Knowledge and Practices of School Nurses Regarding Growth Measurement

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ABSTRACT

Many school districts now require school nurses to calculate BMI (body mass index) from height and weight measurements, and plot BMI using the revised "2000" CDC (Centers for Disease Control and Prevention) growth charts[1]. Errors in BMI calculations can be caused by inaccuracies in measurement equipment or technique or failure to correctly plot BMI[2]. Although inaccuracies in measurement equipment and technique are documented in the literature and likely exist among the growth screening practices of school nurses, accuracy of measurements can be improved with training[3]. This study examined current growth screening practices among school nurses including knowledge, attitudes, measurement technique and equipment. A total of 60 school nurses working in parochial schools in Philadelphia were contacted. Growth measurement knowledge and practices were obtained from 75% (n=45) of nurses using a self-administered questionnaire and knowledge assessment. Although 55% of school nurses reported confidence in accuracy of growth screening practices, 60% also expressed the need to improve accuracy. Thirty three percent (n=20) agreed to an in-school observation and attended a Professional Development Program (PDP) on Growth Screening. Findings from this study may have implications for other BMI reporting programs.

INTRODUCTION

The prevalence of overweight in youth increased from 5% in 1974 to 15% in 1999-2000[4]. BMI-for-age, defined in percentiles, is the recognized and validated standard screening tool for overweight in children and adolescents[5]. Currently, overweight is defined as a BMI ≥ 95th percentile. At risk for overweight is defined as a BMI between the 85th and 95th percentile[5]. Overweight in youth is associated with hypertension, hyperinsulinemia, hyperlipidemia and various pulmonary, musculoskeletal, and mental health issues[6]. Overall, health care costs to treat obesity-related diseases have risen from $35 million to $127 million[7]. These increases have prompted the American Academy of Pediatrics (AAP) and the Institute of Medicine (IOM) to recommend annual assessments of BMI as a strategy to prevent and combat the epidemic of childhood obesity. In September 2005, BMI reporting by school nurses became mandatory in Pennsylvania schools. In light of the new BMI mandate, the objectives of this study are to: 1) evaluate current growth screening practices among school nurses; 2) standardize growth screening practices using recommended protocols; and 3) document the impact of a professional development program on growth screening practices.

HYPOTHESES

1. Nurses' knowledge of recommended protocols for measurement technique and maintenance of equipment will increase after the Professional Development Program (PDP).
2. Nurses' measurement errors in height, weight, and BMI will decrease post PDP.

METHODS

1. This study was approved by the Institutional Review Board of Drexel University and supported by the School District of Philadelphia and the Office of Catholic Education, Archdiocese of Philadelphia.
2. All Philadelphia parochial school nurses were invited to participate. A convenience sample of school nurses self-selected into the study. 55 of the 60 nurses responded to the initial invitation.
3. The study consisted of two phases: Phase 1) development and pilot of study materials as well as methods of intervention through a focus group; and Phase 2) implementation of the intervention. Phase 2 has three components: a) Baseline Assessment; b) The Growth Screening Professional Development Program (PDP); and c) Follow-up Assessment which is now being completed.
4. Key findings adopted from the focus group included: importance of providing incentives; labeling the program as "Professional Development" instead of training; emphasis on standardization of the measurement process; and in-school observation of height and weight measurement equipment and nurses' measurement techniques.
5. During the Baseline Assessment, investigator-developed Measurement Checklists (based on review of the literature) were used to assess measurement equipment and technique. Each nurse was observed measuring a student in the nurse's office. Assessment of measurement technique and equipment will be conducted in the same manner during the Follow up Assessment.
6. The Growth Screening Professional Development Program consisted of a 60 minute presentation. Three sessions were held in different locations of Philadelphia. Topics included nutrition and weight management resources, common sources of measurement error and calculation of BMI. Recommended protocols (based on review of the literature) were provided for: 1) measurement of height and weight; and 2) maintenance and calibration of measurement equipment.
7. Participation incentives included nutrition resources, 1.5 continuing education credits, light snacks, calibration devices, the EZ BMI Percentile Calculator and a $10 Visa gift card.

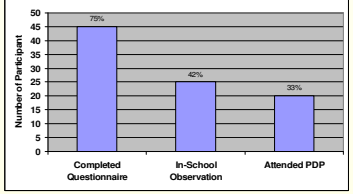
RESULTS

DEMOGRAPHICS (n=20)

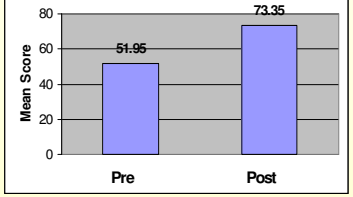
Variable	*n (%)*
Ethnicity	
African American	4 (20)
Caucasian	14 (70)
Other	2 (10)
Age	
36-45	3 (15)
46-55	13 (65)
56-65	4 (20)
Gender	
Female	19 (95)
Male	1 (5)
Education	
Bachelors degree	4 (20)
Masters degree	15 (75)
Nurse Practitioner	1 (5)
Years as School Nurse	
1-10	9 (45)
11-15	4 (20)
>15	7 (35)

100% of nurses have Pennsylvania Certification.

RECRUITMENT (n=60)



Change in Knowledge Post PDP (n=20)



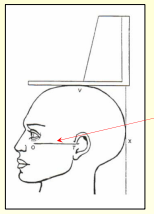
Pre= 51.95± 13.51(SD) Post = 73.35 ± 9.21(SD) P<.0001

Intent to Change Behavior After Attending PDP (n=20)

	n (%)
What actions will you take after this program?	
Measurement Technique	
Improve weight measurement technique.	19 (95)
Improve height measurement technique.	20 (100)
Measurement Equipment	
Calibrate scale regularly.	19 (95)
Calibrate stadiometer regularly.	19 (95)
Perform regular maintenance on scale.	17 (75)
Perform regular maintenance on stadiometer.	19 (95)
Obtain new scale.	6 (30)
Obtain new stadiometer.	9 (45)

State one way you will improve your measurement technique.
Purchase weights to calibrate equipment regularly.
Purchase new stadiometer or use portable stadiometer instead of scale measurement.
Have students take off shoes.
Make sure heels are together and body is aligned properly.
Improve technique – align head in Frankfort Plane; ask student to take deep breath and hold.

Measurement Technique: Recommended Protocol for Height



1. Use a stadiometer with a fixed right angle head piece
2. Head, shoulders, buttocks, and heels against the stadiometer
3. Position head in Frankfort Plane
4. Instruct subject to take a deep breath and stretch
5. Lower head piece onto crown of head
6. Assess measurement at eye level
7. Reposition and Re-measure

Height Measurement Equipment

Stadiometer

Portable Stadiometer

Head- Piece

Not Recommended
Poster Chart

Not Recommended
Measuring Rod

Weight Measurement Equipment

Balance Beam Scales

Not Recommended
Dial Scale

Height and Weight Measurement Technique

Participants Following Recommended Protocol for Measurement Technique (n=20)

Pre Professional Development	*n (%)*
Height	
Use stadiometer	14 (70)
Measure subject in light clothing	18 (90)
Four points against stadiometer	11 (55)
Position head in Frankfort Plane	0 (0)
Instruct student to take deep breath	0 (0)
Assess measurement at eye level	4 (20)
Reposition and Re-measure	0 (0)
Weight	
Use balance beam or digital scale	18 (90)
Zero scale before measurement	3 (15)
Weigh subject in light clothing and without shoes	19 (95)
Reposition and Re-measure	0 (0)

CONCLUSIONS

1. The small convenience sample of school nurses who self-selected into the study was a limitation. Therefore, results of this study can not be generalized to all school nurses.
2. During the baseline in-school observations, inaccuracies in measurement were noted due to faulty equipment; improper measurement technique; or miscalculations in BMI. After the PDP (Professional Development Program), several nurses requested new scales and/or replaced faulty height measurement equipment with new stadiometers.
3. All nurses used a BMI wheel, calculator or table with the CDC growth chart to calculate BMI prior to the PDP. Instructions were provided on calculation of exact age and plotting of BMI on the appropriate growth chart. To increase accuracy and to standardize BMI calculations among the nurses, participants received the EZ BMI Percentile Calculator (a BMI software program) with training.
4. In light of mandated BMI reporting and potential inaccuracies in measurement equipment and technique, a Professional Development Program based on standardized protocols may improve the accuracy of growth measurements and BMI calculations among school nurses.

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