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Validity of Oral Health Screening in Field Conditions: Pilot Study

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Purpose. This small pilot study examined the validity of visual dental hygiene screenings (VDHS) in conditions found in local communities.

Methods. A sample of 126 children in kindergarten through second grade was screened by 2 dental hygienists and inspected by a dentist. None of the assessors had more than minimal experience and training in epidemiological methodologies. Two denal hygienists noted teeth as decayed or not decayed using only a tongue blade and a goose-neck lamp (VDHS). The dentist noted decay by tooth and surface using a mirror, explorer, portable dental chair, as well as a goose-neck lamp; this examination is referred to as a mirror, tactile dental inspection (MTDI). The dentist's assessment (MTDI) was the "gold standard." Data were analyzed using frequency distributions, sensitivity, specificity, and kappa coefficient statistics, as well as other statistics to test the significance of differences and to investigate explanations for discrepancies between the VDHS and MTDI.

Results. Sensitivity and specificity for the VDHS for all teeth were 61% and 96%, with a kappa coefficient of 0.6. Analysis of the discrepancies between the VDHS and the MTDI suggest that, for primary teeth, the sensitivity of the VDHS is greater when: (1) lesions are large (i.e. multi surface) and (2) single surface lesions are located anteriorly. No statistically significant explanations were found for differences in permanent teeth.

Conclusion. In this study, VDHS demonstrated high specificity and moderate sensitivity for caries identification.

Keywords: dental caries, dentists, dental hygienists, oral health, mass screening, sensitivity and specificity

Introduction

Dental hygienists have a long history of providing oral health screenings in community settings, particularly in schools. However, the accuracy of these screenings has not been investigated relative to the standards of treatment by dentists in local communities. The intent of this small study was to investigate the validity of oral health screenings by dental hygienists in field conditions. Specifically, the study examined how well local hygienists could accurately classify school children as either having or not having decay, with reference to standards of treatment by dentists in the local community. This information would enable one to determine how well dental hygienists evaluate children who need dental care without over-referring.

Review of the Literature

Dental hygienists have been providing screenings for over 75 years. A 1927 book on school health elucidates this responsibility: "She [dental hygienist] makes thorough and detailed mouth examinations and records the needs of each individual."[1] In 1949, Williams and Abernathy stated that dentistry created the profession of dental hygiene to address the dental health aspect of school health after it became apparent that the prevalence and incidence of caries made it impractical to insist that only dentists conduct dental examinations in schools.[2]

Oral health screenings in schools are still needed. According to national data, low-income school-aged children have 1.2 to 2.2 times more decayed teeth than do their more affluent peers and while low-income children receive some dental treatment, it is insufficient to meet their needs.[3] In Iowa, as of 1999, 17% to 23% of low-income children aged 7-9 had untreated decay, as did 9% to 13% of non low-income children.[4] Furthermore, among those aged 6-11, 72% of low-income children had a dental visit in the past year compared with 92% of non low-income children. This 20% difference probably underestimates the number of low income children who had routine "check-up" visits to identify early carious lesions and prevent painful problems.

The American Dental Association identified four types of dental examinations:[5]

Type 1 Complete examination, using mouth mirror and explorer, adequate illumination, thorough roentgenographic survey.

Type 2 Limited examination, using mouth mirror and explorer, adequate illumination, posterior bitewing roentgenograms.

Type 3 Inspection, using mouth mirror and explorer, adequate illumination, and

Type 4 Screening, using tongue depressor, available illumination.

In public health settings, dental hygienists often use Type 4, a visual dental hygiene screening (VDHS); however,, dentists typically use Type 3, a mirror, tactile dental inspection (MTDI).

While studies comparing local dental Hygienists' screenings with local dentists' inspections were not found, 2 studies in the United States using epidemiological study methods compared a VDHS with a MTDI. In 1990, Mauriello et al tested the validity of a VDHS conducted by 4 hygienists on 5253 children in grades 1 and 5.[6] The dental hygienists had at least 5 years of private practice experience, extensive study-specific training over several days, and their inter-examiner screening skills calibrated on the first day of the screenings. The dental hygienists used a dental light and tongue blades. The MTDI was conducted by four dentists, each of whom had substantial experience in large-scale epidemiological studies. The dentists also had extensive study-specific training over several days and were calibrated for inter-examiner reliability on the first day of data collection. The dentists used a dental light, mirror, explorer, and compressed air. The dentists followed Radike's criteria and inspected by surface; the dental hygienists used criteria developed for the study and screened by tooth.[7] Using the kappa coefficient to compare the VDHS against the MTDI for all children in the study (n=5233), the kappa for presence of decay was 0.4 in permanent and 0.6 in primary teeth. This sample had a mean and standard deviation of 0.4 and 1.0 decayed teeth, respectively, for the permanent dentition, and a mean and standard deviation of 1.1 and 2.2 decayed teeth, respectively, for the primary dentition.

The other study was quite different in that the study-specific training of the dental hygienist only involved reading written materials and the screening protocol required assessment by quadrant until caries were found or not found. Beltran et al conducted this study in 1997, which compared the screening by one dental hygienist who had previous public health experience, to one dentist with previous experience and calibration with National Institute of Dental Research (NIDR) diagnostic criteria for decay.[8-10] The dental hygienist used a portable chair, flashlight, and tongue blade; the dentist used a portable chair, light, mirror, and explorer. They examined 309 children in kindergarten through fifth grade at a school where 67% of the children were eligible for free or reduced-price lunch.[11] Over one-third of the children had untreated decay. The sensitivity and specificity values of the VDHS were 95% and 94%, respectively, for presence of decay.

These studies involved several days of training for the dentists as did the dental hygienists in the Mauriello et al study.[6,8] It would be expensive and time consuming for local dentists and dental hygienists to undergo such training for local

assessment efforts. Further, the criteria of measurement of these 2 studies were based on the National Institutes of Health epidemiological protocols, as were their standard of validity. In contrast, this study used the level of dental care in the local community and did not provide study-specific training.

Data on the validity of the VDHS using local community dental hygienists without extensive training as "front line" individuals to develop and implement screening programs (12) would be useful in assisting communities accomplish the Healthy People 2010 objectives of: (a) reducing the proportion of children, adolescents, and adults with untreated decay; (b) increasing the proportion of children and adults who use the oral health care system each year; (c) increasing the proportion of low-income children and adolescents who received any preventive dental service during the past year; and (d) increasing the proportion of school-based health centers with an oral health component.[12,13] Weintraub also advocates that dental hygienists who can work without direct supervision in public health settings be utilized to conduct screenings for young children as a means of controlling early childhood caries.[14]

The unique goal of this study was to examine the validity of VDHS in typical field conditions to ascertain if children identified with decay had true treatment needs and those children identified as caries-free did not need treatment for caries consistent with the standards of treatment by a dentist in the local community. Specific aims were to: 1) determine the validity of oral health screenings (VDHS) in a community setting using local oral health care providers without training in public health and research data collection perspectives and methods and 2) explore explanations of possible discrepancies between the VDHS and MTDI based on size, surface, and location of decay.

Methods and Materials

The study population was comprised of 250 children in kindergarten through second grade (K-2) at one inner-city school in a predominantly white Iowa city. This school was identified as having a high risk population since more than half (68%) of the study population was eligible for free or reduced-price school lunch. Consent and cooperation were obtained from the school principal and district school nurse. Informational letters and parental consent forms were mailed to parents and non-respondents were contacted by teachers during parent-teacher conferences. This study was approved by the University of Iowa College of Dentistry's Institutional Review Board for Human Subjects Research.

Dental hygienists employed in the community were asked by the local public health dental hygienist to participate in the study. Interested dental hygienists attended a one-hour presentation to prepare for data collection. Four dental hygienists were available on the study day. Two dental hygienists (A and B) screened and 2 recorded concurrently. Dental hygienist A graduated in 1983 from a two-year dental hygiene program and hygienist B graduated in 1984 from a four-year program. The screenings (VDHS) were conducted one morning in the school art room where the children came one classroom at a time. Each child stood in front of the seated dental hygienist who used a tongue blade and goose-neck lamp to view each child's mouth. Dental hygienist A assessed 63 children, while dental hygienist B assessed the other 63 children. The hygienists were told to consider a tooth sound if in doubt. The dental hygienists recorded the total number of decayed teeth for each dentition. The screenings were completed in less than 2 hours.

The MTDI was conducted by one local dentist. The same public health dental hygienist constructed a short list of dentists who worked in the city and whom she thought might participate. The first dentist contacted by the investigator volunteered. Originally, the protocol had been written to have the children examined in the dentist's office with radiographic data, Type 1 dental examination, just as a new patient would be examined.[5] However, it was not acceptable to the school administrator to transport the children from the school. Since it was not possible to safely accommodate radiographic exposure within the school, a Type 3 dental inspection was conducted in the same room at the school in 3 half-days (9:15 AM-12:30 PM) and completed within one month of the screenings.[5] In preparation, the dentist reviewed Radike's criteria for the diagnosis of dental caries and discussed the format with the investigator who instructed the dentist to examine the subject just as he would in his own practice, except without radiographs.[7] The dentist used a portable dental chair, a goose-neck lamp, a dental-operator chair, mouth mirrors, explorers, his own dental assistant seated in a four-handed-delivery mode, and slightly modified oral examination forms from his office. Students came to the art room in a manner that allowed for continuous

examining by the dentist and observation by subsequent children. In the MTDI assessment, the dentist noted the location of decay by tooth and surface.

Note that while decay status was determined by both the VDHS and the MTDI, they were assessed and recorded in different formats. With the VDHS, the total number of decayed teeth was recorded for each dentition for each subject; whereas, with the MTDI, the location of decay was recorded by tooth and surface for each subject.

All study findings were coded and entered into a computer and verified for accuracy. Initially, the data were analyzed by frequency distributions and cross-tabulations. To analyze the validity of the VDHS, the VDHS and MTDI were compared for presence of decay. Data regarding the number of decayed teeth were converted to dichotomous variables. The congruence of the VDHS and MTDI for these decisions was compared by sensitivity rate, specificity rate, and the kappa coefficient, using findings from the MTDI as the standard. According to Gordis, sensitivity is the ability of a test (VDHS) to identify correctly those who have the disease, while specificity is the ability of the test (VDHS) to correctly identify the non-diseased people as non-diseased.[15] The kappa coefficient is the extent to which the observed agreement (between the VDHS and the MTDI) exceeds that which would be expected by chance alone (numerator) relative to the most that the observers could hope to improve their agreement (denominator). Analysis for the permanent teeth was made only for the children who had permanent teeth (n=113). The chi-square statistic was used to test for significance of differences between the two hygienists.

Data were also analyzed using the Fisher exact test, Cochran *Q* test, and the Mantel-Haenszel test to explore explanations for the discrepancies between the VDHS and MTDI.[16] Three explanations were considered. 1) Lesion size was investigated to to determine if multiple-surface lesions (large lesions) were more accurately detected by the VDHS than single-surface lesions (small lesions). Lesion size was investigated separately for the primary and permanent dentitions. 2) Controlling for lesion size, the location of the lesion was analyzed to determine if lesions of approximately the same size were more accurately detected in locations most visible to the unaided eye (ie, the anterior vs. posterior teeth and mandibular vs. maxillary teeth for both the primary and permanent dentitions). Canines were categorized as posterior teeth because primary canines (there were no permanent canines in this K-2 sample) are normally located within the curvature of the arch and therefore are less visible to observation by the unaided eye. 3) The type of tooth surface, smooth vs non-smooth, was tested by single-surface lesion and by any type of lesion to determine if decay was detected more accurately on smooth surfaces than on non-smooth surfaces. For primary teeth, the analyses compared occlusal surfaces (non-smooth) with all other surfaces (smooth). For permanent teeth, developmentally pitted and fissured surfaces (the lingual surface of the right and left maxillary first molars and the buccal surface of the right and left mandibular first molars) were included with the occlusal surfaces as non-smooth surfaces. The data for the two hygienists were combined for this analysis.

Results

Of the 250 children in kindergarten through second grade, data were collected from 126 (50%) for whom parental consent was obtained. The study participants were not significantly different from the total population on any of the demographic variables available from school records. (Table I.) The largest percentage of students (35.7%) were in the second grade. Sixty-six percent of study participants were eligible for free lunch and 52% lived in a home without a father present.

Table I- Student characteristics of total population and study participants

	Total population N=250		Study participants n=126		
Variable	Number	Percent	Number	Percent	p value*
Economic status					
Self pay	78	31.2	30	23.8	.3
Reduced-price lunch	19	07.6	13	10.3	.6
Free lunch	152	60.8	83	65.9	.5
Not available	1	00.4	xxxxx	xxxxx	xxxxx
Family structure					
Single mom	119	47.6	66	52.4	.6
Single dad	20	08.0	11	08.7	.8
Mom and dad	111	44.4	49	38.9	.5
Gender					
Male	143	57.2	72	57.1	1.0
Female	107	42.8	54	42.9	1.0
Grade					
Kindergarten	91	36.4	41	32.5	.7
First	83	33.2	40	31.8	.9
Second	76	30.4	45	35.7	.4
Birth Year (age)					
1990 (5-6)	59	23.6	24	19.0	.4
1989 (6-7)	89	35.6	44	34.9	.9
1988 (7-8)	77	30.8	42	33.3	.8
1987 (8-9)	24	09.6	15	11.9	.6
1986 (9-10)	01	00.4	01	00.8	.3

* Percents rounded to nearest whole number for these calculations

The distribution of decayed teeth among the 126 children is presented in Table II. Of this K-2 population, 67.6% of the teeth were primary teeth. According to the MTDI, 67 children (53%) did not have any decay; while according to the VDHS, 87 children (69%) did not have any decay. Both approaches found similar numbers of children with 1, 2, and 3 decayed teeth; however, the MTDI found many more children with 4 to 8 decayed teeth.

Table II- Frequency of decayed teeth in children by VDHS and MTDI

Number of decayed teeth	Number of children as defined by VDHS	% children as defined by VDHS	Number of children as defined by MTDI	% children as defined by MTDI
0	87	69.0	67	53.2
1	18	14.3	16	12.7
2	10	07.9	9	07.1
3	6	04.8	8	06.4
4	3	02.4	10	07.9
5	1	00.8	7	05.6
6	1	00.8	2	01.6
7	0	00.0	6	04.8
8	0	00.0	1	00.8
TOTAL	126	100.0	126	100.1

The dental hygienists (VDHS) identified 79 decayed teeth in 39 children; the dentist (MTDI) identified 195 decayed teeth in 59 children. Among the 126 children, the mean number of decayed teeth was 1.6 according to the MTDI and 0.6 according to the VDHS. As expected, given the age of the children, there was more decay in primary teeth than in permanent teeth. While decay was found on all surfaces, the occlusal surface was most frequently decayed in the primary dentition and the buccal surface, followed closely by the occlusal surface in the permanent dentition. (Table III.)

Table III- Frequency, percent, mean and standard deviation of decayed teeth and surfaces among children from VDHS and MTDI

	All teeth (n=126)			Primary teeth (n=126)			Permanent teeth (n=113)		
VDHS	n	mean	sd	n	mean	sd	n	mean	sd
Decayed teeth	79	.6	1.2	70	.6	1.1	9	.1	.4
MTDI									
Decayed teeth	195	1.6	2.2	158	1.2	1.9	37	0.3	0.8
Decayed surfaces	343	2.7	4.1	289	2.3	3.4	54	0.5	1.4
occlusal	143	1.1	1.8	124	1.0	1.6	19	0.2	0.6
mesial	63	0.5	1.0	61	0.5	1.0	2	0.0	0.2
distal	58	0.5	0.8	53	0.4	0.8	5	0.0	0.3
buccal	44	0.4	0.8	22	0.2	0.5	22	0.2	0.6
lingual	35	0.3	0.7	29	0.2	0.6	6	0.1	0.3

The sensitivity and specificity for the VDHS in detecting decay was 61% and 96% for all teeth, 64% and 100% for primary teeth, and 15% and 97% for permanent teeth, respectively. Corresponding kappa coefficients were 0.6, 0.7, and 0.2, respectively. Dental hygienists A and B detected decay comparably except for sensitivity for permanent teeth, for which dental hygienist A was significantly (p .000) less able to accurately detect decay than dental hygienist B. (Table IV.)

Table IV. Sensitivity, specificity and Kappa of the VDHS regarding presence of decay compared with MTDI presence of decay

	Dental hygienist A			Dental hygienist B			Both dental hygienists		
	Sen*	Spec +	Kap-pa	Sen*	Spec+	Kap-pa	Sen*	Spec +	Kappa
All teeth	62	96	.6	60	95	.6	61	96	.6
Primary teeth	66	100	.6	62	100	.7	64	100	.7
Permanent teeth	0	98	.0	30	96	.3	15	97	.2

n=126 children, except for permanent teeth which were present in only 113 children, with hygienist A and B seeing 54 and 59 children respectively
Sen* Sensitivity
Spec+ Specificity

As determined by the MTDI, Table V summarizes carious lesions by primary and permanent dentition, maxillary and mandibular arch, anterior and posterior location, and surface involved. In addition, the table lists the number of subjects by each location of decay as determined by the MTDI. Of the 36 locations where decay was detected by the MTDI, the VDHS identified subjects as having decay in 32 of these locations. The four locations which were most problematic (0% of subjects detected) were the distal, buccal, and mesial single-surface locations of posterior primary teeth and one multiple-surface location in the primary posterior primary teeth.

Table V.- Frequency of decay by dentition, arch, location in the mouth and surface type as determined by MTDI and the ability of the VDHS to correctly identify cases with each type of lesion as having decay

LOCATION OF DECAY BY MTDI					NUMBER OF SUBJECTS		PERCENT CORRECT
Dentition	Arch	Position	Surface	Fre-quency	MTDI # children	VDHS # children	% correct by VDHS*
Primary	maxillary	anterior	mesial (M)	9	5	4	80
(Teeth #4-7)			distal (D)	1	1	1	100
			buccal (B)	3	2	2	100
			All	3	2	1	50
Primary	maxillary	posterior	lingual	6	4	3	75
(Teeth #1,2,3,8,9,10)			occlusal	15	12	6	50
			mesial	2	2	1	50
			distal	3	3	0	0
			buccal	1	1	0	0
			LO	6	5	5	100
			DO	11	9	7	78
			MO	14	10	6	60
			DL	1	1	1	100
			MLO	3	3	3	100
			MOD	1	1	1	100
			All	3	3	2	67
Primary	mandibular	anterior	All	1	1	1	100
(Teeth #14-17)							
Primary	mandibular	posterior	mesial	1	1	0	0
(Teeth #11,12,13,18,19,20)			occlusal	24	19	12	63
			distal	2	2	1	50
			buccal	1	1	1	100
			DO	19	14	12	86
			MO	16	12	8	67
			BO	3	3	3	100
			LM	1	1	0	0
			MOD	1	1	1	100
			BMO	1	1	1	100
			All	6	4	4	100
Permanent	maxillary	posterior	occlusal	4	3	2	67
(Teeth #3,14)			LO	1	1	1	100
			LD	3	2	1	50
			All	1	1	1	100
Permanent	mandibular	posterior	buccal	14	10	7	70
(Teeth #19,30)			occlusal	8	6	2	33
			BO	5	4	3	75
			All	1	1	1	100

* These statistics are for the combined data of hygienists A and B.

Results of testing for the 3 explanations for possible discrepancies between the VDHS and the MTDI are as follows. With regard to size, the ability of the VDHS to identify single-surface decay was significantly less than the ability to identify multiple-surface decay for primary teeth but not for permanent teeth. The odds of the VDHS detecting multiple-surface decay in primary teeth were 3.1 of those for detecting single-surface decay (OR=3.1; p=.0022; confidence interval (CI)= 1.5-6.9). The corresponding p value for the permanent teeth was 0.3887.

For the position of decay (anterior versus posterior) for the permanent teeth, tests could not be conducted due to lack of anterior decay in this dentition for this sample. For single-surface decay in primary teeth, the ability of the VDHS to identify posterior decay was significantly less than the ability to identify anterior decay. The odds of the VDHS detecting single-surface, anterior decay was 10 times that of detecting single-surface, posterior decay (OR=10.; p=.0117; CI=1.2-82.3). However, multiple-surface decay in primary teeth was detected equally well in either the anterior or posterior location (p=0.6473).

With regard to the position of decay in the maxillary versus mandibular arch, the VDHS was not significantly different from the MTDI in identifying either: 1) single-surface maxillary decay in the primary (0.7204) or permanent (0.4462) dentition, or 2) multiple-surface maxillary decay in the primary (0.5708) or permanent (0.3869) dentition.

Tests to compare smooth versus non-smooth surfaces could not be conducted for the permanent teeth due to lack of smooth surface decay in this young sample. For the primary teeth, the ability of the VDHS to identify pitted surfaces (including the occlusal surfaces) was not significant for either single-surface instances of pitted decay (p=0.2920) or instances in which a non-smooth surface was involved in any carious lesion (p=0.3715).

Discussion

As Beltran et al discussed at length, the level of congruence necessary to state that the VDHS is valid has not been widely discussed.[8] Landis established that kappa values <0.39 are "low," 0.4 to 0.6 are "moderate," and >0.61 are "substantial."[17] Stamm states that a test should have a sensitivity level of 0.75 or higher and a specificity level of 0.85 or higher.[18] These guidelines suggest that, as implemented in local community field assessment conditions, the VDHS had moderate to substantial kappa values in primary teeth, excellent specificity in both primary and permanent teeth, poor kappas in permanent teeth, and poor sensitivity in both primary and permanent teeth. Since the carious lesions most often missed by the VDHS were single-surface lesions in general and particularly in the posterior of the mouth, the use of the mirror in MTDI may account for much of the differences in findings.

The congruence level for detecting decay achieved in this study was remarkably similar to those reported by Mauriello et al.[6] This is a somewhat surprising finding given the extensive training for the screenings by both dental hygienists and dentists in the Mauriello study.[6] However, Mauriello's analysis was more precise than this study. Although the level of decay was similar in the 2 studies, the subjects in this study were younger and this may explain the lower kappa coefficient for permanent teeth (0.2 versus 0.4). In contrast, this study's sensitivity levels were considerably lower (0.6 versus 1.0) than those reported by Beltran et al.[8] The 2 studies had similar specificity levels (1.0 versus 0.9). The dental hygienist in Beltran et al had more study-specific training than the 2 dental hygienists in this study, and perhaps Beltran's sample had more extensive decay as slightly more than one-third of the Beltran et al subjects needed urgent dental care while only 15% of these subjects did.[8,9]

The primary limitations of this small-scale pilot study were sample size and the limited number of dental hygienists and dentists. Further, it is possible that the dentist may have over-identified decay knowing that the assessment was part of a research project and having been able to acquire data from use of the mirror and explorer. Also, directing the dental hygienists to consider questionable areas sound may have decreased their sensitivity rates. However, it must be kept in mind that this was a young sample with few erupted permanent teeth.

Without a doubt, the dental Hygienists' ability to detect caries would have been enhanced with a mirror and explorer. Dental hygienists and dentists detect caries at a comparable level when they utilize the same equipment and have the same study-specific training.[19,20] But, the purpose of this study was to investigate the VDHS in typical, local community situations. Analyses of discrepancies between the VDHS and MTDI in this study suggest that if dental hygienists give extra attention to identifying single-surface lesions and single- surface lesions in posterior teeth, the sensitivity of the VDHS would probably increase. If this more careful look is successful, it would be more cost-effective than adding mirrors which cost more than tongue blades and need to be sterilized. The primary advantage of the VDHS is low cost in terms of equipment, preparation, clean-up, and manpower. This study ascertained that child contact time for one dentist to perform the MTDI was more than twice that for one dental hygienist to perform the VDHS.

Some have advocated that dental hygienists who participate in screening programs, such as the Early Periodic Screening, Diagnosis and Treatment (EPSDT) program, need annual continuing education and clinical licensing tests in screening.[21] The present study and Beltran's study indicate that with short study-specific preparation, dental hygienists, as educated under current US accreditation standards, can achieve moderate to high levels of sensitivity and specificity with VDHS.[8] This suggests that that yearly clinical licensing tests and yearly continuing education are not necessary for dental hygienists to participate in oral health screenings.

These findings do suggest directions for further research on the VDHS. Larger sample sizes and a wider age group of children are needed to test the effects of location and size of decay on ability to detect decay with the VDHS. To increase the generalizability of study results, the study needs to be replicated in a variety of types of communities, and the number of local community dental hygienists performing the VDHS and the number of local community dentists performing the MTDI need to be increased. Investigators should consider comparing a visual dental hygiene screening to a dental hygiene screening that includes the use of mirrors. In addition to investigating the validity of the VDHS, cost-benefit analyses should be done. Until these studies are done, this study's findings and Beltran et al's indicate that the VDHS is a low-cost,

simple screening technique with reasonably good validity, and that dental hygienists with general private practice experience can adequately perform VDHS with minimal additional instruction.[8]

Conclusion

In this young sample (kindergarten through second grade) with mostly primary teeth, these dental hygienists using VDHS were able to identify children without carious lesions (specificity=96%). They were less successful in identifying children with caries (sensitivity=61%). For the dental hygienists in this study, it was particularly difficult to identify single-surface lesions and single-surface lesions in posterior teeth. Overall, the high specificity indicates that visual screenings by these 2 community, private-practice dental hygienists would not refer children for dental care who do not need care.

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Notes

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