All tests of blood and urine were performed by the local pathology laboratories, which meet National Association of Testing Authorities accreditation standards. Medical diagnoses and medications prescribed were obtained from the medical records. Tests reported were within three months of the study baseline visit. Medications prescribed were as listed in the clinic's medical records but it is recognised that participants may not always take their prescribed medication as recommended, nor accurately report their medication usage to their clinician. Data linkage with our national medication data-base was not available as it is costly and often lags substantially. Furthermore, collecting a medication does not always equate to it being taken.

4 RESULTS

4.1 Baseline characteristics

Demographic and clinical characteristics of study participants are summarised in Table 1.

4.1.1 Participation

The participation flow chart for the risk factor study is shown in Figure 1. Of the 172 eligible participants 135 (79%) participated, 48(36%) male. The 37 non-participants were not contactable i.e. had either moved or did not respond to the letter of invitation sent to the provided home address, to two phone calls to the provided home landline or to a phone call or text message to the provided mobile phone number. Available data on non-participants was limited to age and sex. Eligible patients not recruited to the iDEES study (non-participants) were similar demographically to iDEES study participants i.e. 41% vs. 36% were male ($p_{\chi 2}$ = 0.268) and median (IQR) age was 55 (41-70) vs. 56 (46-67), respectively, $p_{\text{Mann-Whitney U-Test}}$ = 0.781.

4.1.2 Participant characteristics

Traditional risk factor levels and the percentage of subjects meeting recommended risk factor targets are reported in Table 2.

The number of risk factor targets met by all participants and by each sex are shown in Figure 2. Of nine clinical risk factors, the median (IQR) number of risk factors at target levels among women was 4 (3-5) and among men was 3 (2-5), $p_{\chi 2} = 0.563$.

For glucose control targets, the percent meeting the HbA1c target overall was 34% with differential rates according to the means of glucose control prescribed, as shown in Table 1.

For blood pressure, overall 38% met the recommended blood pressure target, as shown in Table 1.

For lipids, depending on the lipid fraction, between 39% and 62% met the recommended target, as shown in Table 2. With regard to lipid drugs, 73 (54%) were prescribed a HMG CoA Reductase inhibitor ('statin') and 13 participants (10%) were prescribed fenofibrate, of whom 8 (62%) were also prescribed a statin. For those on either a statin and/or fenofibrate, 69% met the LDL-cholesterol target, 58% met the triglyceride target and 57% met the HDL-cholesterol target. By contrast, of those not on lipid drugs, a smaller proportion met the LDL-cholesterol target (31% vs. 69%, respectively; $p_{\chi 2} < 0.05$), and, triglyceride and HDL-cholesterol targets were met by a non-significantly smaller proportion (42%, and 43%, respectively).

Results of sub-analyses not presented in Table 1 for summary CVD and CRP data (reported in Table 1) now follow: a) for the subset with diagnosed CVD (n = 30), median (range) LDL-cholesterol level was 2.1 (0.4-3.6) mmol/L and 53% had been prescribed a statin and/or fenofibrate. For known CVD cases (n = 30), the previously recommended LDL-cholesterol target of < 1.8 mmol/L was met by 12 (43%) and the current LDL-cholesterol target of < 1.4 mmol/L for CVD cases was met by eight (29%) participants, and b) for the subset with CRP data, the CRP range was 0-183 mg/L. For women (n = 76), median (IQR) CRP level was 9

(2-19) mg/L and the CRP range was 0-183 mg/L. For men (n = 42), median (IQR)] CRP level was 6 (2-13) mg/L and the CRP range was 0-75 mg/L, with similar distribution in both sexes. (p = 0.430, Mann-Whitney U-Test). The proportion with CRP in the low, mild-moderate and high CVD risk and potential infection categories were 8.5, 26.3, 28 and 37.3 %, respectively and were similar by sex.

5 DISCUSSION

We conducted a nurse-led study in an Indigenous-led primary care clinic in which eye screening was combined with diabetes education and the nurse had access to patient electronic medical records thereby enabling assessment of vascular risk factors. Most patients did not meet the recommended treatment targets for risk factors such as BMI, smoking, blood pressure, HbA1c, kidney function and blood fats, usually with only 3 or 4 of 9 risk factor targets being met. Whilst this adverse risk profile is similar to that found in other groups in Australia and overseas, findings suggest the nurse-led iDEES model is an appropriate model of care.

There are multiple well-recognised risk factors for the chronic complications of diabetes and many proven strategies to help achieve recommended risk factor targets (Royal Australian College of General Practitioners, 2016). Despite helpful funding support, diabetes self-care is a challenging path to navigate, and a nurse-led model of personalized diabetes education and self-care can be a strong support.

Mental health issues, such as diabetes distress and anxiety can impact capacity to meet and maintain recommended self-care (Browne et al., 2017; Nefs et al., 2019). Furthermore, many Australians with diabetes have multiple vascular risk factors, as noted herein. In a national 2011-12 survey, 94% of people with diabetes had three or more vascular risk factors.

Specifically, 25% had three risk factors, 41% had four risk factors and 28% had five or more risk factors (Australian Institute of Health and Welfare, 2015).

Unfortunately, Indigenous Australians have high rates of heart (Kempton et al., 2020) and kidney disease (Nagel et al., 2020), which are increasing (Mnatzaganian et al., 2020; Radford et al., 2019). To monitor kidney disease outcomes, albuminuria is a key performance indicator for Indigenous health care services. In our iDEES study, many with increased albuminuria (46%) were identified, despite 52% being on blood pressure lowering drugs, which are kidney-protective and usually reduce albuminuria (Delanaye & Scheen, 2019).

The risk factor target met least often (by 14%) amongst our study participants was BMI, in keeping with nation-wide studies that show 2 out of 3 Australians are overweight or obese (Australian Institute of Health and Welfare, 2020b). As being overweight or obese is a risk factor for Type 2 diabetes, the low rate of normal BMI levels in our study was not unexpected, but excess body fat still merits attention as it is associated with adverse outcomes (Kyrou et al., 2018). As well as lifestyle modification, a range of subsidized drugs and bariatric procedures are available (Ammori et al., 2020). Nurses can support diabetes education and discussions around weight management in this iDEES model of care.

The risk factor target that was most often met was that of non-smoking, with 64% of participants being non-smokers, including 22% who were ex-smokers. The is comparable to that in Indigenous and non-Indigenous Australians without diabetes (Australian Institute of Health and Welfare, 2020a). Chewing tobacco or pituri is also common among Indigenous Australians, particularly among Indigenous women in Central Australia (Ratsch et al., 2017), but our data did not capture these potentially harmful behaviours. Recent studies estimate that smoking is a major contributor to the life expectancy gap between Indigenous and non-Indigenous Australians (Greenhalgh, 2020). Consequently, more attention needs to be given

to smoking cessation programs, and a nurse-led iDEES service could support patients in such interventions.

In our cohort of predominantly Indigenous Australians with diabetes, almost 2 out 3 people had diagnosed hypertension, and only 1 in 3 met the recommended blood pressure targets. Often multiple drugs from different classes are needed to reach recommended blood pressure levels. This under-treatment of hypertension also occurs in the general Australian population (Hird et al., 2019) and could be a doctor-initiated intervention target monitored by nurses in the iDEES model of care.

Abnormal lipid levels were present in over 4 out of 5 participants. Combination drugs, such as a statin plus the cholesterol absorption inhibitor ezetimibe, are a potential intervention in such cases. Missed doses of prescribed medications and / or failure to initiate or to up-titrate drug therapy can contribute to suboptimal blood fats. Nurses with prescribing rights can assist with drug initiation and titration and all can support patient education. Given the high rates of heart disease in Indigenous Australians and in people with diabetes, aggressive blood fat control is desirable. The Cholesterol Treatment Trialists Collaboration (CTTC) meta-analysis of statin trials showed that lower LDL-Cholesterol is associated with lower rates of heart disease events and death (Cholesterol Treatment Trialists' (CTT) Collaboration, 1995) and that people with and without diabetes gain similar benefit from a statin drug (Kearney et al., 2008).

Inflammation promotes heart disease and diabetic eye and kidney complications (Shim et al., 2020). Levels of CRP above 1 are associated with higher heart disease risk, and CRP levels over 10mg/L may reflect acute infections (Pearson et al., 2003), which are common in people with diabetes (Knapp, 2013). As shown previously, Indigenous Australians often have high levels of CRP, sometimes related to high body fat and to low nutritional status (Shemesh et al., 2007; Rowley et al., 2003). High rates of CRP levels consistent with infection were noted,

but no data regarding potential sites of infection were available and were beyond the scope of this study. Interventions based on diet quality and/or drugs that treat traditional risk factors (American Diabetes Association, 2021) and have an anti-inflammatory effect (Steven et al., 2019) may attenuate elevated CRP levels in this primary care setting and merit consideration.

Most study participants did not reach recommended risk factor treatment targets, which occurs to a similar level in the general Australian population (Australian Institute of Health and Welfare, 2015). Our results were similar in our comparable audit of Indigenous Australians in Central Australia (Atkinson-Briggs et al.,2021). Potential contributors to suboptimal treatment target attainment may include clinical inertia by clinicians, low health literacy of patients with diabetes, the burden of so many things to monitor and the number of medications, fear of drug side-effects, and the economic costs. Nurses are well-placed to help address some of these issues in the structured and personalized nurse-led iDEES model of care.

Strengths and Limitations

Study strengths include the importance of the clinical problem, the proven benefits of risk factor control, the high rate of study participation (79%) in this nurse-led model of integrated diabetes care, access to medical records and the wide range of risk factors assessed.

Study limitations are that Indigenous male participation rates were low. This is common in screening programmes (Brazionis et al., 2018). Another limitation is that adherence to prescribed medications could not be assessed: Self-report may not be reliable and blood tests to check drug levels to confirm drug adherence were not available. The study did not have data related to acute infections which may contribute to the high CRP levels identified. Our smoking data did not include smoking of pituri or of chewing tobacco and relied on self-report. The generalisability of results to other Indigenous Australians with diabetes is not known, but Central Australian and national data support our findings that suboptimal risk

factor management is common. The COVID-19 pandemic resulted in closure of Indigenous health services for research and non-emergency visits, hence the planned follow-up of change in risk factor levels was not possible. Finally, STROBE guidelines guided the write-up of the manuscript.

In summary, in Indigenous Australians with diabetes attending an Indigenous primary health care clinic, assessment rates of vascular risk factors was high, but most people did not meet recommended treatment targets. As a nurse providing diabetes education often spends more time with the patient than other clinicians, their knowledge and discussions with patients may help improve patient health literacy and risk factor levels. Reinforcement by multiple clinical team members of the importance of risk factor control and discussion of patient concerns can support improved patient self-management and health outcomes.

5 CONCLUSIONS

This nurse-led model of routine risk assessment prior to personalized diabetes education provided useful insights that could facilitate risk factor management in a regional Indigenous primary care clinic. Screening of Indigenous Australian adults with diabetes for recognised complication risk factors in a nurse-managed diabetes clinic was achieved. Additional strategies may be needed for participation and complication prevention, particularly in men, perhaps more male health-workers and clinics for men only (which already exist in some Australian Indigenous primary healthcare services).

Management of key risk factors though was sub-optimal and requires ongoing attention including by the diabetes care team, individual and community education and prevention programs. Nurses have an increasing and key role in optimising risk factor care to help improve health outcomes. An expanded role for nurses in nurse-led diabetes clinics, such as in the iDEES model of risk factor monitoring, eye screening and more-targeted diabetes

education, may be beneficial and warrants further investigation, both in Australia and internationally.

CONFLICT OF INTEREST

The authors declare that they have no competing interests.

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Table 1 Participant characteristics in the iDEES clinical risk factor study*

A. Categorical variables		**n**	**% of total**
Sex, male		48	36
Indigenous		118	87
Diabetes type			
Type 1/ Type 2		7/128	5/95
Smoking status			
Never/ Former/ Current		57/29/49	42/22/36
HbA1c at target (≤ 7% [53 mmol/mol])		46	34
SBP and DBP at target (< 130/80 mmHg)		51	38
SBP at target/DBP at target		75/71	56/53
BMI category			
Normal/Overweight/Obese		18/34/81	14/26/61
Total-/LDL-/HDL-Cholesterol at target (< 4/< 2/≥ 1mmol/L)		56/66/79	44/52/62
Triglycerides at target (< 2 mmol/L)		50	39
LDL-C, HDL-C and Triglycerides at target (as above)		18	14
HbA1c management:			
Diet only/OHA only/Insulin only/OHA Plus Insulin		12/76/21/26	9/56/16/19
Fenofibrate only/Statin only/Fenofibrate and/or statin prescribed		13/73/78	10/54/58
Antihypertensive prescribed		70	52
Antidepressant prescribed		36	27
Hypertension diagnosis		84	62
Hyperlipidaemia diagnosis		74	55
CVD/CHD/IHD diagnosis		30	22
CKD diagnosis		29	22
B. Continuous variables	**Median**	**25th - 75th centile**	
Age (years)	56	46	67
Age at DM diagnosis (years)	48	40	58
Diabetes duration (years)	6	2	12
HbA1c (%/mmol/mol)	8.0/64	6.7/50	9.5/80
SBP/ DBP (mmHg)	127/78	115/70	137/85
Total/LDL/HDL Cholesterol (mmol/L)	4.2/1.9/1.1	3.4/1.4/0.9	5.0/2.9/1.3

Triglycerides (mmol/L)	2.3	1.5	3.4
BMI (kg/m2)	32.4	27.5	40.8
ACR (µg/mg)	2.7	1.0	10.6
eGFR (mL/min/1.73 m²)	89	67	91
CRP (mg/L)	7.0	2.3	16.0

* Total sample size is 135 for each characteristic unless stated otherwise herein: lipid data n = 127, fenofibrate data n = 130, antidepressant data n = 133; Abbreviations (total n) for risk factors: HbA1c glycated haemoglobin (n = 133), SBP systolic blood pressure (n = 133), DBP diastolic blood pressure (n = 133), BMI body mass index (n = 133), ACR albumin:creatinine ratio (n = 119), eGFR estimated glomerular filtration rate (n = 131), OHA oral hypoglycaemic agent/s (n = 131), CVD/CHD/IHD cardiovascular disease/coronary heart disease/ischaemic heart disease (n = 131), CKD chronic kidney disease (n = 131), CRP C-reactive protein (n = 118)

Table 2 Proportion of iDEES participants meeting clinical risk factor targets, by sex

Risk factor (target*)	Total		Women		Men	
	n	% (n) who met target	n	% (n) who met target	n	% (n) who met target
Smoking (non-smoker)	135	64 (86)	87	64 (56)	48	63 (30)
HDL Cholesterol (≥ 1 mmol/L)	126	62 (79)	82	66 (54)	44	56 (25)
ACR (< 2.5 µg/mg men, < 3.5 µg/mg women)	119	54 (64)	79	61 (48)	40	40 (16)
LDL Cholesterol (< 2 mmol/L)	125	52 (65)	81	43 (35)	44	68 (30)
Total Cholesterol (< 4 mmol/L)	126	44 (56)	81	42 (39)	45	49 (22)
Triglycerides (< 2 mmol/L)	127	39 (50)	82	49 (40)	45	22 (10)
Blood pressure (≤ 130/80 mmHg)	135	38 (51)	87	39 (34)	48	35 (17)
HbA1c (≤ 7% [53 mmol/mol])	131	34 (45)	85	37 (31)	46	30 (14)
BMI (≤ 25kg/m^2)	133	14 (18)	86	19 (16)	47	4 (2)

Abbreviations: ACR albumin to creatinine ratio; *refers to nationally recommended target for Australian adults, including Indigenous Australians

Title: Nurse-led vascular risk assessment in a regional Victorian Indigenous primary care diabetes clinic: An **i**ntegrated **D**iabetes **E**ducation and **E**ye disease **S**creening [iDEES] study

Short title: Vascular risk factors in a nurse-led integrated diabetes clinic

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AUTHOR CONTRIBUTIONS

SAB, LB and AJ were involved in the conceptualisation of the study, and SAB, AJ and LB prepared the first draft of the manuscript. AJ and LB were involved in the design of the study, acquisition of funding and reviewing manuscript drafts. All authors have read and approved the final manuscript and accept responsibility for its content.

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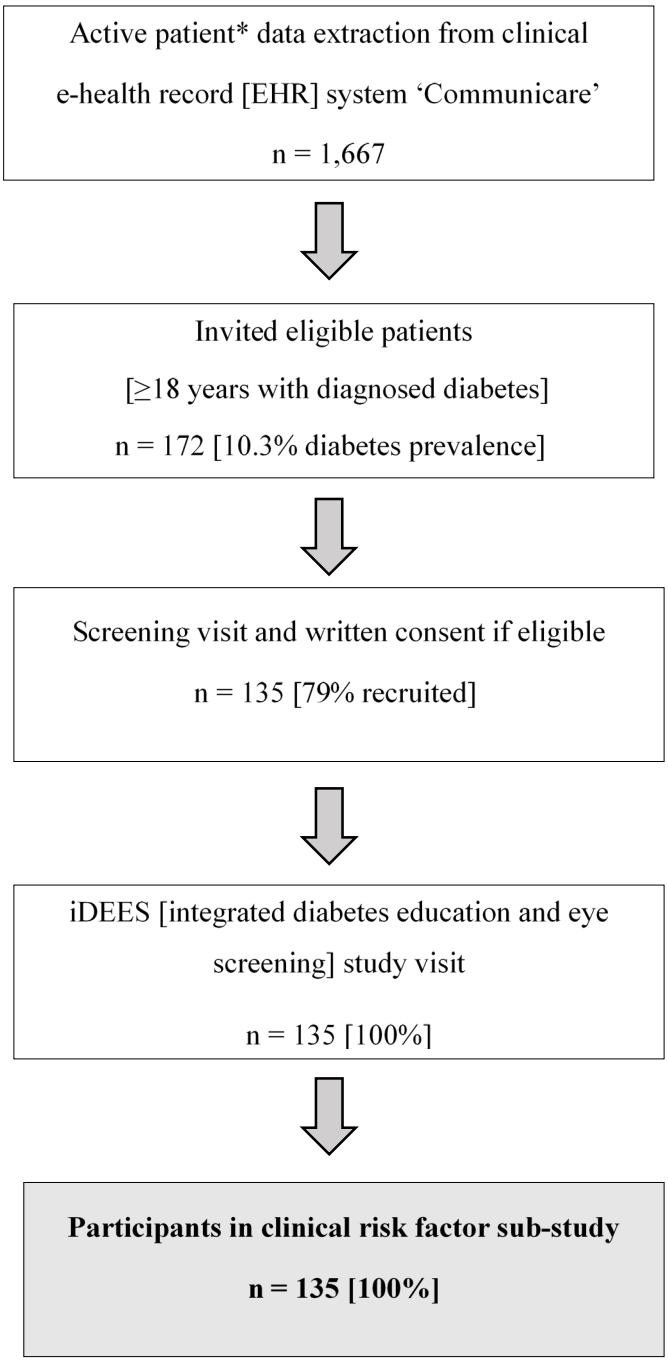

* Active patient is defined as a patient who attended the health service at least 3 times within two years preceding study start date at the clinic

Figure1 Participation flowchart for the nurse-led iDEES clinical risk factor study

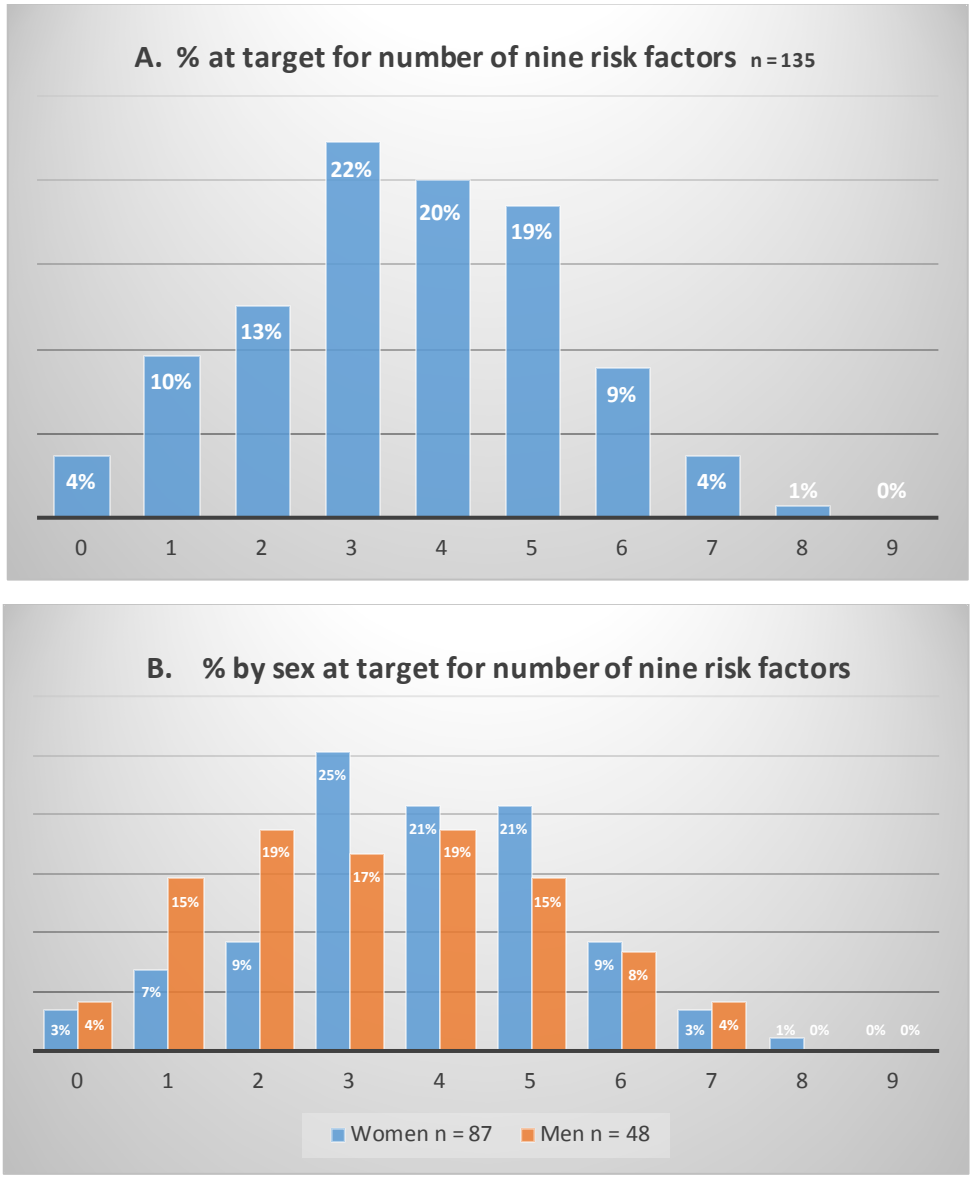

Figure 2 Proportion of iDEES participants (A) and participants by sex (B) meeting multiple clinical risk factor treatment targets