


BMJ Open Codesigning enhanced models of care for Northern Australian Aboriginal and Torres Strait Islander youth with type 2 diabetes: study protocol

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ABSTRACT

Introduction Premature onset of type 2 diabetes and excess mortality are critical issues internationally, particularly in Indigenous populations. There is an urgent need for developmentally appropriate and culturally safe models of care. We describe the methods for the codesign, implementation and evaluation of enhanced models of care with Aboriginal and Torres Strait Islander youth living with type 2 diabetes across Northern Australia.

Methods and analysis Our mixed-methods approach is informed by the principles of codesign. Across eight sites in four regions, the project brings together the lived experience of Aboriginal and Torres Strait Islander young people (aged 10–25) with type 2 diabetes, their families and communities, and health professionals providing diabetes care through a structured yet flexible codesign process. Participants will help identify and collaborate in the development of a range of multifaceted improvements to current models of care. These may include addressing needs identified in our formative work such as the development of screening and management guidelines, referral pathways, peer support networks, diabetes information resources and training for health professionals in youth type 2 diabetes management. The codesign process will adopt a range of methods including qualitative interviews, focus group discussions, art-based methods and healthcare systems assessments. A developmental evaluation approach will be used to create and refine the components and principles of enhanced models of care. We anticipate that this codesign study will produce new theoretical insights and practice frameworks, resources and approaches for age-appropriate, culturally safe models of care.

Ethics and dissemination The study design was developed in collaboration with Aboriginal and Torres Strait Islander and non-Indigenous researchers, health professionals and health service managers and has received ethical approval across all sites. A range of outputs will be produced to disseminate findings to participants, other stakeholders and the scholarly community using creative and traditional formats.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ Our study design, which encompasses four regional sites spanning Northern Australia and partnerships with key stakeholders from each jurisdiction, will advance the implementation of enhanced models of care.
- ⇒ A complex multijurisdictional study presents challenges in development of local collaborations and context-specific responses to the needs of youth with type 2 diabetes that attend to the diversity of Aboriginal and Torres Strait Islander peoples.
- ⇒ Through local collaboration and codesign processes in each site, we envision that a range of outputs will be developed, some of which may be region-specific, while other outputs may be relevant to youth and healthcare systems more broadly.
- ⇒ Time and resource constraints and the ongoing impacts of COVID-19 may pose limitations to the engagement of each participant group in the study.
- ⇒ Beyond the life of this project, further evaluation will be required to assess the implementation of enhanced models of care, and the longitudinal health and social impacts on Aboriginal and Torres Strait Islander youth with type 2 diabetes.

INTRODUCTION

There is a critical need for the development of systems and supports for the management of youth-onset type 2 diabetes (defined as that diagnosed in people aged 12–25). While the high prevalence of type 2 diabetes among older adults has received considerable attention,¹ youth-onset type 2 diabetes is an emerging condition worldwide, particularly in

socioeconomically marginalised and Indigenous¹ populations.¹⁻³ Across Northern Australia, we recently reported a very high prevalence of type 2 diabetes among Aboriginal and Torres Strait Islander youth of 6.7 per 1000 people aged 24 years or younger.⁴ This is arguably the highest reported prevalence in any youth population internationally within the past 25 years. The emergence of youth-onset type 2 diabetes is taking place within contexts in which type 2 diabetes among adults is already endemic. For example, in Australia's Northern Territory, a jurisdiction encompassed within Northern Australia, the prevalence of diabetes among Aboriginal and Torres Strait Islander adults in remote areas is 28.6%.⁵

Type 2 diabetes among young people is associated with earlier complications than later-onset diabetes and a more rapid decline in pancreatic beta cell function.⁶⁻⁹ In utero, exposure to elevated glucose levels from maternal diabetes predisposes children to altered growth patterns,^{10 11} obesity in childhood and adolescence¹² and significantly higher risk of type 2 diabetes later in life.^{10 11} Additional associated factors include social and structural components influencing the conditions in which young people live.² Healthcare systems do not currently have well-established pathways and approaches for addressing the interconnected clinical and social dimensions of youth-onset type 2 diabetes to optimise management and improve quality of life and social and emotional well-being.

The increasing prevalence of youth type 2 diabetes is associated with systemic inequalities and structural racism, and their effects on social determinants of health.^{13 14} In Indigenous populations around the world, displacement, political and economic marginalisation, poverty, poor living conditions and inequitable access to healthcare are all factors that contribute to significant social stress, food insecurity, reliance on calorie-dense, nutrient-poor food and ultimately health inequities.² These factors have also contributed to intergenerational trauma and the marginalisation of younger generations, who may experience educational and employment inequities in broader societies while, in many cases, their capacity to participate in customary economies has also been diminished.^{15 16} Despite this, across Northern Australia, many Aboriginal and Torres Strait Islander youth and their families draw strength from extended kinship networks, practices of family caregiving and positive Indigenous identities to act in the world and live meaningful lives.^{15 17}

Recent work exploring the lived experience of young Aboriginal and Torres Strait Islander people with type 2 diabetes across Northern Australia illustrates the many difficulties youth and their families experience in managing young peoples' health.^{18 19} Our formative study illustrated how diabetes is normalised yet also stigmatised among Aboriginal and Torres Strait Islander youth; and young people diagnosed with the condition may

experience social ostracisation and judgement, despite its high prevalence in many Aboriginal and Torres Strait Islander communities.¹⁹ We have also shown that the presence of comorbidities and contexts of poverty and social stress impede the capacity of youth and their families to monitor blood glucose levels, regularly take diabetes medications and avoid foods with high sugar content.¹⁹ Many Aboriginal and Torres Strait Islander people with type 2 diabetes are not engaged with health services and participants in our formative work articulated a need for information about diabetes to be presented in an accessible format, along with more support with diabetes management.¹⁹

Internationally, a small number of programmes have been developed to address diabetes among young Indigenous populations through varying culturally relevant, place-based interventions comprising physical activity, dietary and educational components.²⁰⁻²² These programmes have been developed using a range of participatory research approaches relevant to local contexts. However, our literature review has not located any measures or programmes designed to address both the social and clinical dimensions of diabetes among young Indigenous people. The current study has emerged in response to a lack of effective clinical guidelines, resources and approaches that address the specific health and social care needs and contexts of Northern Australian Aboriginal and Torres Strait Islander youth living with type 2 diabetes. Importantly, our formative work demonstrates that Aboriginal and Torres Strait Islander young people have ideas about how care could be improved, including establishing youth support networks, conducting education and support activities on country, and by making healthcare services youth-friendly spaces.¹⁹

Codesign approaches have the potential to facilitate the adaptation and improvement of current models of care for youth-onset type 2 diabetes. Through codesign, the knowledge and experiences of people living with health conditions, health professionals and other stakeholders are brought together, disrupting traditional power structures in healthcare systems.²³⁻²⁶ In this paper, we describe the methodology of a codesign project that addresses youth-onset type 2 diabetes and is nested within the Diabetes across the Lifecourse: Northern Australia Partnership. This collaboration was established in 2011 between research institutes, health services, policy-makers and communities. It works in partnership with Aboriginal and Torres Strait Islander people to break the cycle of type 2 diabetes and related conditions.^{13 27}

Northern Australia comprises the regions of the Top End and Central Australia (in the Northern Territory), Far North Queensland and the Kimberley region of Western Australia. Within the regions of Northern Australia, Aboriginal and Torres Strait Islander people comprise 17%–42% of the total population and represent a large variety of tribe, clan and language groups.²⁸

Care for Aboriginal and Torres Strait Islander youth with type 2 diabetes takes place within families and

¹We respectfully use the term Indigenous to refer to populations around the world.

communities, along within established healthcare systems. We will therefore collaborate with a range of participants and stakeholders from across Northern Australia to identify, codesign, implement and evaluate a range of multifaceted initiatives and resources through a codesign process to improve support systems and components of current models of care over 2020–2023. The specific aims of this project are to:

1. Build awareness, support networks and advocacy efforts for type 2 diabetes among youth, in communities and in health systems.
2. Improve diabetes knowledge.
 - a. Increase diabetes knowledge of youth and their families and communities through the development of age-appropriate and culturally safe educational resources and initiatives.
 - b. Increase health professional knowledge through education, development and promotion of guidelines and clinical pathways.
3. Enhance and develop relevant support systems for the management of youth type 2 diabetes.
 - a. Support young people and their families to manage type 2 diabetes
 - b. Support health professionals and health systems to engage effectively with youth to deliver relevant and meaningful health messages and education.
4. Positively influence self-rated quality of life (including social and emotional well-being outcomes) through the development of new ways of providing health services and supports for young Aboriginal and Torres Strait Islander people with type 2 diabetes.

The aim of this paper is to describe the codesign process for developing enhancements to current models of care for youth-onset type 2 diabetes in Northern Australian Aboriginal and Torres Strait Islander communities, using a developmental evaluation approach.

METHODS AND ANALYSIS

Theoretical and conceptual framework

Our study is informed by a range of social sciences theories and conceptual frameworks that foreground the validity and value of patient knowledge and experience, namely: experiential knowledge,²⁹ healthcare and codesign conceptualised as relational practices^{30 31} and narrative theory.³² These standpoints inform our approach that the active participation of young people, their families and communities, and health professionals is required to facilitate new ways of working that address the physical and social dimensions of youth type 2 diabetes. We conceptualise participation in health system adaptation as a relational process; and as requiring traditional power structures in healthcare to be challenged. We understand experiential knowledge as a set of insights that may be explicit, tacit, embodied and contextual and locate storytelling as central to the way that young people construct their experiences of diabetes and their identities in the face of chronic illness. We therefore incorporate methods

designed to elicit participants' experiential knowledge, foster collaborative relationships and give voice to young people with type 2 diabetes.

Patient and public involvement

The aims and design of this study emerge from our formative work exploring the lived experience of type 2 diabetes among Aboriginal and Torres Strait Islander youth.¹⁹ Components of enhanced models of care will be codesigned and evaluated using a participatory approach to ensure issues are appropriately framed, solutions collaboratively developed and assessed, and recommendations for implementation agreed on.^{23 33} Consistent with similar codesign studies, our study design does not include a detailed description of an intervention to be developed and evaluated.^{34–36} While we describe below a framework for working with a broad range of participants and for supporting the development of the codesign process through a developmental evaluation approach, the improvements to existing models of care that we develop will be determined over the course of the project so as to enable Aboriginal and Torres Strait Islander young people with type 2 diabetes, their families and health professionals to be genuinely engaged in their design, implementation, evaluation and dissemination. Our approach requires the development of authentic ways of working through the centring of relationships between project participants, including researchers. We will use methods that respect Aboriginal and Torres Strait Islander communicative, age-based and gender norms and reflect local contexts and circumstances.

While it is not possible to alter the positionalities of the research team and participants, which may give rise to power imbalances and insider/outsider dynamics, we have attempted to address these to the extent which we are able within the overall study design, codesign process and research methods used. As described in more detail in the methodology, the following elements are designed to address power imbalances and to foster age-appropriate, culturally safe practice:

- ▶ The engagement of Aboriginal and Torres Strait Islander researchers as paid members of the research team.
- ▶ The generation of opportunities for participants to be involved in determining which initiatives and resources are developed, and to participate in their development and implementation.
- ▶ The adoption of a flexible yet structured codesign process in which youth with type 2 diabetes are given options to participate alongside parents/caregivers, individually or together with other youth with type 2 diabetes.
- ▶ The adoption of a codesign process which includes a crucial first step of building relationships among participants, and between participants and the research team.
- ▶ The inclusion of Aboriginal and Torres Strait Islander researchers as members of the research team who act

as conduits who share the perspectives and outcomes of different participant cohorts with each other. Consequently, youth with type 2 diabetes are not required to share their experiences in front of health professionals also participating in the project.

- ▶ The use of a range of qualitative research methods including arts-based methods designed to respect Aboriginal and Torres Strait Islander communicative norms and traditions of storytelling and visual communication during the codesign process.

Evaluation methodology

A developmental evaluation approach is adopted to support the creation of enhancements to current models of care. Developmental evaluation deploy cycles of reflective practice and adaptation to support innovation, and can, therefore, be used to inform codesign processes and emergent outcomes through feedback loops.^{37 38}

This approach reflects poststructural understandings of complex system changes as a 'dynamic process of situated improvisation where plans are... renegotiated as circumstances warrant' (39: 54), rather than a sequential process of formally devising plans and then executing them. The developmental evaluation approach is, therefore, concurrent with codesign and implementation of specific adaptations to models of care. Research methods used within the codesign process will generate data that will also be used in the evaluation, in rapid data analyses undertaken at each stage of the project. For example, interviews, arts-based methods, meeting minutes and other data being collected as part of the codesign process described below will also be used to evaluate emergent outcomes, which then inform subsequent stages of the codesign process and development of interventions. To facilitate this process, evaluators are embedded within the research team. We will also evaluate the development, implementation and outcomes of specific enhancements to models of care components, using the methods described below.

Study design: codesign process and implementation of components of models of care

Participants

The codesign and implementation process will bring together the lived experience and ideas of Aboriginal and Torres Strait Islander young people with type 2 diabetes, their families and communities, health professionals providing diabetes care and researchers. In each of the four regions, we aim to recruit 15 young Aboriginal and Torres Strait Islander people with a diagnosis of type 2 diabetes, 15 Aboriginal and Torres Strait Islander community members, guardians, caregivers and support people (such as elders, leaders and social and community service staff) and 30 health professionals (such as general practitioners, paediatricians, endocrinologists, nurses, allied health professionals, Aboriginal Health Practitioners, diabetes educators and health service managers working in primary healthcare and specialist diabetes services). Within the youth participant group, we aim to include

young people within the 10–25 years age range, reflecting different levels of cognitive development and young people who adopt a mix of gender identities, in order to ensure a range of perspectives are included. By cognitive development, we refer to children and young people's growing capacities regarding perception, information processing, conceptual resources and other aspects of brain development generally considered to take place during childhood and adolescence. We anticipate that these sample sizes will provide sufficient diversity of experience and perspective.

Sites

Encompassing a broad range of study sites across four regions of Northern Australia will enable inclusion of participants in diverse social and health systems contexts. There will be approximately 1–3 sites in each region (approximately 8 sites total), involving collaboration with relevant jurisdictional health services (primary, secondary and tertiary) and Aboriginal community-controlled primary healthcare services. Sites in each region will be selected on the basis of the presence of Aboriginal community-controlled primary healthcare services interested in participating in the project and logistical and resourcing considerations. For each region, one project coordinator and one community liaison officer will be employed by the project. Two evaluation officers will be employed to cover the four regions.

Recruitment strategies

We will adopt a family and peer support-based approach to recruiting and working with young people, reflecting Aboriginal and Torres Strait Islander understandings of health as residing within extended family networks and extensive Aboriginal and Torres Strait Islander caregiving practices.^{15 40 41} This approach also fosters a supportive environment for young participants. Recruitment of young people will be through referral to the study by participating health services, and through networks of members of the research team. Members of the research team who have professional or personal networks that encompass Aboriginal and Torres Strait Islander youth with type 2 diabetes will make informal approaches to them (eg, via phone calls, social media or in person). Potential participants who show interest in being involved will then be provided with more detailed information about the study and informed consent for participation will be sought, as with other participants. Young people will be approached by the research team about involvement in the project together with their caregivers, guardians or other support people where possible. Community members will be recruited through local events and promotional activities during the codesign process and on the recommendation of youth and family participants, partnering health services and members of the team. Invitations to participate in the project will be made to health professionals who are involved in various aspects of the management of youth type 2 diabetes at participating health services,

and through other networks of the Diabetes across the Lifecourse: Northern Australia Partnership.

Codesign and implementation methods

We will collaborate with youth, their families, communities and with health professionals, using flexible processes premised on experience-based codesign.²³ This includes sequential phases of engagement and relationship-building; collecting information and identifying issues; reaching consensus over approaches and resources to develop; and design work with cohorts of Aboriginal and Torres Strait Islander youth with type 2 diabetes and health professionals (online supplemental tables 1 and 2). Timely action learning sessions will take place during each stage of the codesign process with each participant group and within the research team to inform the next stage. The codesign process will take place from approximately mid-2021 to mid-2023 but may vary across sites depending on the recruitment of sufficient numbers of youth and health professionals. Youth and health professional cohorts will undertake separate processes to develop different resources and approaches but may also provide feedback on the corresponding group's outputs. Decisions about which issues to prioritise and which solutions to develop will be made through consensus-based discussion between workshop participants and the research team, taking into account feasibility and available resources. The research team, including Aboriginal and Torres Strait Islander researchers, will be conduits for sharing the perspectives and outcomes of each participant group with the other.

Young people with type 2 diabetes and their families will be involved in shaping codesign methods and approaches used in this study, as well as determining the outputs and intended outcomes of the codesign process. In collaboration with young Aboriginal and Torres Strait Islander people with type 2 diabetes in each region, we will consider developing the following approaches and resources identified by youth during the formative phase,¹⁹ in addition to other approaches or resources identified by participants:

- ▶ An awareness-raising campaign (including a social media component) to raise the profile of youth-onset type 2 diabetes in communities and address social stigma.
- ▶ Age-appropriate and culturally safe diabetes education and management information resources.
- ▶ Peer networks of young people with type 2 diabetes to support diabetes management and address social dimensions of diabetes.
- ▶ Camps or workshops on country (to further develop peer networks and support diabetes education and management in a non-clinical setting).

We will undertake a structured yet flexible process of working with young people and their families, and then transitioning to working with small groups of young

people within study sites or regions if supported by participants and if COVID-19 restrictions allowⁱⁱ (online supplemental table 1). While we aim to convene youth workshops and focus group discussions in each site, we will be guided by the needs and preferences of young people and the developmental capacities of participants and may work with individuals or families where it is not possible to convene groups. Other Aboriginal and Torres Strait Islander community members may also be involved in aspects of this work, for example, by contributing to and disseminating the awareness-raising campaign, advising on culturally appropriate diabetes information and leading activities during camps or workshops on country.

The codesign process adopts a range of qualitative methods including surveys, interviews and focus group discussions using a yarning approach developed by Aboriginal and Torres Strait Islander researchers,⁴² in addition to a range of arts-based methods (online supplemental file 1). The contributions of Aboriginal and Torres Strait Islander youth and their caregivers participating in the study will be recognised through provision of small gift vouchers (\$A25 for activities of less than 1-hour duration, \$A50 for activities of 1-hour duration or more).

Health professionals from each region will also identify approaches and resources to develop to improve health services for young people with type 2 diabetes. Through initial consultations and through networks of the Diabetes across the Lifecourse: Northern Australia Partnership, health professionals have identified a range of specific opportunities for improving the clinical management of type 2 diabetes among Aboriginal and Torres Strait Islander youth. These include the following:

- ▶ Developing screening and management guidelines for type 2 diabetes among youth.
- ▶ Developing referral pathways for type 2 diabetes among youth.
- ▶ Initiatives for improving health professionals' knowledge and confidence in screening for, diagnosing and treating type 2 diabetes among young people.
- ▶ Improving the engagement of young people living with type 2 diabetes with health services.

Health professionals will participate in working groups in each region to collaborate in the development of approaches and resources to address these issues. Working groups will undertake pre-codesign and post-codesign assessments of how well local healthcare systems support youth with type 2 diabetes. This will be performed using the One21seventy Systems Assessment Tool for Aboriginal and Torres Strait Islander primary healthcare, which is based on a validated process grounded in the WHO's Chronic Care Model.⁴³ Working groups will use the systems assessments tool to identify regional priorities for improving

ⁱⁱAt the time of submission, there were no COVID-19 restrictions across study sites, however, travel restrictions, physical isolation and social distancing requirements were in place across all sites during aspects of the planned data collection period.

clinical care and resources and approaches to address them (online supplemental table 2). The process of codesign and implementation will be recorded in meeting minutes and documents and through the Systems Assessment Tool. Webinars on the treatment and management of youth type 2 diabetes will also be provided for health professionals by lead clinicians who are members of the research team, as well as identified champions in each region. Participants will complete post-training evaluation forms.

The involvement of health professionals will be integral to ensuring that approaches and resources developed during the project contain accurate information about diabetes and its clinical management. Approaches and resources developed in collaboration with health professionals will also be reviewed by young people and family and community members to support age-appropriateness and cultural safety.

Evaluation methods

Our developmental evaluation will contribute to the development and implementation of components of models of care. Drawing on developmental evaluation principles, our evaluation framework may be adjusted according to the changes to models of care and approaches developed throughout the project. Planned evaluation methods include the use of action learning sessions using the ‘What? So What? Now What?’ rubric⁴⁴ to engage participants in reflection on the unfolding codesign process. Other planned methods include interviews and focus group discussions, surveys with health professionals, attendance and dissemination logs, systems assessments, reflexive notes and working group minutes and documents.

Data analysis

Two phases of analysis will be undertaken. In phase 1, emergent data will be analysed concurrent with the codesign process described above, to inform subsequent phases of codesign. In phase 2, deeper analysis of qualitative and quantitative data following the conclusion of data collection will identify principles of enhanced models of care.

Phase 1

Rapid analyses of interview, focus group and action learning session data will be undertaken by the evaluation team. Major learnings and emerging recommendations will be shared with participants to inform subsequent action learning sessions and related actions throughout the project in the first instance. Emerging findings from these analyses will be shared with participants to check congruence with their experiences of the project. Separate analyses will also assess the development, implementation and outcomes of developed models of care components.

Phase 2

Text-based qualitative data will be organised, analysed and stored in the qualitative analysis programme NVivo

(V.12). Initially, inductive analysis will be undertaken to ensure emerging categories are accounted for. A coding tree will be developed and cross-checked for accurate interpretation of meaning. Deductive analysis will be informed by a coding tree as developed from formative work, along with the five main constructs of the Systems Assessment Tool⁴³ and constructs that are being explored and tested during the implementation of codesigned activities. Arts-based data and accompanying textual data (eg, recorded discussions and reflections about photographs and drawings) will be analysed separately using an inductive thematic analysis approach. Findings will be triangulated with the themes and findings of other qualitative analysis processes, and shared back with participants where appropriate for cross-checking interpretation of meaning.

The quantitative components of the study (surveys, attendance and dissemination logs, post-training evaluations and social media metrics) will be analysed using Stata (V.16). Outcome measures will be analysed to provide descriptive information and summary statistics, and assess baseline and post-codesign characteristics and outcomes where applicable. Basic frequencies related to implementation activities will be recorded (ie, attendance and dissemination logs, social media metrics) to assess reach and adoption.

ETHICS AND DISSEMINATION

This project has received ethical approval from the Northern Territory Human Research Ethics Committee (#2020-3764), the Western Australian Aboriginal Health Ethics Committee (#HREC 1093), the Western Australian Country Health Service Human Research Ethics Committee (#RGS-5821) and the Far North Queensland Human Research Ethics Committee (#HREC/2021/QCH/70454). All participants will provide written informed consent, or where required, written informed consent from caregiversⁱⁱⁱ; and participants who do not speak standard Australian English as a first language will be offered assistance with an interpreter to complete this process.

Caregiver or guardian informed consent will be obtained for participants below the age of consent, according to legislative requirements in each study jurisdiction. Participants in focus group discussions will be asked to refrain from distributing information shared within the group to maintain privacy and confidentiality. The research team has developed a protocol to respond to instances in which participants experience psychological distress during study activities. This includes all staff involved in data collection undertaking an Aboriginal

ⁱⁱⁱAs our study is being undertaken across three separate Australian jurisdictions (Queensland, the Northern Territory, Western Australia), individual sites are subject to different legislation regarding consent. Some jurisdictions specify an age, whereas in others, consent is premised on a mix of age and developmental capacity.

and Torres Strait Islander Youth Mental Health First Aid training course and understanding the referral process for social and emotional well-being services.

The study will be undertaken over 2020–2023 (dates extended due to the COVID-19 pandemic, which resulted in a 12-month delay). Following its conclusion, a range of outputs will be produced to disseminate findings to Aboriginal and Torres Strait Islander youth and their families and communities, health professionals, policy-makers and the scholarly community. The content and format of anticipated outputs will be determined and developed during the codesign process (online supplemental table 3).

DISCUSSION

There is some evidence that current models of care do not meet the needs of Aboriginal and Torres Strait Islander youth with type 2 diabetes.¹⁹ Opportunities exist to improve quality of life, the prevention of complications and risk reduction for transgenerational exposure to high glucose levels. Internationally, few interventions, programmes and other measures have been developed and evaluated to address youth-onset type 2 diabetes in Indigenous populations through holistic, strengths-based approaches that respond to the health, social and economic circumstances of youth and their families. Our project, therefore, represents an innovative attempt to address this challenge. Our flexible yet structured methodology balances the development of local, context-driven adaptations to models of care with approaches to the management of youth-onset type 2 diabetes that can be scaled up across the region.

Methodologies for addressing both the clinical and social dimensions of youth type 2 diabetes in Aboriginal and Torres Strait Islander communities and other marginalised populations must attend to the power structures that contribute to low levels of engagement of youth and their families with health services. Emerging evidence suggests that codesign approaches have the capacity to engage marginalised populations in processes of participatory healthcare reform.^{33 45 46} Our proposed codesign process and methods are specifically designed to elicit the voices of Aboriginal and Torres Strait Islander youth with type 2 diabetes, adopting approaches that reflect Aboriginal and Torres Strait Islander communicative norms and practices and engage participants in a meaningful process of change that is attentive to relationships among youth and with other stakeholders and researchers.

We anticipate that this study may result in new theoretical insights and practice frameworks, resources and approaches to developmentally appropriate, culturally safe diabetes care. We also expect to contribute to the development of codesign methodologies for projects involving collaboration with Indigenous youth.

Recommendations will be made around what project outcomes should be further implemented and evaluated using implementation science frameworks.

Increasing rates of youth-onset type 2 diabetes in Indigenous populations are associated with structural inequities, including inequitable access to health services and treatment options. In responding to the urgent need to develop appropriate models of care, this project attends to the broader social, structural and health context in which youth-onset type 2 diabetes occurs. Our vision, of developing developmentally appropriate and culturally safe care through a codesign approach, requires the marginalisation of Aboriginal and Torres Strait Islander youth to be addressed conceptually, methodologically and substantively.

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Contributors RK co-led the study, conceived the study design and methodology, contributed to the theoretical framework, wrote the study protocol and contributed to the manuscript. SP contributed to the theoretical framework, study design and methodology and drafted the manuscript. NF, EW, ED, PA, JES, BAW and AB contributed to the study design, methodology and reviewed the manuscript. AT advised on clinical dimensions of youth type 2 diabetes, contributed to the study design, methodology and reviewed the manuscript. JM contributed to the study design from the perspective of a young First Nations person with lived experiences of diabetes and reviewed the manuscript. SM, JM and SG advised on cultural safety



within the project, contributed to the study design, methodology and reviewed the manuscript. AKW, VO'D, CC, LS, JB, JD, EE and SC contributed a stakeholder perspective to the development of the study design and methodology and reviewed the manuscript. LM-B co-led the project, coconceived the study design and methodology and reviewed the manuscript. All authors also provided approval of the manuscript and agreed to be held accountable for all aspects of the work. RK and LM-B co-led funding application, with contributions from SG, ED, AB, PA, JES, CC, AT and AKS.

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