Screening for Pre-Diabetes and Type 2 Diabetes in Children & Youth for Indigenous Communities in Saskatchewan

This tool was developed for health care providers working in Indigenous communities in Saskatchewan. It can be used by communities hoping to start screening and monitoring for pre-diabetes and type 2 diabetes in children and youth. Please be advised that this resource should only be used as a guideline for screening and is NOT considered a diagnostic tool.

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Section 1: Introduction

Purpose

The purpose of this screening tool is to assist health care providers working in Indigenous communities in Saskatchewan (SK). It has been developed in partnership with and input from Aboriginal Diabetes Initiative (ADI) stakeholders, those with expertise in diabetes care and others nationally. Indigenous communities have identified the risk of type 2 diabetes as a health priority and are seeking guidance on screening children and youth. The evidence informed content within the resource is based on best practice, expert opinion and community need. The content is not prescriptive, rather it is meant to provide options for screening in a consistent, safe manner that can work for all Indigenous peoples in their diverse communities.

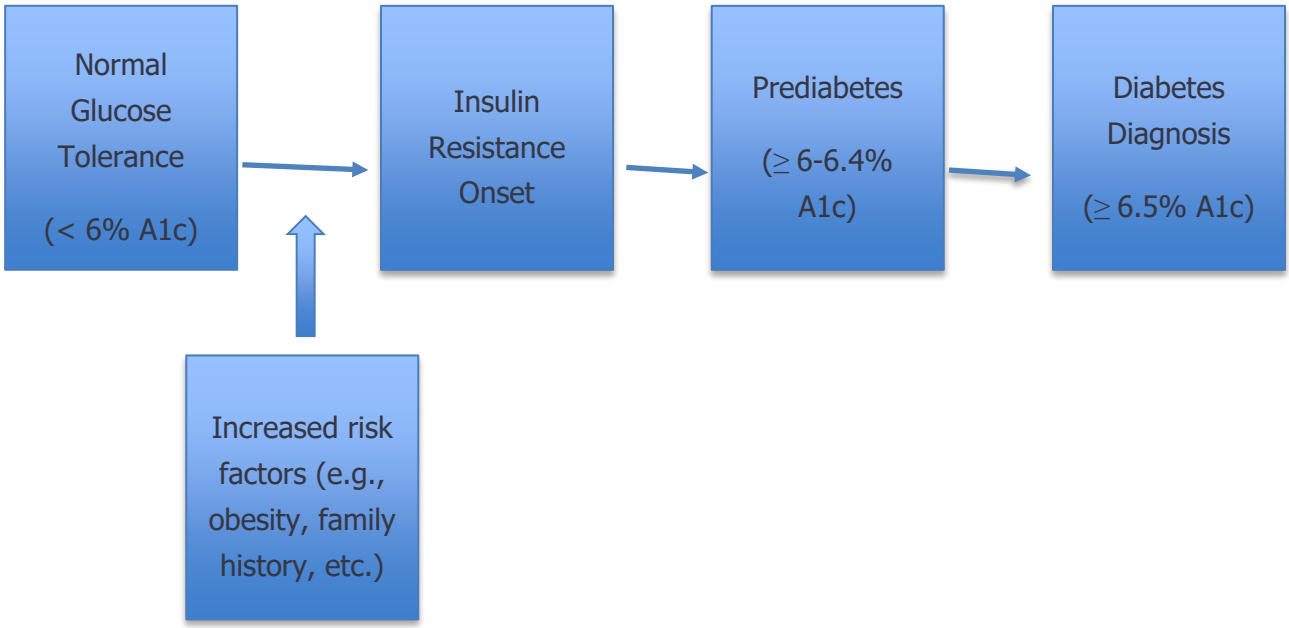
This resource aims to:

- Review prevalence of pre-diabetes and type 2 diabetes in Indigenous children/youth provincially, nationally, and globally;
- Discuss risk factors for pre-diabetes and type 2 diabetes in children/youth;
- Review current practice for screening for pre-diabetes and type 2 diabetes in children/youth living in Indigenous communities (e.g., provincial/national "scan");
- Provide best practice and alternative screening options for distinct community needs (i.e., one size does NOT fit all approach);
- Provide guidelines for obtaining consent, defining mature minors and ensuring confidentiality of results;
- Provide reliable, consistent, and easy to understand referral systems (i.e., referral trees) for initial visit and follow up care for children/youth diagnosed with pre-diabetes or type 2 diabetes;
- Provide recommendations for seamless transition of care to adulthood;
- Discuss next steps related to youth onset pre-diabetes and type 2 diabetes in Indigenous communities within Saskatchewan.

Prevalence and History of Pre-Diabetes and Type 2 Diabetes in Indigenous Children & Youth

Although population based studies and data are minimal regarding type 2 diabetes in children/youth of Indigenous communities in Saskatchewan, literature was reviewed provincially, nationally and internationally to observe trends. Internationally, there has been a steady increase in the prevalence of obesity, alongside a steady increase in type 2 diabetes in children and youth.[1] The United States SEARCH study saw a rise in prevalence of 30.5% of type 2 diabetes in 10-19 years olds from 2001 to 2009.[2] The SEARCH study also determined that the highest prevalence was in Indigenous children and youth.[2] Numerous other countries are experiencing an increase in prevalence of obesity and type 2 diabetes in children/youth, including Australia, Japan, Thailand and Argentina.[1] Nationally, the majority of studies involving Indigenous children and youth have been completed in Ontario, Manitoba and Alberta. Dean suggests that Indigenous children/youth in Canada suffer from type 2 diabetes at seven times the rate of Caucasian children.[3] Manitoba and Ontario have determined that 87% of children, who have type 2 diabetes, are of Indigenous ancestry.[4] Similar results in Alberta were determined in a study by Oster et al., showing that prevalence of type 2 diabetes grew twice as much in Indigenous youth compared to non-Indigenous youth.[5] Sellers, et al. and Spurr, et al. submit that as there are few population based studies, the true prevalence of type 2 diabetes may be underestimated.[6,7] Imperatore, et al. projects a 49% incidence increase for type 2 diabetes in children and youth, which will likely be seen to a greater extent those children/youth of Indigenous ancestry.[8] Another concern is that although some communities have data suggesting type 2 diabetes is on the rise, pre-diabetes has not been studied in children/youth over the past 20 years in Canada.[9] This is a concern as recent studies have found that screening in Indigenous children and youth has determined higher rates of pre-diabetes than type 2 diabetes.[7,9,10] This suggests that earlier screening during the asymptomatic development period of progression to type 2 diabetes (i.e., pre-diabetes stage) can reduce the incidence of type 2 diabetes and reduce risk of cardiovascular and microvascular complications.[11]

Figure 1. Progression of type 2 diabetes.



Section 2: Cultural Considerations Prior to Screening in Community

Prior to developing a screening initiative in Indigenous communities, it is important to review cultural considerations. Following are some of the considerations health care providers should review in preparation to work alongside community members and departments.

- Recognize the diversity between Indigenous communities in Saskatchewan;
- Understand the historical and social context of Indigenous health research. Mistrust and fear of harm from historical research performed "on" communities may lead to hesitance of community members to participate in screening initiatives.[12] Ensure rationale for screening and the follow up procedure is understood by parents and children/youth;
- Ensure confidentiality of data obtained from screenings and ensure Ownership, Control, Access and Possession (OCAP) principles are followed. Parents/guardians should know what will be done with the data obtained from the screening (e.g., data entered on local medical records, forwarded to family physician/specialist for referral process, etc.);
- Understand structural barriers to care in the community (e.g., does the community have the ability to implement screening in a safe manner?);[12]

- Understand the importance of relationships amongst children/youth and their parent/guardian and other community members (e.g., support network in the community);
- Ensure engagement with community members, local human resources (e.g., employees within health department, school, etc.), leadership and Elders in all stages of the screening process (i.e., design, implementation and follow up of screening intervention) community engagement increases trust and support of the screening, which results in effective and sustainable screening initiatives;[13]
- Understand the "fatalistic beliefs regarding the inevitable progression of diabetes" and how this may decrease motivation to participate in screening or sign consent for children/youth to participate.[3,13] Ensure participants and families are aware that early detection is the most effective way to improve health outcomes.
- Obtain consent from community leadership (e.g., health leadership, Chief and Council, etc.) to support screening initiatives taking place within the community as a whole.

Section 3: Risk Factors for Type 2 Diabetes in Indigenous Children & Youth

Numerous studies suggest that children and youth who are diagnosed with pre-diabetes and type 2 diabetes are asymptomatic upon diagnosis.[1,14-21] It is also known that comorbidities (e.g., dyslipidemia, hypertension) and complications (e.g., nephropathy) are associated with duration of hyperglycemia.[14] This suggests children are more likely to develop complications and/or comorbidities related to hyperglycemia as their disease state is of longer duration than adult onset diabetes.[22,23] Additionally, studies have found that children and youth diagnosed with type 2 diabetes have a more rapid and aggressive onset to these complications/comorbidities compared to adult onset or those children with pediatric type 1 diabetes.[14,17,23,24] Therefore, early detection and assessment of risk factors could reduce comorbidities and micro/macro-vascular complications, while enhancing quality of life.

Risk Factors

The following have been defined as risk factors for developing pre-diabetes or type 2 diabetes in children/youth:[22,25]

- Overweight: BMI ≥ 85th – 95th percentile (refer to Appendix 1)
- Obesity: BMI ≥ 95th percentile (refer to Appendix 1)
- History of type 2 diabetes in first degree (i.e., mother, father or sibling) or second degree (i.e., grandparent, aunt, uncle, nephew, niece or half sibling) relative
- Ethnicity/Member of high risk population (e.g., Indigenous)
- Impaired glucose tolerance
- Conditions linked to insulin resistance:
    - Polycystic ovarian syndrome
    - Acanthosis nigricans (refer to Appendix 2)
    - Hypertension (refer to Appendix 3)
    - Dyslipidemia (refer to Appendix 4)
    - Non-alcoholic fatty liver disease
- Exposure to diabetes in utero (e.g., mother had pre-gestational or gestational diabetes)
- Use of atypical antipsychotic medications[25]

Additional literature suggests the following can also be considered risk factors for developing pre-diabetes and type 2 diabetes in children/youth:[1,14,22]

- Female gender [1,26,27]
- Intrauterine undernutrition (i.e., low birth weight of < 2500 g)[14,22,28]
- High birth weight (i.e., > 4000 g)[22]
- Low socioeconomic status[19,25]
- Alcohol intake in youth[14]

A risk assessment tool has been developed for use in communities (refer to Appendix 5). It can be used by health care providers if they choose to screen only children and youth considered high risk. As Indigenous children and youth are members of a high-risk ethnic group, if they have > 1-2 additional risk factor(s) from the form, it would suggest the child should be screened for pre-diabetes and type 2 diabetes. The form may also be used with an attached consent form for parents to fill out prior to a screening event**.** It is important to remember that screening of those children only at risk can increase stigma for various reasons (e.g., children

who are obese or mothers who had diabetes during their pregnancy). For this reason, some communities may choose to screen all students to reduce screening stigma**.**

Section 4: Consent

Age of Consent

A scan was completed to determine what policies are followed for consent in Indigenous communities in Saskatchewan. Most health care providers working in Indigenous communities across Saskatchewan gather parental/guardian consent for any children or youth less than 16 years of age. Based on this feedback and reviewed immunization policies currently used in communities, it is recommended that consent be obtained for any children under 16 years of age. *Note: It is important to ensure community and health leadership are in agreement with the age of consent being used. Some communities prefer to have all student consents obtained prior to an intervention, regardless of age.* Sample and template consent form is available in Appendix 5.

Mature Minor Consent

Definition of a Mature Minor[29]

"Mature minor consent" is obtained from a child or youth after they have been assessed by a health care provider. The health care provider determines whether the child or youth understands what consent means and what it implies. The children or youth who are assessed and found to be able to provide consent are considered "mature minors". These children or youth would be considered capable of making their own decisions regardless of parent or guardian consent or wishes.

Rationale for Obtaining Mature Minor Consent

In certain situations, a health care provider can accept consent from a child/youth and complete pre-diabetes and type 2 diabetes screening without obtaining consent from the parent or guardian. An example of a situation that a health care provider may seek mature minor consent is the following: A 14 year old female attends a health fair where screening is taking place. She

has just given birth to her first baby. She is able to provide consent for her baby but she is not yet 16 years of age. If the health care provider completes the mature minor assessment tool and deems the child/youth a mature minor, they may proceed with obtaining consent for screening of pre-diabetes and type 2 diabetes without parental or guardian consent.

Section 5: Screening for Pre-Diabetes and Type 2 Diabetes in Children & Youth in Indigenous Communities

Screening as a Public Health Measure

In order to screen in a public health setting, Alberti et al. suggest the following criteria must be met:[22]

- The disease being screened for is common among the population being targeted or be a high risk group;
- The disease is related to high morbidity and mortality rates;
- The disease is asymptomatic or has a long duration without any symptoms;
- The screening methods or tests used are sensitive and specific for the disease being tested for;
- Follow up care or interventions are available to prevent, delay or treat as soon as possible.

When reviewing the criteria, it is well known that pre-diabetes and type 2 diabetes are more common in Indigenous populations than the general Canadian population. Additionally, rates of morbidity and mortality related to diabetes are high and the disease can be asymptomatic prior to diagnosis. However, to effectively screen an entire population, further studies and/or coordination of care may be required to ensure risk of harm is reduced and screening is accurate. According to the CPGs, "in laboratory" glycated hemoglobin (A1C) is a highly sensitive and specific method for screening in a clinic setting but for diagnosis, additional testing is recommended.[25,30] The CPGs also state that a point of care (POCT) A1c has successfully been used in remote, Indigenous communities for screening but this requires further diagnostic testing in a laboratory setting.[30] **It is important to remember that screening does not equal diagnosis; it is merely a "flag" to refer on for further testing.** An additional

concern related to screening methods, is that population based studies of pre-diabetes and type 2 diabetes in children and youth are limited and screening/diagnostic testing continues to be based on adult cut off values.[22] Until more study results are available for children/youth, the adult screening/diagnostic methods and values are the only option available for communities to use. Another cautionary measure when screening in a public health setting is to ensure positively screened children and youth have readily available follow up care to reduce harm and improve health outcomes.[22]

Current Screening Practices in Indigenous Communities

A provincial and national scan took place to determine current screening practice for pre-diabetes and type 2 diabetes in children and youth in Indigenous communities. Numerous health care providers working in Indigenous communities in Saskatchewan responded and only one health professional from an Indigenous community in Alberta responded. The scan suggests that health care providers working in communities follow varied approaches for screening and others do not perform screenings. Following is a summary of practices in Indigenous communities in Saskatchewan:

- Types of screening taking place:
    - Case-by-case or opportunistic screening in clinic settings or in rural settings when a child/teen appears high risk;
    - Public health screening (i.e., mass screening) at schools, health fairs, Treaty days/community events;
    - No screening of children/youth.
- Screening methods:
    - Age range: 8 to 18 years of age (i.e., Grade 3 to 12 students) is the range screened in communities completing public health screenings. Many communities only choose two particular grades to screen or specific age ranges and others opt to screen ALL students. If particular grades are chosen, it appears they are often Grades 7 to 9.
    - Types of screening tests being used for public health screening: Point of care (POCT) A1C Now ++ is being used in one community in combination with a random blood glucose test and the remainder of communities are completing

random blood glucose (RBG) testing. One community mentioned they complete the RBG testing 1-2 hours post-prandial (e.g., after lunch in the school).

- Types of screenings being used in clinic settings or on a case-by-case basis: POCT A1C Now has been used in one community on a case-by-case basis but the remainder of communities who screen appear to have laboratory services available and often order lab work that would be diagnostic (e.g., A1C plus additional test for confirmation of diagnosis).

Diabetes Screening Tree

Prior to screening in any community, it may be helpful to visualize the process. Following is a diagram depicting the screening process in community to ensure safe and optimal care of all children and youth.

Roots→ Safety/Supports: Are supports in place and is the community ready to screen? Be sure to review the pre-screening recommendations check list on page 14 prior to moving up the base of the trunk.

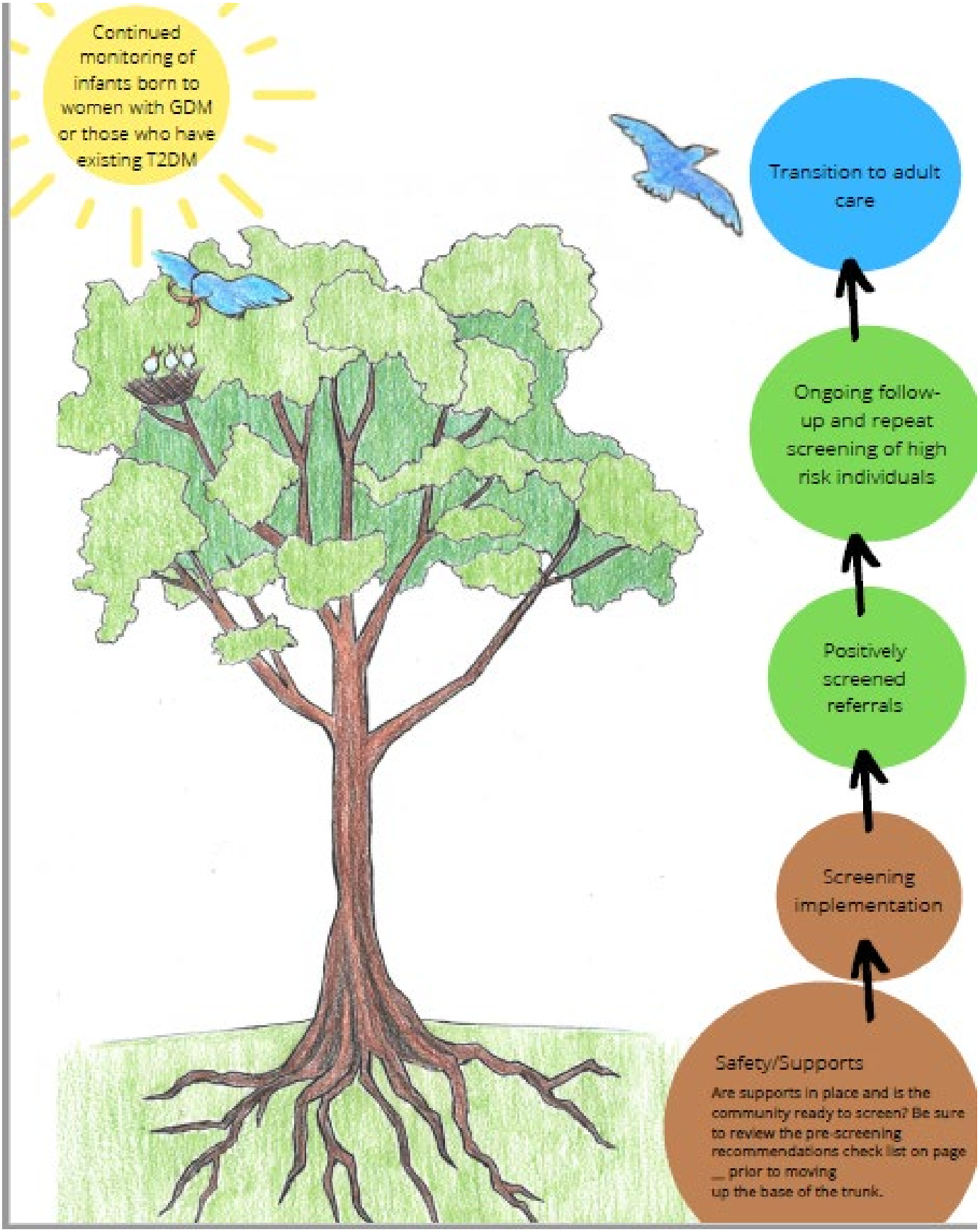
Base of trunk→ Screening implementation (i.e., mass screening/screening event in community; large number screened)

Smaller, upper part of trunk→ Positively screened referrals (i.e., smaller portion of number screened that had positive results and require referrals to specialists or family doctors/DNE/RD)

Smaller branches→ Ongoing follow up and repeat screening of high-risk individuals

Birds flying away→ Transition to adult care

Birds in nest→ continued monitoring of infants born to women with GDM or those who have pre-existing type 2 diabetes.


Continued monitoring of infants born to women with GDM or those who have existing T2DM
Transition to adult care
Ongoing follow-up and repeat screening of high risk individuals
Positively screened referrals
Screening implementation
Safety/Supports
Are supports in place and is the community ready to screen? Be sure to review the pre-screening recommendations check list on page __ prior to moving up the base of the trunk.

Pre-Screening Recommendations

(1) Obtain consent or direction from community leadership (i.e., health boards, Chief and Council, etc.) before proceeding with screening initiative.

(2) Develop a team for design and implementation of screening in community (e.g., health care providers, community members working in health centre/schools, Elders, etc.). *Properly trained and licensed health care providers must perform the screening. These health care providers should be certified in diabetes education or have extensive experience working in diabetes care and management.*

(3) Ensure there is healthy lifestyle education support and a referral system for confirmed diagnoses/shared care after screening event. *If limited follow up care for confirmed diagnoses available, (i.e., specialists, doctors, nurse practitioners, nurses, diabetes educators, and/or dietitians), ensure it is in place prior to proceeding.*

(4) Design screening event with screening team:

a. Determine timeline for screening to take place. If many Indigenous communities in Saskatchewan begin screening children and youth on a regular basis and additional diagnoses occur, this may place a burden on the existing health care system (i.e., referrals to specialists, etc.). It may be beneficial to stagger community screenings in different months to ensure less demand on the healthcare system and ensure adequate care. This may have to be discussed in conjunction with the Aboriginal Diabetes Initiative coordinators, specialists and other staff working within the ADI program to determine best options.

b. Determine target for screening. Does the community wish to screen:

i. Only those children at risk for developing pre-diabetes/type 2 diabetes?

☐ As Indigenous children have one pre-existing risk factor (i.e., member of a high-risk ethnic group), a pre-pubertal child with ≥ 2 risk factors or a pubertal child with ≥ 1 risk factor, could be considered high risk.

ii. All children within a certain age group or grade?

☐ If this option is chosen, it is recommended that certain grades are chosen for screening and then re-screened at a later date. The Diabetes Canada Clinical Practice Guidelines (2018) recommend screening high risk children once they reach puberty.[31] Therefore, it may be beneficial to screen Grade 7 to 9 students and then re-screen the same group of

students when they reach Grade 11 or 12. If there are younger children who have not reached puberty but have 2 additional risk factors (not including increased risk based on ethnicity), they can be screened earlier.

iii. All children within a school, regardless of age?

c. Determine the age of consent and how it will be obtained;

d. Determine option for screening (listed below) that will be feasible within the community. *It is important to note that even if a child/teen screens negative at one time, they may have a positive screen at a later date. Parents and participants must be aware of this at time of screening. It would be beneficial to discuss how development of diabetes is a progression over time (refer to Figure 1 on page 6);*

e. Determine roles and logistic details for the screening event;

f. Determine how the screening event will be promoted in community (refer to Appendix 6 for sample posters and ideas).

(5) Ensure all stakeholders are aware of the rationale, procedure and follow up for screening children/youth. This includes, but is not limited to, parents, schools/community venues where screening is taking place, community members, Chief and Council, and Elders (refer to Appendix 6 for sample parent letter).

(6) Refer positively screened children/youth based on referral system determined by community, health care providers, specialists and other supports within and outside of the community (refer to page 19).

(7) Develop a monitoring or data collection tool for use in the community to ensure children considered high risk continue being followed on a regular basis (e.g., annually).

Screening Options for Pre-diabetes and Type 2 Diabetes

The screening guidelines following are provided as options based on the distinct community environment health care providers work in. Recommendations are based on clinical practice guidelines, expert opinion, and strengths and challenges associated with each option. It is up to the community to determine what works best based on the information provided. Some screening tests (e.g., 2 hour oral glucose tolerance test) have been omitted due to impracticalities associated with the test for use in communities.

Note: It is only recommended that screening occurs when certified diabetes educators or those with extensive experience in diabetes care perform the screening and follow up care is available. If follow up care is unavailable, ensure this is advocated for and/or arranged prior to any screening in communities.

Screening Option #1: A1C and Fasting Plasma Glucose (FPG)

The benchmark for diabetes recommendations in Canada continue to be the Clinical Practice Guidelines (CPGs) developed and distributed by Diabetes Canada. Strengths:

- Most accurate (sensitivity/specificity).
- Would be considered diagnostic if both results are positive. No need for a screen and then a referral for a confirmed diagnosis.

Challenges:

- Requires transportation and access to clinic and/or laboratory services for the screening.
- Requires child/youth to be in a fasting state.
- Unrealistic method for larger screening initiatives (i.e., used for case-by-case or opportunistic screening/diagnosis in a clinic setting).
- Recommends screening over 8 years of age but some communities may wish to screen at earlier ages if risk factors are present.

Screening Option #2: Point of Care Testing (POCT) Glycated Hemoglobin A1C (A1C) and Random Blood Glucose (RBG)

As Indigenous children have one pre-existing risk factor (i.e., member of a high risk ethnic group), if child is pre-pubertal and has $\geq$ 2 risk factors or is pubertal and has $\geq$ 1 risk factor (refer to Risk Factors page or appendix with risk factor assessment sheet), they would be considered high risk and should be screened for pre-diabetes and type 2 diabetes.

This option suggests use of a POCT A1c and a random blood glucose (RBG). The RBG can be performed any time of day. Some communities may wish to test 1-2 hours post meal [e.g., after noon meal], which would provide additional information for screening purposes.

Strengths:

- Two tests capture a random blood glucose reading in addition to the average of the A1C. If the RBG is performed 1-2 hours after a meal, this provides additional information and can show if a child/youth is having post meal elevated BG readings.
- Does not require laboratory services for screening.

Weaknesses:

- POCT A1C machines and tests are expensive and require validation.
- Must time the screening 1-2 hours after lunch meal and need confirmation that meal was eaten.

Screening Option #3: POCT A1C

As Indigenous children have one pre-existing risk factor (i.e., member of a high risk ethnic group), if child is pre-pubertal and has ≥ 2 risk factors or is pubertal and has ≥ 1 risk factor (refer to Risk Factors page or appendix with risk factor assessment sheet), they would be considered high risk and should be screened for pre-diabetes and type 2 diabetes.

This option suggests use of a POCT A1C.

Strengths:

- Does not require laboratory services for screening.
- No timing needed based on meal intake.
- Includes all pre-pubertal children in recommendations versus only age 8 and up.

Weaknesses:

- A1C captures average blood glucose over the past 3 months but does not accurately capture impaired glucose tolerance or elevated post meal blood glucose values (i.e., could have large variability of blood glucose throughout the past 3 months).
- POCT A1C machines and tests are expensive and require validation.

Screening Results for Pre-diabetes and Type 2 Diabetes

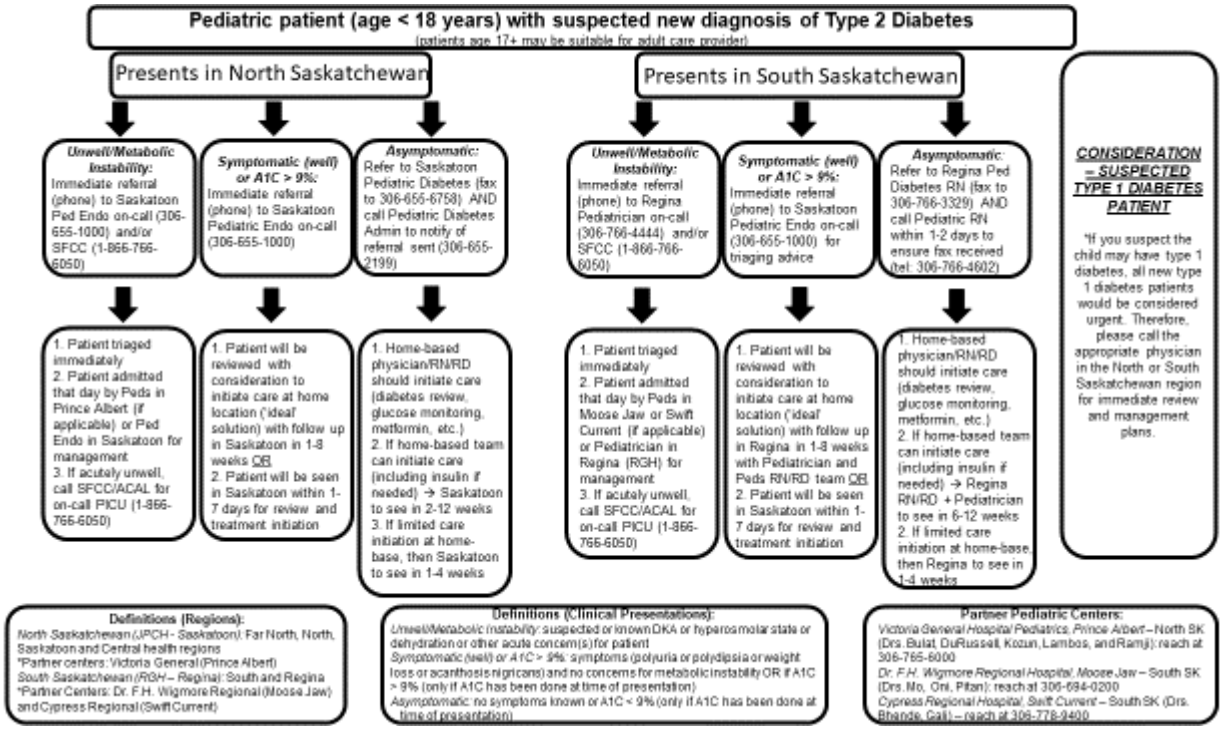
TEST	Normoglycemia	Pre-diabetes	Type 2 Diabetes
A1c	<6.0%	6.0-6.4%	6.5-7.5%
Fasting Plasma Glucose (FPG)	< 6.1 mmol/L	6.1-6.9 mmol/L	≥7.0 mmol/L

Section 6: Shared and Follow Up Care

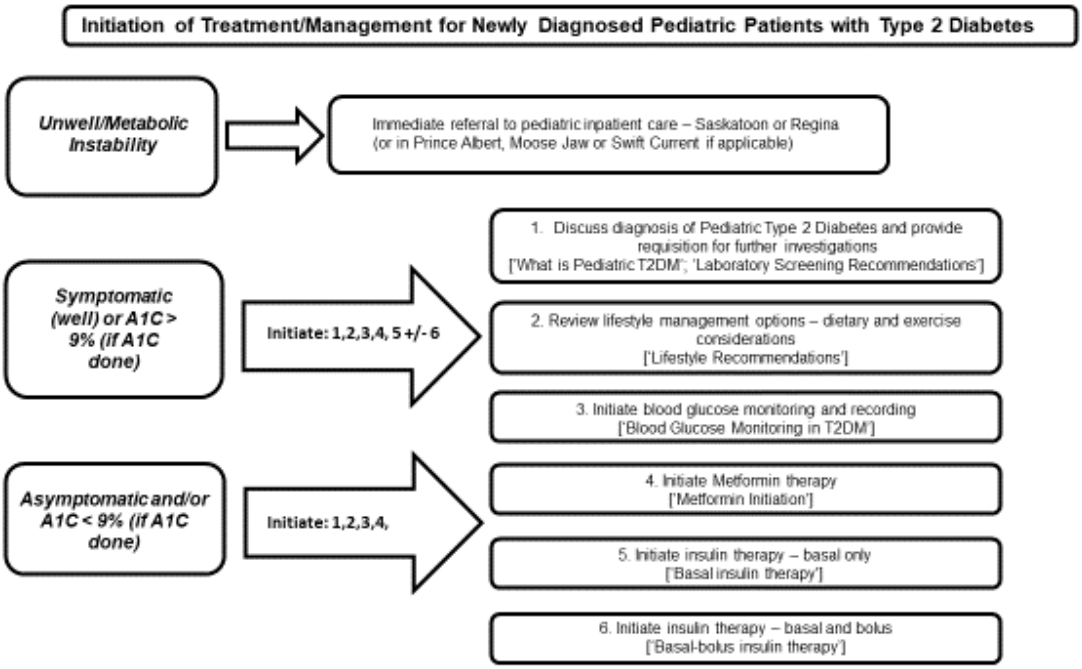
Once screening is completed and children/youth have been identified as having elevated blood glucose by any of the screening methods, it is recommended that they be referred to their family physician or nurse practitioner for diagnostic screening. If children/youth do not have a family physician or nurse practitioner, referrals can be made based on the referral process outlined. Pediatric endocrinologists and teams are available in the north and in the south of Saskatchewan for anyone who requires follow up care. Even those confirmed with a diagnoses of type 2 diabetes, who have family physicians or nurse practitioners, should be referred to the pediatric endocrinologist and team for coordinated care.

Note: All children or youth who are considered high risk and do NOT test positive at the screening event, should be referred to the local diabetes team or a health care professional to address healthy lifestyle changes (e.g., diet and physical activity).

Referral Process



Initiation of Treatment/Management for Newly Diagnosed Pediatric Patients with Type 2 Diabetes



Recommended Initial Pediatric Type 2 Diabetes Handouts

Pediatric Type 2 Diabetes Handouts

1a. What is Pediatric Type 2 Diabetes (primer on pediatric type 2 diabetes – what is it, why is it important, what you need to know, etc.)
1b. Laboratory Screening Recommendations (overview for testing at diagnosis – for confirmation and comorbidity screening)

2. Lifestyle Recommendations (focus on modifiable lifestyle behaviours within one's own context)
3. Blood Glucose Monitoring in Type 2 Diabetes (when/how and recording)

4. Metformin Initiation (mock script and protocol for metformin in pediatrics)

5. *Basal insulin therapy* (approach to initiation of OD glargine insulin)

6. *Basal-bolus insulin therapy* (approach to initiation of BID intermediate/rapid insulin therapy and glargine/rapid insulin therapy)

Section 7: Continued Support for Indigenous Children/Youth at Risk or with Pre-diabetes or Type 2 Diabetes

This tool kit provides information related specifically to screening and referral of children/youth with pre-diabetes or type 2 diabetes. There is continued need for other supports in communities at high risk for developing diabetes. Following are some ideas on areas to target, alongside screening in communities:

- Collecting data in community would:
  - Provide evidence and baseline data of prevalence of pre-diabetes and type 2 diabetes in Indigenous children living in Indigenous communities in SK. If the community wishes to share their data with funders/researchers and advocate for more resources and supports, this

would provide data to address barriers. Currently, there is limited data related to prevalence of pre-diabetes and/or type 2 diabetes in Saskatchewan Indigenous communities and more population based data is needed.[32]

- Provide awareness for leadership and community members;
- Promote community driven solutions by obtaining and controlling their own data and using as they deem necessary.

- Monitoring infants/children who are high risk for developing pre-diabetes and/or type 2 diabetes. Following are the infants who could be followed more closely after birth for development of pre-diabetes and type 2 diabetes:
  - Infants born to a mother who had pre-gestational or gestational diabetes
  - Infants born over weight (> 4000 g)
  - Infants born underweight (< 2500 g)
- Screening for comorbidities and additional risk for children and youth should continue regularly for those who are considered high-risk[6]
- Improving regular communication efforts between multidisciplinary teams for diabetes management, including those in the community (e.g., schools, health, mental wellness, etc.) and those outside of the community (e.g., visiting health care providers, pediatric endocrinologists, etc.)
- Continuing prevention efforts focusing specifically on female youth of childbearing age and promotion/normalization of breastfeeding in the community.[6]

Section 8: Appendices

Appendix 1 : BMI Charts

BMI Index Table (Imperial→Inches/Pounds):
https://www.dietitians.ca/DietitiansOfCanada/media/Documents/WHO%20Growth%20Charts/BMI_Imperial_ENG.pdf

BMI Index Table (Metric→ Centimeters/Kilograms):

https://www.dietitians.ca/DietitiansOfCanada/media/Documents/WHO%20Growth%20Charts/BMI_Metric_Eng.pdf

Online BMI Percentile Calculator:

https://www.cdc.gov/healthyweight/bmi/calculator.html

BMI-for-Age Percentile Chart for Boys:

https://www.dietitians.ca/DietitiansOfCanada/media/Documents/WHO%20Growth%20Charts/Set-2-BMI_2-19_BOYS_Set-2_EN.pdf

BMI-for-Age Percentile Chart for Girls:

https://www.dietitians.ca/DietitiansOfCanada/media/Documents/WHO%20Growth%20Charts/Set-2-BMI_2-19_GIRLS_SET-2_EN.pdf

Appendix 2: Acanthosis Nigricans Screening Tool

The following link provides photos for those looking for acanthosis nigricans as a risk factor:

https://www.rchsd.org/documents/2014/02/acanthosis-nigricans.pdf/

Appendix 3: Hypertension Charts

Hypertension charts have been included for communities who want to screen for high blood pressure. This could be done to determine if a child/teen has an additional risk factor for developing pre-diabetes/type 2 diabetes or as part of a general health screen.

An excerpt of the screening table recommended for the screening of children for high blood pressure is below. The full Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents can be accessed at the following URL:

https://pediatrics.aappublications.org/content/pediatrics/early/2017/08/21/peds.2017-1904.full.pdf

Practice Pearl from Dr. Inman: *"The table presumes 5th percentile height and 90th percentile blood pressure (i.e., If the blood pressure is below the number listed, the child is at target unless they are extremely short; if above this, the blood pressure may still be at target but then*

you must plot for the age, sex and height on the more in depth tables from the practice guidelines referenced [Tables 4 & 5]).”

TABLE 6 Screening BP Values Requiring Further Evaluation

Age, y	BP, mm Hg			
	Boys		Girls	
	Systolic	DBP	Systolic	DBP
1	98	52	98	54
2	100	55	101	58
3	101	58	102	60
4	102	60	103	62
5	103	63	104	64
6	105	66	105	67
7	106	68	106	68
8	107	69	107	69
9	107	70	108	71
10	108	72	109	72
11	110	74	111	74
12	113	75	114	75
≥13	120	80	120	80

Appendix 4: Pediatric Dyslipidemia Guidelines

Please refer to the following URL and article for more information regarding screening of dyslipidemia in pediatric clients:

https://onlinecjc.ca/action/showPdf?pii=S0828-282X%2822%2900286-0

Appendix 5: Sample Risk Assessment and Consent Form

Following sample risk assessment and consent form for use in communities (see Resources).

Insert Logo Here

RISK ASSESSMENT TOOL FOR PRE-DIABETES AND TYPE 2 DIABETES IN CHILDREN AND YOUTH IN INDIGENOUS COMMUNITIES

USE A PEN AND PRINT CLEARLY TO COMPLETE FORM

Section 1: Introduction to Risk Assessment Form

The questions below are being asked to see if your child or teen is at high risk for pre-diabetes or type 2 diabetes. Pre-diabetes is a condition that shows high levels of blood sugar, but is not at high enough levels to diagnose someone with type 2 diabetes. Pre-diabetes and type 2 diabetes may exist **without** any symptoms. The results from this risk tool are useful in knowing whether your child or teen should have additional screening completed.

Please answer the personal information and questions as completely as you can. If you have questions or concerns about them, please contact your health care provider to discuss. All answers are confidential. Please complete the consent form in Section 4 if you are providing consent that further screening can be completed if your child or teen is considered high risk for pre-diabetes or type 2 diabetes.

Section 2: Student's Personal Information (Parent / Guardian to complete)

Last Name	**First Name**	**Birthdate** (YYYY/MM/DD)
Health Card Number	**Mailing Address/House #**	**Age**
Parent/Guardian Name (Print)	**Phone** **Text only? Yes ☐**	**School/Grade**
Relationship to this Student	**Email Address**	

Section 3: Risk Check List (Parent / Guardian/Health Care Provider to complete)

1) Does this student have a first degree relative who has been diagnosed with type 2 diabetes? *A first degree relative is defined as a child's mother, father or sibling.*
No ☐ **Yes** ☐ If yes, describe: _____

2) Does this student have a second degree relative who has been diagnosed with type 2 diabetes? *A second degree relative is defined as a child's grandparent, aunt, uncle, nephew, niece, or half sibling.*
No ☐ **Yes** ☐ If yes, describe: _____

3) Does this student have any of the following conditions: impaired glucose tolerance, polycystic ovarian syndrome (PCOS), high blood pressure, dyslipidemia (e.g., high cholesterol or high triglycerides), or fatty liver disease?
No ☐ **Yes** ☐ If "yes", please list:
_____
_____

4) Was this student born to a Mom who had diabetes (e.g., high blood sugars) during her pregnancy?
No ☐ **Yes** ☐ If "yes," please provide details:_____

5) Was this student born at a low birth weight (less than 2500 grams **or** less than 2.5 kilograms **or** less than 5.5 pounds) or a high birth weight (more than 4000 g **or** more than 4 kilograms **or** more than 8.8 pounds)?
No ☐ **Yes** ☐ If "yes", state weight at birth: _____

6) Is this student on any medications?
No ☐ **Yes** ☐ If "yes", describe: _____

→→→ Parent/Guardian please also complete Section 4 →→→→

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(HEALTH PROFESSIONAL USE ONLY) Section 3: Anthropometrics

Weight: (lbs) *or* (kg)

Height: (in) *or* (cm)

BMI:

BMI Percentile:

Is the student's BMI ≥ 85th percentile?
☐ Yes ☐ No

Risk calculation based on answers provided and BMI percentile:

Section 4: Consent for Diabetes Screening (Parent / Guardian to complete)

→→→→ **Please read attached diabetes screening fact sheet for important information** →→→→

- I have read and understand the information in the diabetes screening fact sheet provided to me for the procedure that will be used for screening my child/teen for pre-diabetes and type 2 diabetes.
- I understand that the questions asked are specifically for the screening and will be held in confidentiality.
- I have had the opportunity to ask questions that were answered to my complete satisfaction.
- I understand the benefits of my child/teen being tested for pre-diabetes and type 2 diabetes at this time.
- I understand the potential risks if my child/teen is not screened and develops pre-diabetes or type 2 diabetes at a later date.
- I understand that if my child/teen tests positive for pre-diabetes or type 2 diabetes screening, I will be notified and referrals for diagnosis, treatment and/or follow up services will be provided as needed.
- I understand that missed or refused screening for pre-diabetes and type 2 diabetes will be offered at another time.

As the parent/guardian of this student, I understand and acknowledge that it is my responsibility to:

- **Seek answers to any medical questions I have regarding this screening and the follow up process.**

PARENT / GUARDIAN MUST CHECK ONLY 1 BOX BELOW AND SIGN AND DATE:

Yes ☐ **I CONSENT FOR THIS STUDENT TO BE SCREENED FOR PRE-DIABETES AND TYPE 2 DIABETES.**

No ☐ I DO NOT CONSENT FOR THIS STUDENT TO BE SCREENED FOR PRE-DIABETES AND TYPE 2 DIABETES.

SIGNATURE _____ **DATE** YY/MM/DD

NOTE: It is recommended that parents/guardians and the student discuss consent. Efforts are first made to get parental/guardian consent for screening. However, students at least 16 years of age and older who are able to understand the benefits and possible positive results, and the risks of not getting screened for pre-diabetes and type 2 diabetes, can legally consent to or refuse screening in Saskatchewan by providing mature minor informed consent to a healthcare provider.

Health Care Provider Contact Info:

Please be aware that parents/guardians/students are encouraged to contact the health care provider to get screening for pre-diabetes and type 2 diabetes completed if it was missed and they would like it completed in the future.

Parents/Guardians – Please ensure you have completed sections 2, 3 and 4 (in yellow)

Section 5: Other Consent Options (Health Care Provider to complete)

Please select one: ☐ **Telephone/Verbal Consent** ☐ **Mature Minor Consent**	Notes:

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