School-Based Health Screening

Best Practices

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Public health is defined as the organized efforts of society to keep people healthy and to prevent injury, illness and premature death. The most recent description of prevention identifies five levels as being primordial, primary, secondary, tertiary and quaternary [1]. Screening a population for diseases or health conditions is an example of secondary prevention.

This document was prepared in response to specific screening initiatives which were being developed in a select number of New Brunswick schools. As such, it does not reflect an exhaustive literature review of screening best practices for school environments but rather provides a cursory view of recommended screening practices specific to diabetes, lipid disorders, obesity, hypertension, and resting heart rate. Complexities and challenges faced by those tasked with deciding whether to proceed with school based screening are discussed and suggested approaches are provided to address these challenges.

Background

Schools are important settings for comprehensive health promotion. Research consistently demonstrates that health and education are inextricably linked and the most effective way to address the development of life-long healthy attitudes and behaviours such as maintaining a healthy weight is through a comprehensive school health approach. The comprehensive school health approach is an internationally recognized framework for supporting improvements in students' educational outcomes while addressing health issues in the school context in a planned, integrated and holistic way. It encompasses the whole school environment with actions addressing four distinct but inter-related pillars: social and physical environment; teaching and learning; healthy school policy; and partnerships and services [2].

The New Brunswick Student Wellness Survey, a provincial initiative of the Department of Healthy and Inclusive Communities, collects data on the school environment, healthy weights and lifestyle, mental fitness, social relationships and influences, and tobacco and other substance use [3]. Data collection and analysis is conducted by the New Brunswick Health Council. The purpose of the survey is to examine the health and wellness attitudes and behaviours of students in grades K-12. The survey is done every three years. The data are used to help schools and school districts plan and undertake strategic actions to promote healthy lifestyle behaviours.

The Promoting a Healthy Student Body Initiative was developed and implemented in a New Brunswick high school in 2010. This initiative involves education on healthy lifestyle choices and a health assessment (blood glucose, blood pressure, height/weight, Body Mass Index (BMI) measurement, waist circumference, resting heart rate, lipid profiles, self-esteem questionnaire and healthy lifestyle questionnaire) generating a health report card. At-risk students, identified through the health assessment, are met to determine a plan of care and are offered one-on-one or group educational sessions [4].

Issue

- The implementation of school-based health measurements can have various objectives. One being surveillance which is to identify the percentage of students in a population who are at risk for a particular disease or health condition. This information may assist planning of various preventive interventions at the school population level. Or, measurement can also be done for screening purposes which is to assess individual students for risk factors that may lead to detrimental health outcomes. Results and information are then provided to the at-risk students and their parents with guidance for corrective action.

- School-based health screening is costly and might not be the most effective way to promote healthy lifestyle changes. Screening programs might stigmatize students and lead to harmful behaviours like unsafe weight-control practices [5]. The decision to implement a health screening program/activity for adolescents in high schools should be based on evidence.

- Some New Brunswick high schools are interested in joining the Promoting a Healthy Student Body Initiative.

Population-Based Screening Principles

Population-based screening is where a test is offered systematically to all individuals in the defined target group within a framework of agreed policy, protocols, quality management, monitoring and evaluation. According to the Canadian Adaptation of the WHO principles of Early Detection [6], the criteria that should be met when considering screening for disease conditions are:

1) The condition should be an important health problem.

2) The natural history of the condition, including development from latent to declared disease must be understood. There should be a recognizable latent or early symptomatic stage.

3) There should be a suitable screening test or examination.

4) The overall benefit of the screening program should outweigh the potential harms from its application.

5) The test and the screening program should be acceptable to the population.

6) Evidence-based recommendations should be available regarding who should be offered further diagnostic investigation and/or treatment and the choices available to them.

7) Treatment or intervention that improves survival or quality of life (compared with not screening) should be available for patients with recognized disease.

8) Adequate staffing and facilities for recruitment, testing, diagnosis and follow-up treatment and program management should be available.

9) The resources allocated to the screening program (including testing, diagnosis and treatment of patients diagnosed) should be economically balanced in relation to other health care priorities [6].

Selected Screening Practices for Children

Diabetes (blood sugar):

- The Clinical Practice Guidelines Expert Committee of the Canadian Diabetes Association (2008) recommends regular screening for type 2 diabetes for children that have two or more of the following risk factors [7]:
  - Obesity (BMI≥95th percentile for age and gender)
  - Member of high-risk ethnic group and/or family history of type 2 diabetes and/or exposure to diabetes in utero.
  - Signs or symptoms of insulin resistance
  - Use of antipsychotic medications/atypical neuroleptics

- According to an article published in the Paediatric Child Health Journal (2009), screening children for type 2 diabetes in community settings such as schools or fairs is not recommended. Screening for type 2 diabetes in Canadian children should be encouraged for selected children with risk factors, and only occur in health care settings that have the capacity for comprehensive follow-up of results and that are using Canadian standards for diagnosis [8].

- The Canadian Task Force on Preventive Health (2012) recommends not routinely screening adults at low to moderate risk of diabetes. There are no specific recommendations for children and adolescents [9].

Lipid disorders (lipid profile):

- The U.S. Preventive Services Task Force (2012) concludes that the evidence is insufficient to recommend for or against routine screening for lipid disorders in infants, children, adolescents, or young adults. The USPSTF was unable to determine the balance between the potential benefits and harms of routinely screening children and adolescents for dyslipidemia [10].
  - USPSTF reported that the effectiveness of treatment interventions (diet, exercise, lipid-lowering agents) in improving health outcomes in children with dyslipidemia remains a critical research gap. Potential harms of screening may include labeling of children whose dyslipidemia would not persist into adulthood or cause health problems. Adverse effects from lipid-lowering medications and low-fat diets, including potential long-term harms, have been inadequately evaluated in children.

Obesity (anthropometric measures: height/weight, BMI, waist):

- The U.S. Preventive Services Task Force (2012) recommends that clinicians screen children aged 6 years and older for obesity and offer them or refer them to comprehensive, intensive behavioural interventions to promote improvement in weight status [10].
  - USPSTF found adequate evidence that BMI was an acceptable measure for identifying children and adolescents with excess weight. Overweight is defined as an age and gender specific BMI at ≥85th to 94th percentiles, and obesity is defined as an age and gender specific BMI at ≥95th percentile.
  - USPSTF found that effective comprehensive weight-management programs incorporated counseling and other interventions that targeted diet and physical activity. Moderate to high intensity programs involving >25 hours of contact with the child and/or the family over a 6 month period showed results. Low-intensity interventions, defined as less than 25 contact hours over a 6-month period, did not result in significant improvement in weight status.
  - Harms of screening were judged to be minimal.

- No evidence was found on appropriate screening intervals

- The 2006 Canadian clinical practice guidelines on the management and prevention of obesity in adults and children [11]:
  - Recommends measuring BMI in all children and adolescents.
  - Recommends that the clinical evaluation of overweight and obese children include a history and a general physical examination to exclude secondary (endocrine or syndrome-related) causes of obesity and obesity-related health risks and complications.
  - Recommends measuring fasting plasma glucose level and determining lipid profile as screening test in overweight and obese adults and children aged 10 years and older. It is suggested to repeat these tests at regular intervals as needed.
  - Recommends future research should be directed at determining the clinical utility of waist circumference in the identification of health risk among children and youth, independently or in combination with BMI.
  - Encourages the use of surveillance systems and measurement tools to determine the effectiveness and efficacy of obesity prevention programs and interventions. The development of a comprehensive, coordinated and rigorous surveillance plan with strong links among program developers, advocates, policy-makers and other stakeholders is encouraged as a key component in obesity prevention.

- The Canadian Task Force on Preventive Health care has identified "screening for child obesity" as a priority for guideline development. As a result, more current Canadian recommendations may be available soon.

- A recent collaborative statement from the Dietitians of Canada, the Canadian Paediatric Society, The College of Family Physicians of Canada and Community Health Nurses of Canada, recommends the use of the World Health Organization (WHO) growth charts in children and adolescents. Measurement of BMI is recommended as the most accurate gauge for the diagnosis of obesity. BMI for age charts from the WHO assist in determining percentiles. Note that for children over 10 years of age, BMI and not weight for age is recommended for plotting. Cut-offs are defined for underweight (< 3rd percentile), overweight (85th to 97th percentile) and obese (>97th percentile) [12].

- An article on the BMI measurement in schools concluded that although some promising results have been reported, more study is needed to determine whether school-based BMI screening programs are a promising practice for addressing obesity. Schools that initiate BMI measurement programs should evaluate the effects of the program on BMI results and on weight-related knowledge, attitudes, and behaviours of youth and their families; they also should adhere to safeguards to reduce the risk of harming students, have in place a safe and supportive environment for students of all body sizes, and implement science-based strategies to promote physical activity and healthy eating [5].

Hypertension (Blood Pressure**):**

- The U.S. Preventive Services Task Force is currently updating its 2003 recommendations for screening for high blood pressure in children and adolescents.

Resting Heart Rate:

- Research conducted by Freitas et al. concluded that Resting Heart Rate (RHR) was significantly associated with dyslipidemia in obese children and adolescents and that elevated RHR offers potential to screen subjects at an increased risk of atherosclerosis development.

However, longitudinal and epidemiological surveys should be carried out to develop optimal cutoff values for RHR in pediatric populations [13].

- Research conducted by Rabbia concluded that a systematic quantitative approach toward ascertaining RHR may be an additional parameter in the study of cardiovascular risk factors in youth as in adulthood. However, although relatively easily measured, RHR in adolescents shows an important relationship to various physiological, environmental variables that are to be taken into account. Moreover, adherence to a detailed protocol is necessary to obtain individual values that can be reliably compared [14].

Discussion

As this document points out, studies carried out so far on the effects of screening children for health risk factors have often given conflicting results. Key questions still need to be addressed including the effectiveness of screening, optimal ages and intervals for screening children, cost-effectiveness of screening, or the effects of treatment in childhood outcomes following positive screening results. Also, consideration must be given to the fact that populations may vary and what has been proven effective for a particular group may not give the same results when applied to a different community. There needs to be a good balance between overall benefits and the harms done when implementing screening programs in schools. Potential harm of screening may include labeling children whose risk factor would not persist into adulthood nor cause health problems. These considerations demonstrate the complexities and challenges faced by those tasked with deciding whether to proceed with school-based screening.

Hence, New Brunswick Public Health recommends that before implementing a school-based screening program, the proposed initiative should be grounded in population health evidence and it should be determined that it will not cause inadvertent harm. Before adopting a new screening program, public health authorities, such as the Chief Medical Officer of Health or a local Medical Officer of Health, may be consulted to assist in evaluating the following screening criteria:

- Difficulties incurred by not detecting the problem in school-age children through a screening process;
- the effectiveness and accessibility of therapy;
- the relative efficiency of the screening procedure;
- the specificity, sensitivity and positive predictive value of the screening tool;
- the relative efficiency of utilizing schools as the screening site;
- the availability of remediation and follow-up for all students with positive screening results;
- the potential harms associated with the screening initiative; and
- the cost of the screening program.

Conclusion

Authorities responsible for implementing health screening programs in New Brunswick schools should first carry out a literature review of best screening practices for school environments, including an evaluation of the quality of available evidence to ensure they implement science-based strategies. If a screening program is implemented, authorities should carefully evaluate the effects of screening children for health risk factors, including the effects on knowledge, attitudes, and behaviours of youth and their families. They also should adhere to safeguards to reduce the risk of harming students and have in place a safe and supportive environment for students. Furthermore the value of school screening programs should be regularly assessed.

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