Implementation of Oral Health Screening and Referral Guidelines in Primary Health Care

Ye Zhu, MD, MPH[1]
Kelly Close, MSPH[2]
Leslie Zeldin, MSUP, MPH[1]
B. Alex White, DDS, DrPH[1, 3]
R. Gary Rozier, DDS, MPH[1]

Affiliations:
[1]Department of Health Policy and Management, Gillings School of Global Public Health, University of North Carolina at Chapel Hill
[2]Oral Health Section, Division of Public Health, NC Department of Health and Human Services
[3]Department of Dental Ecology, School of Dentistry, University of North Carolina at Chapel Hill

Supplement: Questionnaire development, analytical variables and scale items

Questionnaire development

Dozens of theories, models and frameworks have been proposed to describe and explain the diffusion-dissemination-implementation continuum (Nilsen 2015). At a general level, common domains can be identified such as characteristic of the guidelines, characteristics of the health care practitioners and the patients, the context in which implementation is occurring, and strategies for facilitating implementation (Nilsen 2015). We used constructs from the determinant framework proposed by Cabana et al. (1999) because of its underlying emphasis on provider behavior change, a domain thought to be important in physician oral health screening and referral practices (dela Cruz et al. 2003). We also were interested in identifying factors associated with providers' adherence to clinical guidelines that could be considered as targets for interventions.

The framework includes several domains related to the provider (awareness and familiarity with guidelines, agreement, self-efficacy, outcome expectancy, external barriers to perform recommended actions). We expanded the content of the original framework domains by including items that acknowledge that implementation is considered a multidimensional and multilevel phenomenon (Cabana & Kiyoshi-Teo 2010; Nelson 2015).

The 91 item, self-completed questionnaire drew on three areas of literature—guideline implementation and adherence (Cabana et al. 1999; Francke et al. 2008; Cochrane et al. 2007); effectiveness of guideline dissemination (Akbari et al 2008); and recommendations for oral health care of infants and toddlers (AAP 2014). Items in the questionnaire related specifically to risk assessment and referral are those proposed by the AAP.

Two important premises underlie these guidelines: (1) POHS by primary care providers is an essential part of well-child visits and should be tied to clinical and behavioral risk factors; and (2) every child needs a dental home but referrals to dentists often need to be prioritized, also according to risk, because of an insufficient supply of dentists in many communities.

Analysis variables

Practices: Providers were queried about the specific type and frequency of their risk assessment and referral practices. Patient volume was assessed with 3 items that asked them to report on the percentage of well-child visits (0%, 1-10%, 11-25%, 26-50%, 51-100%) in which they screen for dental problems, decide on services based on risk for caries, and refer to a dentist. Frequency of specific risk assessment practices (8 items; 0-24 scale) and referral practices (7 items; 0-21 scale) were assessed with a four-point Likert response scale (never, sometimes, often, always). We also asked if they had billed Medicaid for IMB services in the last 12 months (yes/ no).

Adherence: The survey contained four vignettes to assess adherence to AAP guidelines for oral health risk assessment and dental referral under specified workforce supply conditions of an adequate or inadequate supply. The results of a hypothetical screening and risk assessment depicted risk factors for different levels of risk (low, moderate, high, higher) and dental caries status (none, early stages, advanced stages). For each vignette, respondents were asked to respond to three items: 1) oral health risk status (low, moderate, high, not sure), 2) whether to refer the child to a dentist if there was an adequate supply of dentists in their community, and 3) whether to refer to a dentist if the supply of dentists was inadequate. Options provided for referral were as follows: 1) Refer the child to a dentist now; 2) Wait and refer the child at 3 years of age, but continue dental screenings during well-child visits; 3) Wait and refer the child at 3 years of age, but continue dental screenings and provide preventive dental services during well child visits.

Barriers and enablers: Knowledge and familiarity with AAP oral health guidelines were assessed using 1 item (not aware; aware and slightly familiar; aware and moderately to very familiar). Self-reported responses were provided for 7 other predictor scales formed by summing coded responses to Likert scale questions. The scales were; agreement with risk assessment (4 items; score=4-20; alpha=0.74); agreement with referral (6 items; score=6-30; alpha=0.76); self-efficacy (5 items; score=5-15; alpha=0.74); and outcome expectancy (3 items; score=0-12; alpha=0.88). All of these scales were coded to reflect increasing support for risk-based assessments and referrals. Barriers were assessed for oral health risk assessment (8 items; score=8-24; alpha=0.75), referral (8 items; score=8-24; alpha=0.76) and patient characteristics (5 items; score=0-5; alpha=0.78). Positive scores on the barriers scales represent the likelihood of experiencing increasing difficulties in conducting risk assessment or referrals.

We also included specific questions in the survey instrument to distinguish among opinions held about universal referral versus risk-based referral. These four items asked about the likelihood of referral for an infant or toddler who was low risk, had risk factors but no obvious caries, the beginning stages of caries or obvious untreated caries. Reponses were provided using a 5-level Likert scale from “very unlikely” to “very likely”.

Only 26.4% were “somewhat likely” or “very likely” to refer an infant or toddler who was at “low risk for existing dental disease”; 47.1% a patient with “risk factors for future dental disease but no obvious tooth decay”; and 90.5% and 100% a patient who “has a few teeth believed to be in the beginning stages of tooth decay” or “has obvious untreated tooth decayed”, respectively.

Potential confounders: We included several variables pertaining to characteristics of the provider (sex, type, years in practice and hours patient care/ week), patient (total / week; infants & toddlers /

week; % with well-child visits, % non-English speaking parents; % enrolled in Medicaid and % uninsured or self-pay) and characteristics of the guideline intervention (IMB training or not, how and when; use of screening tool).

Individual items in each domain and their association with adherence

Individual questionnaire items within each scale and their associations with adherence levels (high vs. other, or counts) provide insights into barriers and facilitators for medical providers' implementation of oral health practices. We present the distribution of responses for questioinaire items making up each domain score in Table S1 – Table S5. Results of our evaluation of the association of each item with adherence category (high vs. other) are also indicated.

Most of the individual items are not associated with adherence level. However, 2 items in the "referral agreement" domain, 2 in the "self-efficacy" domain, and 1 in the "barriers to risk assessment" domain were associated with high adherence to dental referral guidelines.

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Appendix Table 1: Percent Distribution of Agreement with Risk Assessment and Referral Statements (N=53)

Domain	Strongly Agree=1	Somewhat Agree=2	Neutral=3	Somewhat Disagree=4	Strongly Disagree=5	Mean
Agreement with risk assessment						
Physicians should screen children for tooth decay by 1 year of age.	88.6	7.5	3.7	0	0	1.15
Physicians should perform oral health risk assessment beginning at 6 months of age.	79.2	15.0	3.7	1.8	0	1.28
Physicians can determine the oral health risk status of infants and toddlers.	73.5	16.9	9.4	0	0	1.35
Oral health risk assessments improve oral health.	79.2	16.9	1.8	0	1.8	1.28
						Mean weighted sum score = 5.07 (SD=1.838)
Agreement with referral						
Physicians should refer all infants and toddlers to a dentist by the first birthday.*	9.4	16.9	9.4	32.0	32.0	3.60
Physicians should refer infants and toddlers to a dentist based on their risk for tooth decay.	32.0	43.4	16.9	3.7	3.7	2.03
Physicians should refer infants and toddlers to a dentist only if untreated disease is present.*	7.5	22.6	13.2	33.9	22.6	3.41
Infants and toddlers with behavioral risks for caries, such as drinking sweetened beverages between meals, should be referred to a dentist even if they don't have obvious untreated tooth decay.	23.0	28.8	19.2	21.1	7.6	2.61
Dental referrals by physicians increase the number of infants and toddlers with a dental home.	64.1	22.6	9.4	3.7	0	1.52
The age 1 dental visit helps prevent tooth decay.	17.3	26.9	42.3	9.6	3.8	2.56
						Mean weighted sum score = 15.82 (SD=3.335)
*Scales reversed; Bolded items associated with adherence categories (p-value <0.05)						

Appendix Table 2: Percent Distribution of Self-efficacy Responses (N=53)

Domain	Very Confident=1	Somewhat Confident=2	Not Confident=3	Mean item Score
Self-efficacy				
How confident are you in…..				
Examining teeth of infants and toddlers for tooth decay?	58.4	41.5	0	1.4
Identifying tooth decay in infants and toddlers?	64.1	35.8	0	1.3
Evaluating risk of tooth decay in infants and toddlers?	64.1	35.8	0	1.3
Deciding if a child needs a referral to a dentist?	62.2	35.8	1.8	1.3
Advising parents about dental visits during early childhood?	86.7	13.2	0	1.1
Mean weighted sum score=6.66 (SD=1.950)				
Scales are reversed for the analysis. Bolded items are associated with adherence categories (p-value= < 0.05)				

Appendix Table 3: Percent Distribution of Responses to Outcome Expectancy Items (N=53)

Domain	Percent Distribution				Mean
	No Effect=1	Small Effect=2	Moderate Effect=3	Large Effect=4	
Outcome expectancy					
How much effect does your advice have on a parent taking their Medicaid-enrolled infant or toddler to the dentists when that child has…					
Untreated tooth decay?	1.8	18.8	45.2	33.0	3.11
Behavioral risk factors for tooth decay but no disease?	5.6	49.0	39.6	5.6	2.45
No risk factors or tooth decay?	20.7	47.1	28.3	3.7	2.15
Mean weighted score = 7.71 (SD=1.84)					

Appendix Table 4: Barriers to adherence to oral health risk assessment and dentist referral guidelines (N=53)

Barrier	Percent Distribution (Row %)			Mean
	Not a Barrier at All=1	Somewhat of a Barrier=2	Very Much a Barrier=3	
Oral Health Risk Assessment				
Poor motivation by parents to change behaviors once risk factors are identified	7.5	20.7	71.7	2.64
Lack of time during well-child visits*	52.8	37.7	9.4	1.69
Lack of practical risk assessment checklists or other tools	41.5	49.0	9.4	1.67
Lack of an information system to monitor dental caries risk	45.2	43.4	11.3	1.66
Lack of staff training or skill in recognizing tooth decay or determining risk status	49.0	41.5	9.4	1.30
Inadequate reimbursement	52.8	37.7	9.4	1.56
Lack of evidence-based guidelines about oral health screening and risk assessment	52.8	43.4	3.7	1.50
Lack of staff or 'buy-in' to provide oral health services	71.7	26.4	1.8	1.30
Mean weighted score=13.66 (SD=3.037)				
Dentist Referral				
Limited availability of dentists in community who will see infants and toddlers	22.6	33.9	43.4	2.20
Low importance parents place on dental referrals	13.2	52.8	33.9	2.20
Lack of an information system to monitor outcomes of dental referrals	32.0	56.6	11.3	1.79
Lack of referral tools, forms, or checklists	54.7	43.4	1.89	1.47
Lack of evidence-based guidelines about referrals	56.6	35.8	7.6	1.50
Lack of time during well-child visit	58.4	37.7	3.7	1.45
Lack of support staff to help parents with the referral	64.1	32.0	3.7	1.39
Inadequate reimbursement	75.0	18.8	5.7	1.30
Mean weighted score=13.33 (SD=3.044)				
Bolded items are associated with adherence categories (p-value= < 0.05)				

Appendix Table 5: Percent distribution of responses for referral difficulty according to patient characteristics

How difficult is it to find a local dentist for an infant or toddler who…	**Percent Distribution**				**Mean**
	Very Difficult=1	**Somewhat Difficult=2**	**Not Difficult at All=3**	**Not Sure=4**	
…is uninsured?	58.4	24.5	13.2	3.7	1.52
…has a significant developmental disability	41.5	28.3	30.1	0	1.88
…has private dental insurance and has an emergency dental problem at night or on a weekend	26.4	35.8	24.5	13.2	1.97
…has Medicaid dental benefits	28.3	43.4	28.3	0	2.00
…is younger than two years of age	16.9	50.9	32.0	0	2.15
Mean weighted score = 6.03 (SD=2.780)					