A Report to the Governor and 80th Legislature of the State of Texas

In Fullfillment of House Bill 2721 of the 79th Legislature

Prepared By:
The University of Texas-Pan American
Border Health Office

The University of Texas-Pan American Border Health Office

Doreen D. Garza, M.P.H., Executive Director
David Salazar, Associate Director
Gina Garza, Health Education Coordinator
Lissa Alanis, Health Education Coordinator
Denny A. Meline, Health Education Coordinator
Martin Peña, Health Education Coordinator
Robert Puentes, Health Education Coordinator
Annette Rocha, Health Education Coordinator
Amy Ramirez, Health Education Coordinator
Sylvia A. Leal, Administrative Secretary
Sylvia G. Hinojosa, Administrative Clerk
Trini Soto, Community Health Specialist
Dora Proa, Community Health Specialist
Celia Carrion, Community Health Specialist

Yavuz Tor, ANTES RFES programmer

A Report to the Governor and 80th Legislature of the State of Texas

In Fullfillment of House Bill 2721 of the 79th Legislature

Prepared By:
The University of Texas-Pan American Border Health Office

Table of Contents

ACKNOWLEDGEMENTS

There are many parties that contribute to the success of the ANTES Risk Factor Assessment for Type 2 Diabetes Program, but none other like the foundation that it is built on - the Texas school nurse. Through our involvement with the ANTES program, we have come to understand the many responsibilities school nurses assume on a daily basis to ensure the health and safety of the children in their communities. We would like all school nurses in the state of Texas to know that The University of Texas-Pan American (UTPA) Border Health Office appreciates their trust, patience and support. We believe that in the fight against Type 2 diabetes in children, school nurses are an integral part of the solution.

Providing risk assessment training to over 5,000 school nurses throughout 11 Texas Education Agency Regional Education Service Centers (ESC) could be overwhelming without the assistance of Regional School Health Specialists. We would like to extend a special thanks to these remarkable persons who hold these positions in ESCs 1, 2, 3, 4, 10, 11, 13, 15, 18, 19, and 20 for assisting us in coordinating these trainings at their centers.

The ANTES Risk Factor Assessment Program is also very fortunate to have the advice and guidance of the ANTES Advisory Council. This group of professionals and parents are well respected in their fields, understand the populations that are affected by the program, and understand the value of having such a program in place. For their help, we would like to thank the ANTES Advisory Council members - Dr. Stephen Ponder, Dr. Paul Villas, Karen Batchelor, Klaus Hille, Gwen Johnson, Mary Baumann, Patty Carlton, Sandy Beckford, Julia Soper, Marina Herrera, Adel Fuentes, Margaret Powell, and Patricia Lopez.

We would also like to thank The University of Texas-Pan American, President Dr. Blandina Cárdenas, and Provost Dr. Paul Sale for their continuing support of the program.

Finally, we would like to thank the UTPA Border Health Office staff for believing in what they do.

EXECUTIVE SUMMARY

Eight years ago, The University of Texas-Pan American was charged by the state of Texas to establish the ANTES Risk Factor Assessment for Type 2 Diabetes program to identify those children who were at high risk to develop Type 2 diabetes and make these risk factors known to parents and provide them with the opportunity to seek additional health evaluation for their children.

Today, the ANTES program has trained over 5,000 school nurses to conduct risk assessments. The ANTES program developed a unique, secure web-based risk factor assessment program that assists school nurses with their observations, provides parents and healthcare providers with a simple description and significance of the nurse's observations, and can also serve as a surveillance tool to assist School Health Advisory Councils with their mission to improve their school's health environment. For example, by using the ANTES Risk Factor Electronic System, the Laredo Independent School District School Health Advisory Council was able to present risk assessment information to their school board which in turn led to an increase in physical activity time by 15 minutes to the state required amount of physical activity per day.

In the following pages, information will be presented on the risk assessments conducted during the 2005-2006 school year. The number of children who were reported as having Acanthosis Nigricans, overweight or at-risk of overweight, and having elevated blood pressures indicate that these children have a greater risk to develop future health problems.

Despite the challenges that are associated with mandates like the ANTES Risk Factor Assessment for Type 2 Diabetes program, utilizing risk assessments as a starting point for health promotion and disease prevention in a population has merit and can complement concerted efforts to prevent or reduce possible future health conditions.

INTRODUCTION

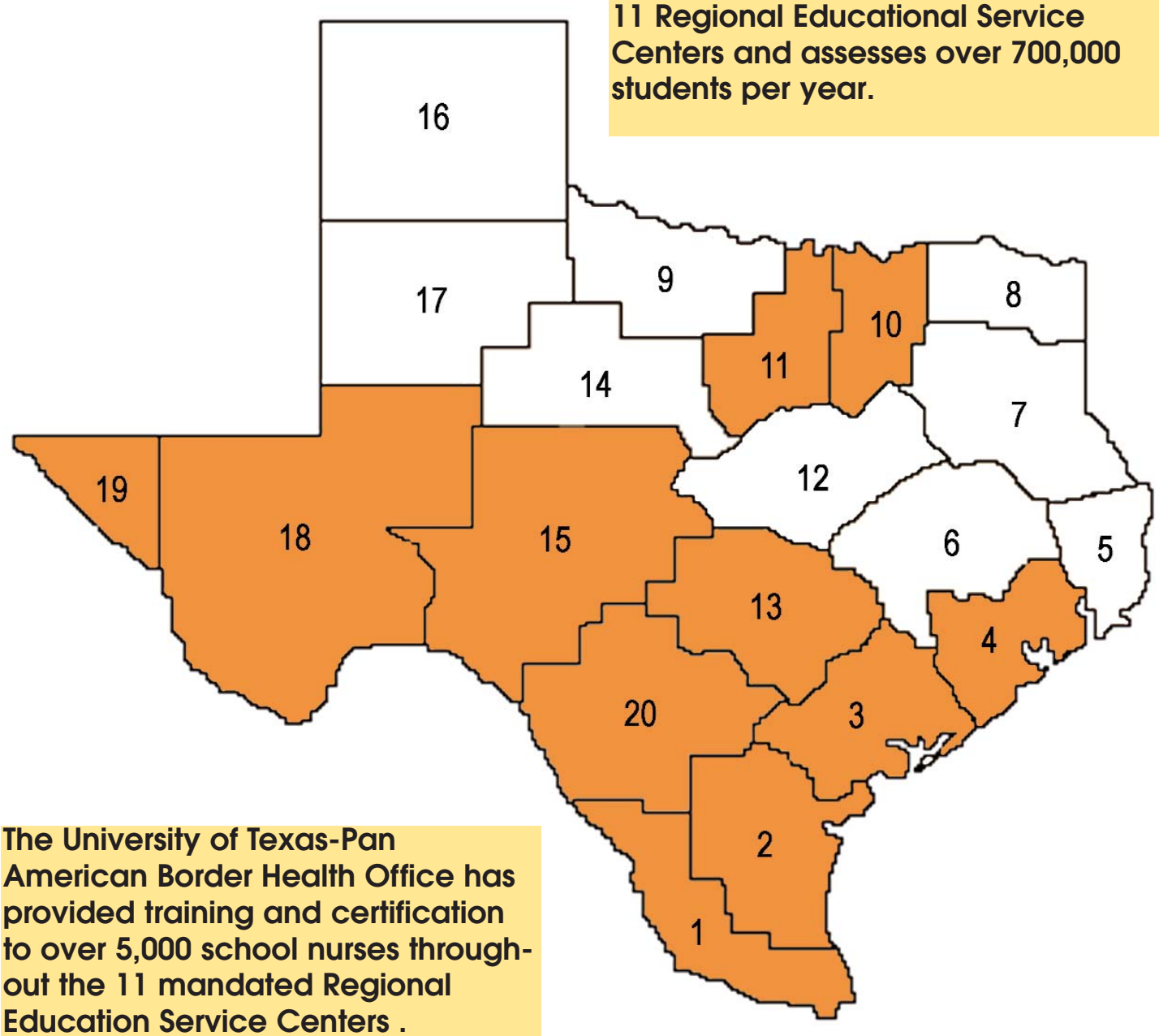
Acanthosis nigricans (AN), a hyperkeratinization of the skin, is a cutaneous marker associated with hyperinsulinemia and insulin resistance and serves as a risk factor for Type 2 diabetes and other chronic diseases. Because of the increasingly alarming rates of children at-risk for developing Type 2 diabetes, assessing for acanthosis nigricans can be useful to help identify children with who may be at-risk for developing future health problems.

In 1999, the state of Texas charged The University of Texas-Pan American Border Health Office (UTPA BHO) to coordinate assessments for AN that were to be conducted on school children in Regions 1 and 19 Education Service Centers during vision/hearing and scoliosis screenings. In addition, AN positive children were assessed for degree of overweight and blood pressure. These risk factors were made known to parents to provide them with the opportunity to seek additional health evaluation.

Today, the ANTES Risk Factor Assessment for Type 2 Diabetes program is active in 11 Regional Educational Service Centers and assesses over 700,000 students per year. The awareness that the program has created among school nurses, parents, physicians, dietitians, school officials, and academia has been quite an accomplishment. Becoming aware and understanding what the risk factors suggest can stimulate the changes necessary to prevent or delay future health problems.

Acanthosis Nigricans (AN) is considered a risk factor in the development of Type 2 Diabetes. Assessing for acanthosis nigricans can be useful to help identify children with who may be at-risk for developing future health problems

The ANTES Risk Factor Assessment for Type 2 Diabetes program is active in 11 Regional Educational Service Centers and assesses over 700,000 students per year.



* shaded area represents Regions/ESCs affected by ANTES mandate

The University of Texas-Pan American Border Health Office has provided training and certification to over 5,000 school nurses throughout the 11 mandated Regional Education Service Centers . Requests for trainings, materials, or technical support are provided by the Border Health Office's health education coordinators at a school nurse's request. Establishing a perennial presence and providing customer service is pertinent to the success of the program and the UTPA BHO recognizes that garnering school nurse trust and support is a priority.

The School Nurse

School nurses are truly the backbone of the ANTES Risk Factor Assessment for Type 2 Diabetes program.

School nurses conduct the ANTES risk assessments during vision/hearing and scoliosis screenings for grades 1st, 3rd, 5th, and 7th. These are the grades that have been recommended for assessment by the ANTES Advisory Council. If a child is positively identified with the AN marker, the school nurse conducts additional assessments of body mass index (BMI), BMI percentile, and blood pressure. The school nurse takes the child's height and weight to determine body mass index (BMI), determines the degree of overweight in the child as prescribed by the Centers for Disease Control and Prevention guidelines, and performs two blood pressure measures, which are averaged and determined as hypertensive, prehypertensive, or normal as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents.

School nurses issue medical referrals to AN positive students, which includes the results from the other assessments performed. The referral contains an explanation of AN and recommends that parents seek further evaluation from their health care provider. The health care provider evaluates the child and makes further recommendations. The health care provider may also refer the child to a dietician for nutritional counseling.

The University of Texas-Pan American Border Health Office has provided training and certification to over 5,000 school nurses throughout the 11 mandated Regional Education Service Centers . Requests for trainings, materials, or technical support are provided by the Border Health Office's health education coordinators at a school nurse's request. Establishing a perennial presence and providing customer service is pertinent to the success of the program and the UTPA BHO recognizes that garnering school nurse trust and support is a priority.

SCHOOL HEALTH SPECIALISTS

Providing risk assessment training to over 5,000 school nurses throughout 11 Texas Education Agency Regional Education Service Centers can be overwhelming without the assistance of Regional School Health Specialists. School Health Specialists are frequently the point-of contact for coordination of trainings and dissemination of new information regarding the ANTES Risk Assessment for Type 2 Diabetes Program. The UTPA Border Health Office values their support and assistance.

Kelly Heland-Cline is the Regional School Health Specialist for Region 4, which serves the largest student population in the state of Texas. The following statement is an example of the collaborative partership that has been developed between School Health Specialists and the UTPA Border Health Office as a result of the ANTES Risk Assessment for Type 2 Diabetes Program.

region 4
Educated Solutions

Region 4 Education Service Center
7145 W. Tidwell Street
Houston, Texas 77092
Phone: 713.744.6531
Fax: 713.744.2731
Email: kcline@esc4.net

Kelly Helland-Cline

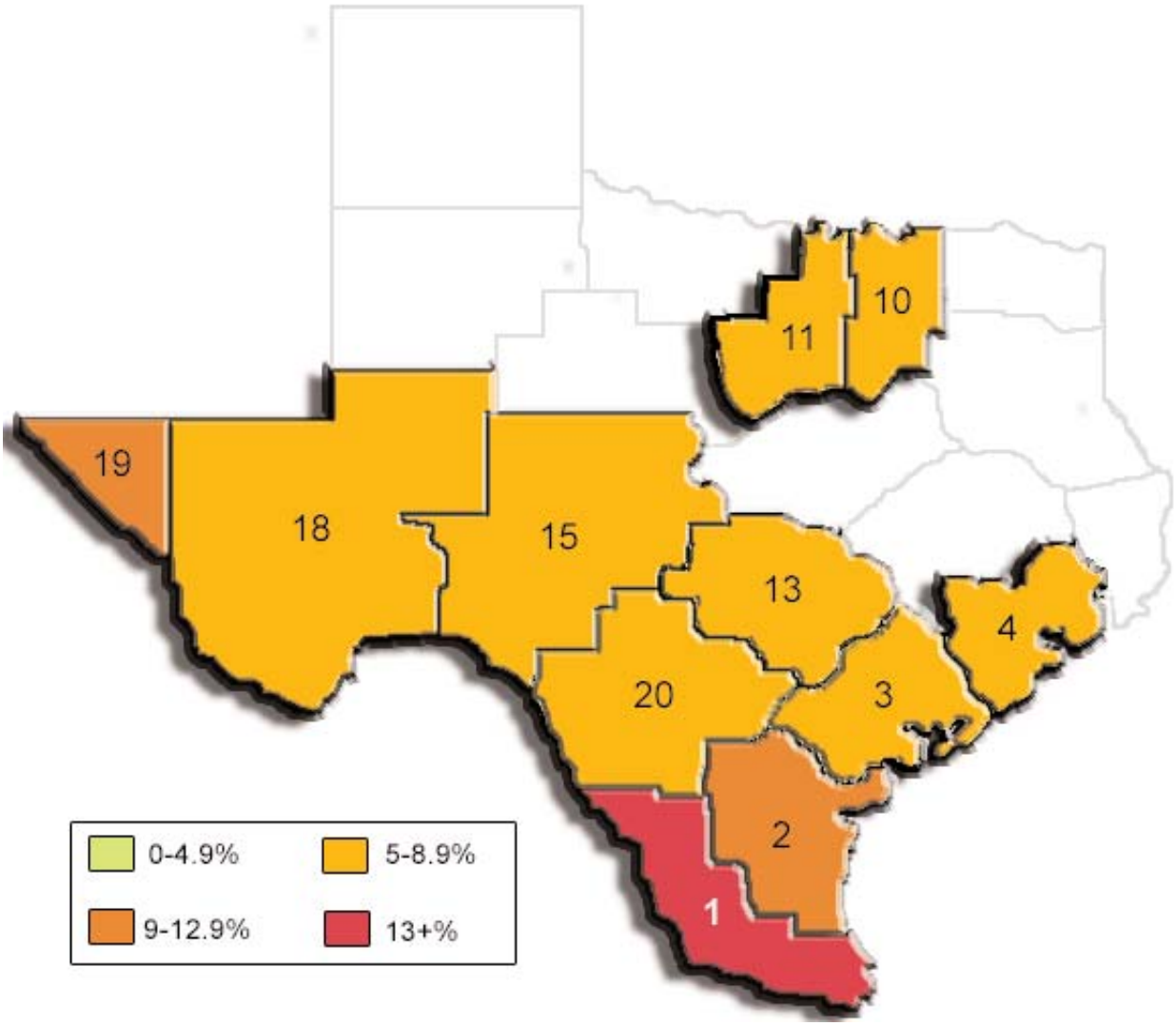
Current Position	Region 4 School Health Specialist
Statement	Region 4 values excellence, service, and children and is committed not only to supporting improvement in student achievement but also providing a healthy learning environment for all students. Senate Bill 19/1357 and 42 relate to health education in public schools and to the improvement of children's health. These bills are instrumental in the pursuit to combat childhood obesity and reduce the prevalence of Type II diabetes in school aged children. My position at Region 4 requires me to have a thorough and comprehensive understanding of all state health laws that focus on the obesity epidemic. I have developed and presented numerous professional development workshops in accordance with new rules, regulations and guidelines that have significantly impacted Texas school health. I have encouraged and nurtured a strong collaborative partnership with the UT Pan American Border Health Office to implement House Bill 2989 and 2721 in an effort to ensure that all students in the Region 4 service area are adequately screened for Acanthosis Nigricans through ANTES (Acanthosis Nigricans: The Education and Screening Program). This program addresses latent health problems such as childhood high insulin levels, obesity, diabetes and other resulting health consequences before they become debilitating, expensive health conditions. The ANTES program also provides districts with online health reports and necessary information about the health and welfare of their students so that districts can make informed educated decisions concerning the adoption and implementation of a state mandated Coordinated School Health Program in an effort to eliminate childhood obesity.
Partnerships	Texas Obesity Task Force Mayor Bill White's Wellness Council UT Prevention and Advocacy for Teen Health Advisory Council Steps To a Healthier Houston Coalition

ASSESSMENTS - ACANTHOSIS NIGRICANS (AN)

The increasing number of youth-onset Type 2 diabetes cases has heightened new interest in children's health, particularly in cases where acanthosis nigricans has been present at the time of diagnosis. Acanthosis nigricans is considered the hallmark for insulin resistance. Because of the increasingly alarming rates of children developing Type 2 diabetes, assessing for acanthosis nigricans may help identify children who may be at-risk for developing future health problems.

During vision/hearing and scoliosis screenings, school nurses identify children with AN. The following figure provides the percent of children with acanthosis nigricans by Texas Education Agency Educational Service Center Regions during the 2005-2006 school year:

Figure 1. Percentage of Children with AN by TEA Region, ANTES 2005-2006



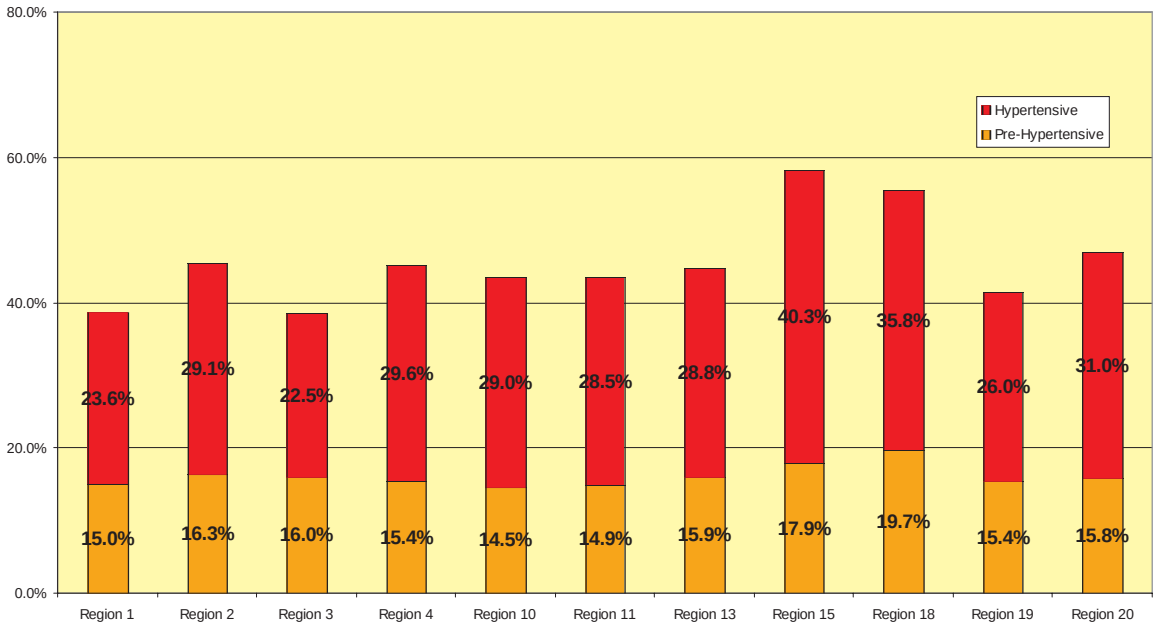
ASSESSMENTS - BLOOD PRESSURE

Hypertension increases the risk for cardiovascular disease and is a complication of obesity. Hypertension has also been associated with insulin resistance and hyperinsulinemia, which results in acanthosis nigricans. Elevated blood pressure in childhood correlates with hypertension in early adulthood, supporting the need to track blood pressure in children.

School nurses perform blood pressure measurements on children who test positive with AN. School nurses are informed of the proper procedure for assessing blood pressure measures in children as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. School nurses perform two blood pressure measures on the child's right arm in a controlled environment, giving three to five minutes of rest in between each reading.

The blood pressure categories are identified as **hypertensive**, **prehypertensive**, or **normal** as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. This process is simplified by the ANTES Risk Factor Electronic System (RFES) which takes the raw blood pressures and interprets them instantly. Figure 2 represents the percentage of children with AN who had been assessed as hypertensive and prehypertensive by Texas Education Agency Region.

Figure 2. Percentage of Hypertensive and Prehypertensive Blood Pressure Readings in Children with AN by TEA Region, ANTES 2005-2006

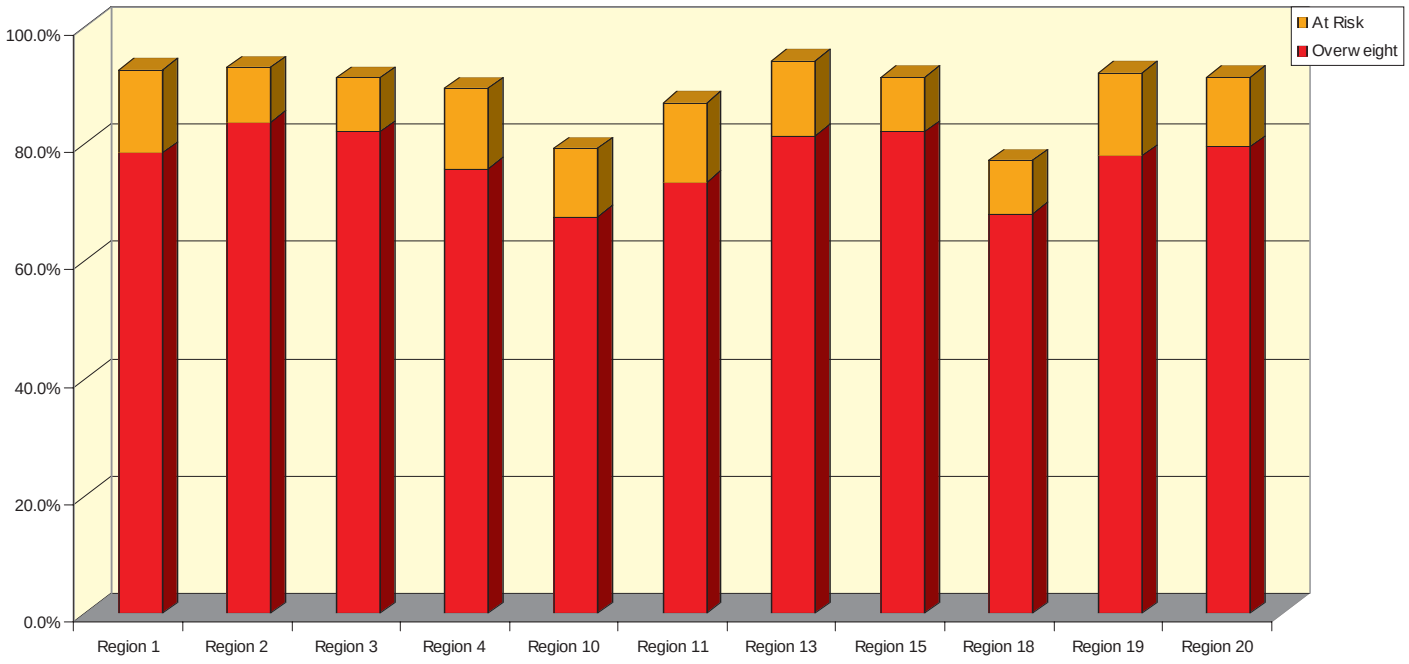


ASSESSMENTS - BODY MASS INDEX (BMII)

Since the ANTES project focused on acanthosis nigricans and children who are at high risk of developing Type 2 diabetes, understanding complications associated with obesity is also important. Obesity has rapidly become a major health concern since its prevalence has increased dramatically worldwide and it has been linked with an increase in the incidence of Type 2 diabetes, cardiovascular disease, hypertension, stroke and other physical, physiological and even psychological complications. Obesity is also a major cause of mortality in the United States, with substantial increases in morbidity and impairing quality of life.

With the assistance of the ANTES RFES, BMI was interpreted on children with AN. Overweight in children was determined using the revised National Center for Health Statistics growth charts to determine the degree of the child's overweight. A child with a BMI greater or equal to the 95th percentile has a greater chance of maintaining obesity into adulthood. This is also significant since studies have shown that BMI above the 95th percentile is associated with elevated blood pressure, hyperlipidemia, and obesity-related disease and mortality. Children whose BMI falls from the 85th and 94th percentile should be evaluated carefully and should be given particular attention to secondary complications of obesity. Figure 3 shows the percent degree of overweight in children with AN by Texas Education Agency Region.

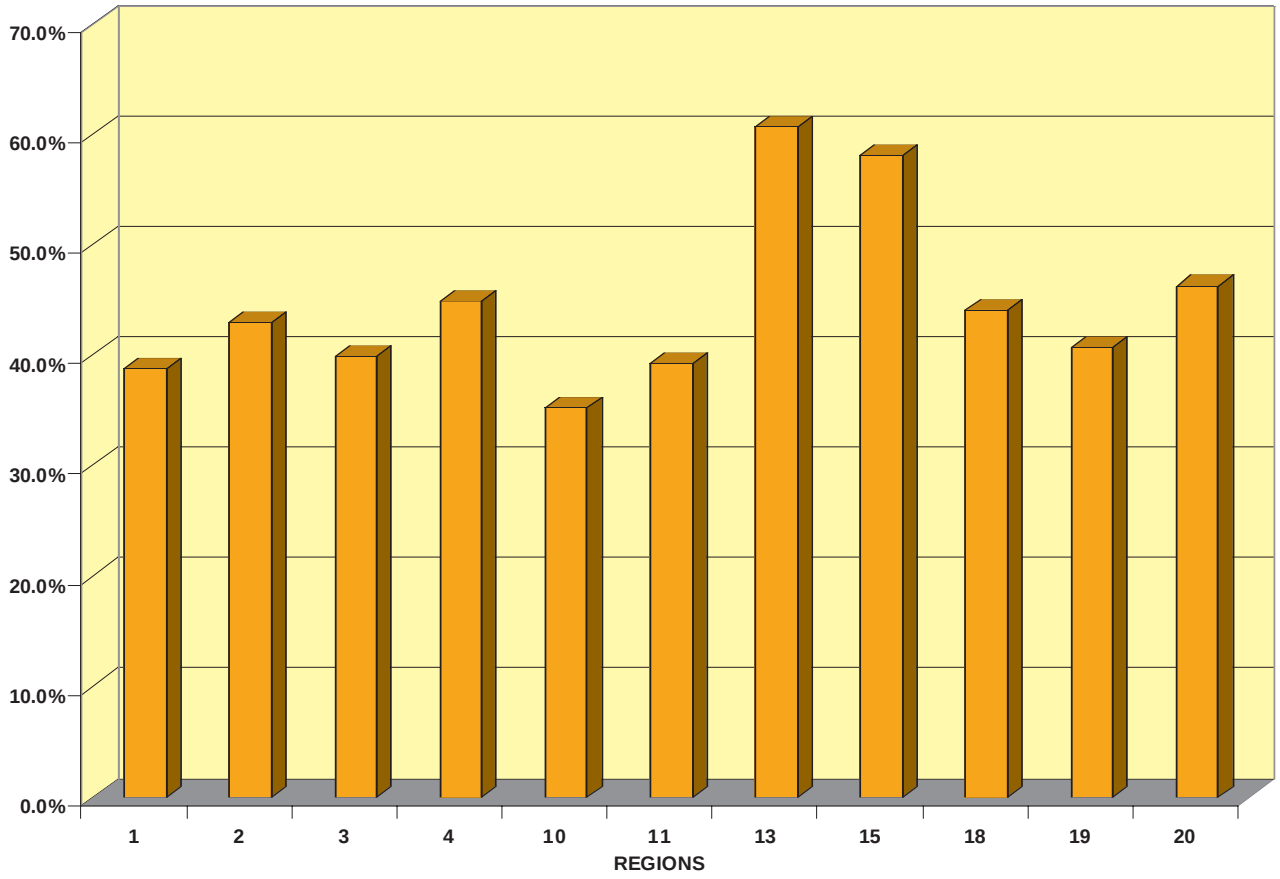
Figure 3. Percent Degree of Overweight/At-Risk of Overweight in Children with AN by TEA Region - ANTES 2005-2006



ASSESSMENTS - COMBINED RISK FACTORS - AN, BP, & BMI)

The purpose of the ANTES Risk Factor Assessment for Type 2 Diabetes program is to identify those children who were at high risk to develop Type 2 diabetes and make the risk factors known to parents and provide them with the opportunity to seek additional health evaluation for their children. Figure 4 represents the percent of children with Acanthosis Nigricans who have the additional risk factors of elevated blood pressure and high BMI (85%-ile and above) by Texas Education Agency Region.

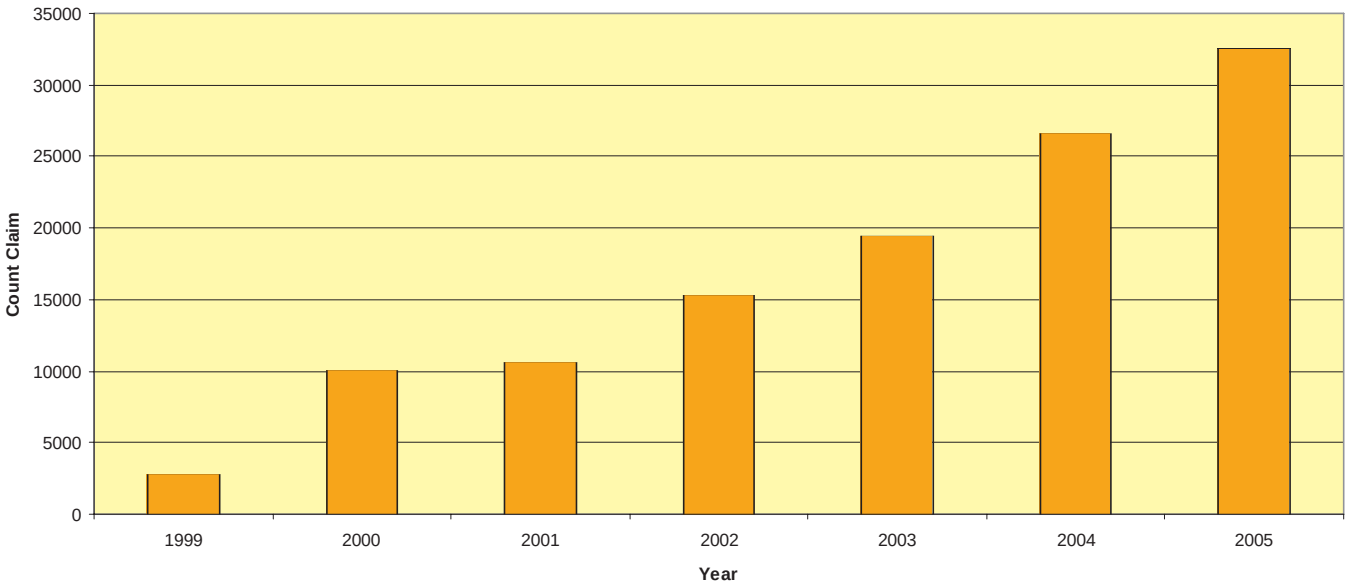
Figure 4. Percent Degree of Overweight/At-Risk of Overweight and Elevated BP in Children with AN by TEA Region - ANTES 2005-2006



ANTES Program - Outcomes

Physicians are vital in the referral of an AN positive child by understanding the risk assessments to ensure that the child receives the proper recommendations. Physician education has been important to the ANTES program. Therefore, since the inception of the program, it was imperative to inform physicians that visits with AN positive children may be reimbursed with CPT Code 701.2 Acquired Acanthosis Nigricans. The following graph depicts the number of claims made using this code from the program's inception in 1999 to 2005.

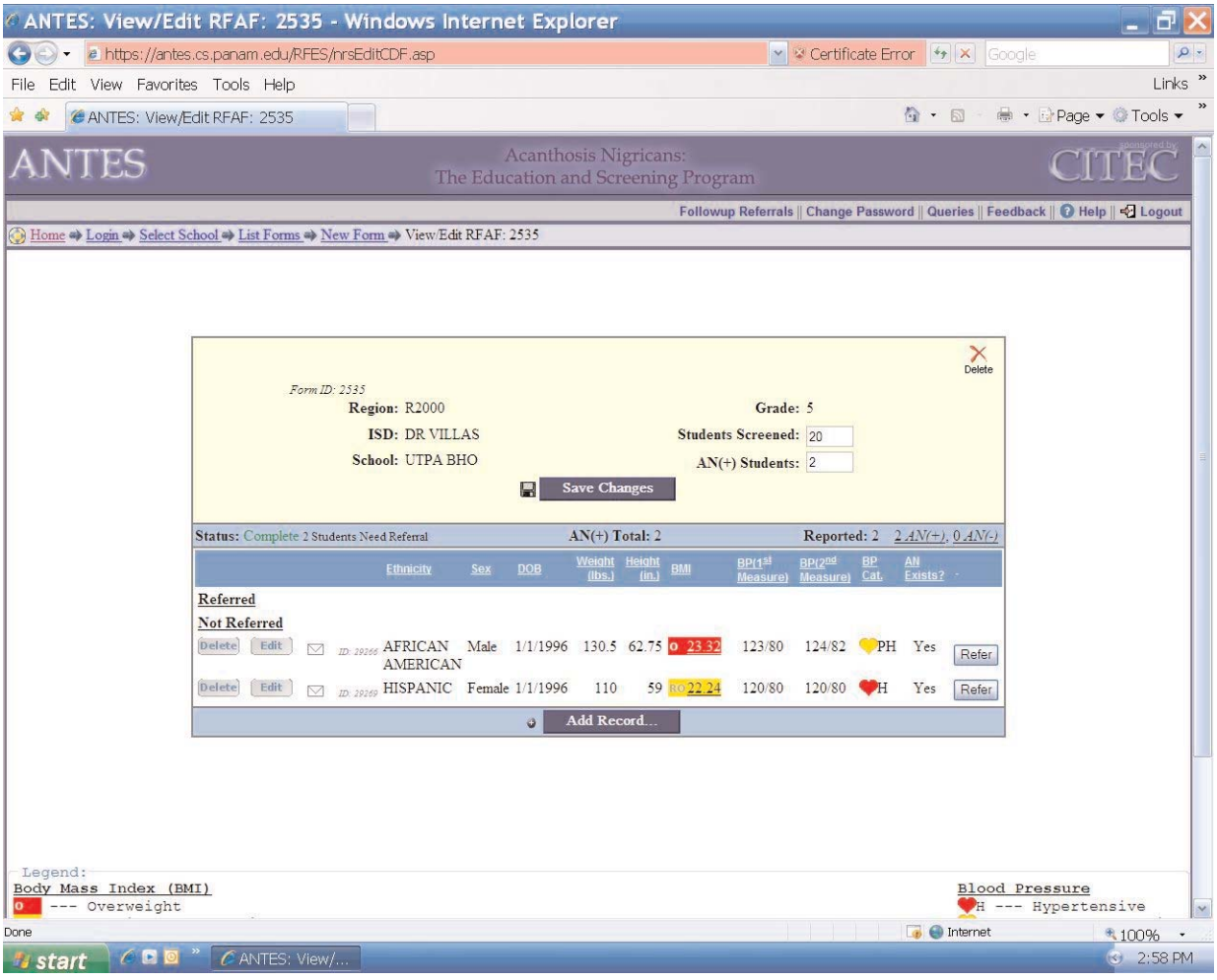
Figure 5. Acanthosis Nigricans CPT Code 701.2 Claim Count among children 0-17 years old Texas Medicaid SFY 1999-2005



THE ANTES RISK-FACTOR ELECTRONIC SYSTEM (RFES)

In 2003, The University of Texas-Pan American Border Health Office and The University of Texas-Pan American Computer Information Technology Center (CITeC) collaborated to create a secure web-based electronic information system that would assist school nurses to fulfill the requirements of the ANTES program. The system was developed to provide school nurses with a faster, easier, and organized way to input information and obtain results and to strengthen the assessment of the AN positive children.

The capabilities of the system allows users to enter information such as age, gender, height, weight, and blood pressure and allows for the interpretation of the variables.



Sample screen shot from RFES Consolidated Data Form

THE ANTES RISK-FACTOR ELECTRONIC SYSTEM (RFES)

The ANTES RFES was created to provide school nurses with a faster, easier, and organized way to input information and to strengthen the assessments of children with Acanthosis Nigricans by providing interpretations of a child's Body Mass Index and blood pressures. The following profiles acknowledge the system's use and versatility.

The ANTES System has been an excellent tool to use in our district. It gives us the opportunity to obtain different reports for statistical analysis. Additionally, the system allows us to obtain information on the childs' BMI and BP and what range the child falls if it within the normal, low risk, or high risk. School nurses are glad to see a system in place that helps to monitor and improve the health of our children. In conclusion, I encourage districts to use the ANTES System if they have access in their district.

Adalia Del Bosque
McAllen ISD
Nurse Coordinator

METROPLEX EDUCATIONAL CONSULTANTS INC.
P.O. Box 13233
Arlington, Texas 76094
1-800-416-TEST
E-mail: mec@mectest.com
Web page: mectest.com

January 15, 2007

To the UT-Pan American Office,

I would like to commend all of you for developing a important program to recognize the early signs of type 2 diabetis. I have used your services since October 2006 when my screeners were trained to observe possible acanthosis nigricans. We service over 400 private schools in the Metroplex for vision, hearing, spinal screening and now this, although many are younger than first grade so this is not offered in all of the schools. We also provide screening in IQ, developmental, kindergarten/first grade readiness, speech, ADHD screenings, and brain, learning, emotional, career, parenting, and stress indicators. I am an educational diagnostician with over thirty years of experience.

I have found your training, charts, and brochures you provide to be helpful when referring students. I personally enter the needed information for the referrals on the website you provide for each school and update it when necessary. It was a bit challenging at first but since I do it often, I find it easy for me to do this for my schools. I like the charts and reports available which calculate the BMI and if they are high risk for hypertension. I have found I can revise the letters since some of the information is not pertinent to all schools (some do not have nurses). I have a nurse on staff who has worked with the other trained screeners who are certified teachers, speech therapists, psychology majors, or educational diagnosticians to calculate height, weight, and use the automatic blood pressure instruments. It was challenging to find these automatic blood pressure devices for children, and we have found cuffs we can adjust to the sizes. Since we are just doing a screening and then refer the students to their physicians for further testing and treatment, we are glad we have the training and equipment to service many students without nurses available in every school.

When I refer a student, I print the chart, the referral letter, and attach the pamphlet for AN. The student then needs to return this letter to the school with the results. Although the physician may not feel immediate treatment is needed, they usually recommend some specific suggestions for weight reduction and exercise if they are overweight. I also send the schools the AN pamphlet and also some printed materials from the www.tdh.state.tx.us website entitled "Acanthosis Nigricans and Insulin Review". It helps the school to understand how important this early intervention is and what they can do.

I hope this can assist other schools to develop a referral plan for their acanthosis nigricans screening program so more children can be observed and assisted. Please feel free to contact me with any questions or any assistance.

Sincerely,

Dawn Heil, M.A.
Educational Diagnostician/Owner

SUGGESTED READINGS

1. Allison, DB, Fontaine, KR, Manson, JE, Stevens, J, VanItallie, TB. Annual Deaths Attributable to Obesity in the United States. JAMA. 2000; 282: 1530-1538.

2. Barlow, SE, Dietz, WH. Obesity Evaluation and Treatment: Expert Committee Recommendations. Pediatrics. 1998; 102 (3): e29.

3. Bent, KN, Shuster, GF, Hurley, JS, Frye, D, Loflin, P, Brubaker, C. Acanthosis Nigricans as an Early Clinical Proxy Marker of Increased Risk of Type II Diabetes. Public Health Nursing. 1998; 15: 415-421.

4. Campagna, AF, Pettitt, DJ, Engelgau, MM, Burrows, NR, Geiss, LS, Valdez, R, Beckles, GLA, Saaddine, J, Gregg, EW, Williamson, DF, Narayan, KMV. Type 2 diabetes among North American children and adolescents: An epidemiologic review and a public health perspective. The Journal of Pediatrics. 2000; 136: 664-672.

5. Cook, VV, Hurley, and JS. Prevention of Type 2 Diabetes in Childhood. Clinical Pediatrics. 1998; 37: 123-130.

6. Dabelea, D, Pettitt, DJ, Jones, KL, Arslanian, SA. Type 2 Diabetes Mellitus in Minority Children and Adolescents: An Emerging Problem. Pediatric Endocrinology. 1999; 28: 709-729.

7. Gilkison, C, Stuart, CA. Assessment of patients with acanthosis nigricans skin lesion for hyperinsulinemia, insulin resistance, and diabetes risk. Nurse Practitioner. 1992; 17(2): 26-43.

8. Hamiel, OP, Standiford, D, Hamiel, D, Dolan, LM, Cohen, R, Zeitler, S. The Type 2 Family: A Setting for Development and Treatment of Adolescent Type 2 Diabetes Mellitus. Arch Pediatric Adolescence Med. 1999; 153: 1063-1067.

9. Kiernan, M, Winkleby, MA. Identifying Patients for Weight-Loss Treatment. An Empirical Evaluation of the NHLBI Obesity Education Initiative Expert Panel Treatment Recommendations. Arch Intern Med. 2000; 160: 2169-2176.

10. Kuczmarski, RJ, Flegal, KM, Campbell, SM, Johnson, CL. Increasing prevalence of overweight among U.S. adults: the National Health and Nutrition Examination Surveys. JAMA. 1994; 272: 205-211.

11. Ludwig, DS, Majzoub, JA, Al-Zahrani, A, Dallal, GE, Blanco, I, Roberts, SB. High Glycemic Index Foods, Overeating, and Obesity. Pediatrics. 1999; 103: 3.

12. Mokdad, AH, Serdula, MK, Dietz, WH, Bowman, BA, Marks, JS, Koplan, JP. The Spread of the Obesity Epidemic in the United States, 1991-1998. JAMA. 1999; 282: 1519-1522.

13. Must, A, Spadano, J, Coakley, EH, Field, AE, Colditz, G, Dietz, WH. The Disease Burden Associated with Overweight and Obesity. JAMA. 1999; 282: 1523-1529.

14. National Association of School Nurses. Position Statement:Caseload Assignments. June 1972.

15. National Association of State Boards of Education. Policy Update. Vol. 8, No. 10 June 2000.

16. National Task Force on the Prevention and Treatment of Obesity. Overweight, Obesity, and Health Risk. Arch Intern Med. 2000; 160: 898-904.

17. Neufeld, ND, Raffel, LJ, Landon, C, Chen, YDI, Vadheim, CM. Early Presentation of Type 2 Diabetes in Mexican-American Youth. Diabetes Care. 1998; 21: 80-86.

18. Pediatrics. The Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents: National High Blood Pressure Education on Children and Adolescents. 2004; 114; 555-576.

19. Pediatrics. Update on the 1987 Task Force Report on High Blood Pressure in Children and Adolescents: A Working Group Report for the National High Blood Pressure Education Program. 1996; 98(4): 649-657.

20. Pettitt, DJ, Moll, PP, Knowler, WC, Mott, DM, Nelson, RG, Saad, MF, Bennett, PH, Kottke, BA. Insulinemia in Children at Low and High Risk of NIDDM. Diabetes Care. 1993; 16: 608-615.

21. Pihoker, C, Scott, CR, Lensing, SY, Cradock, MM, Smith, J. Non-Insulin Dependent Diabetes Mellitus in African-American Youths of Arkansas. Clinical Pediatrics. 1998; 37: 97-102.

22. Pinhas-Hamiel, O, Dolan, LM, Daniels, SR, Standford, D, Khoury, PR, Zeitler, P. Increased incidence of non-insulin-dependent diabetes mellitus among adolescents. Journal of Pediatrics. 1996; 128: 608-615.

23. Reaven, GM. Role of insulin resistance in human diseases. Diabetes. 1988; 37: 1595-1607.

24. Rhodes, SK, Shimoda, KC, Wald, R, et al. Neurocognitive deficits in morbidly obese children with obstructive sleep apnea. Journal of Pediatrics. 1995; 127: 741-744.

25. Rosenbloom, AL, House, DV, Winter, WE. Non-Insulin Dependent Diabetes Mellitus (NIDDM) in Minority Youth: Research Priorities and Needs. Clinical Pediatrics. 1998; 37: 143-152.

26. Rosenbloom, AL, Joe, JR, Young RS, Winter, WE. Emerging Epidemic of Type 2 Diabetes in Youth. Diabetes Care. 1999; 22: 345-354.

27. Rosenbloom AL, Silverstein JH. Type 2 Diabetes in Children & Adolescents: A Guide to Diagnosis, Epidemiology, Pathogenesis, Prevention, and Treatment. Alexandria, Virginia: American Diabetes Association, Inc. 2003.

28. Scott, CR, Smith, JM, Cradock, MM, Pihoker, C. Characteristics of youth-onset noninsulin-dependent diabetes mellitus and insulin-dependent diabetes mellitus at diagnosis. Pediatrics. 1997; 100: 84-91.

29. Shwartz, RA. Acanthosis Nigricans. Journal of the American Academy Dermatology. 1994; 31: 1-19.

30. Slyper, AH. Childhood obesity, adipose tissue distribution, and the pediatric practitioner. Pediatrics. 1998; 102(1): e4.

31. Strauss, RS. Childhood Obesity and Self-Esteem. Pediatrics. 2000; 105: 1

32. Stuart, CA, Driscoll, MS, Kurt, LF, Gilkison, CR, Sudah, S, Smith, MM. Acanthosis Nigricans. Journal of Basic and Clinical Physiology and Pharmacology. 1998; 9(2-4): 407-418.

33. Stuart, CA, Gilkison, CR, Smith, MM, Bosma, A, Keenan, BS, Nagamani, M. Acanthosis nigricans as a risk factor for non-insulin dependent diabetes mellitus. Clinical Pediatrics. 1998; 73-79.

34. Stuart, CA, Pate, CJ, Peters, EJ. Prevalence of acanthosis nigricans in an unselected population. American Journal of Medicine. 1989; 87: 269-272.

SUGGESTED READINGS

35. Stuart, CA, Smith, MM, Gilkison, CR, Shaheb, S, Stahn, RM. Acanthosis nigricans among Native Americans: an indicator of high diabetes risk. American Journal of Public Health. 1994; 84(11): 1839-1842.

36. Troiano, RP, Flegal, KM, Kuczmarski, RJ, Campbell, SM, Johnson, CL. Overweight prevalence and trends for children and adolescents. The National Health and Nutrition Examination Surveys, 1963 to 1991. Archives of Pediatric Adolescent Medicine. 1995; 149: 1085-1091.

37. US Department of Health and Human Services. Physical Activity and Good Nutrition: Essential Elements for Good Health At-A-Glance 2000. US Department of Health and Human Services, Center for Disease Control and Prevention; 2000.

38. Villas, P, Salazar, D, Garza, D, Villagomez, N, Lightner, T. Acanthosis Nigricans in Youth: A Type 2 Diabetes Marker. Texas Journal of Rural Health. 2000. 18; 1: 52-58.

39. Young, KT, Dean, HJ, Flett, B, Steiman, PW. Childhood obesity in a population at high risk for type 2 diabetes. The Journal of Pediatrics. 2000; 136: 365-369.

40. Zwillich, CW. Is Untreated Sleep Apnea a Contributing Factor for Chronic Hypertension? JAMA. 2000; 283: 1880-1881.

The University of Texas-Pan American
Border Health Office
1201 West University Drive
Edinburg, Texas 78541
Phone: 956/318-8900
Fax: 956/318-8903
E-mail: TMBHCO@PANAM.EDU
www.panam.edu/dept/tmbhco