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COVER STORY

Motivating parents to prevent caries in their young children

One-year findings

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Views about caries have changed in this generation; caries now is viewed as a process, not an outcome.^{1,2} Restorative care does not cure the disease, and filling children's primary teeth may have a number of drawbacks, especially when the lesion is confined to the enamel.^{3,4} A number of interventions now are available to prevent the disease or arrest it in its early stages without surgical intervention. These interceptive interventions are noninvasive and focus on the identification of white-spot lesions; the use of topical fluorides, sealants, antimicrobial agents and glass ionomer cements; and diet and hygiene modification.⁵ Moreover, this approach overlaps to a considerable extent with the concept of minimally invasive dentistry.⁶

Motivational interviewing may lead parents and others to better accept dental recommendations about preventing caries in their children.

Childhood caries in North America is concentrated in low-income populations.⁷ The parents of these high-risk children hold beliefs and demonstrate behaviors congruent with a "caries as a hole in the tooth" viewpoint. That is, such parents often wait until caries in primary teeth are advanced or symptomatic before bringing their children to the dentist.⁸ Treatment at that time is invasive, and parents tend to avoid subsequent treatment until their children's needs again become extreme.⁹ To control this cycle, dentists and hygienists and other dental team members must alter the thinking and behaviors of the parental gatekeepers.

How can we influence this parental point of view so that children at high risk of developing caries can ben-

Background. The authors conducted a study to compare the effect of a motivational interviewing counseling treatment with that of traditional health education on parents of young children at high risk of developing dental caries.

Overview. The authors enrolled in the study parents of 240 infants aged 6 to 18 months and randomly assigned them to either a motivational interviewing, or MI, group or a traditional health education (control) group. Parents in the control group received a pamphlet and watched a video. Parents in the MI group also received the pamphlet and watched the video; in addition, they received a personalized MI counseling session and six follow-up telephone calls.

Results. After one year, children in the MI group had .71 new carious lesions (standard deviation, or SD, = 2.8), while those in the control group had 1.91 (SD = 4.8) new carious lesions ($t[238] = 2.37$, one-tailed, $P < .01$).

Conclusions. MI is a promising approach that should receive further attention.

Clinical Implications. MI may lead parents and others to better accept dental recommendations about preventing caries in their children.

efit from the interceptive approach? What can we say or do to motivate the parents of high-risk children to prevent or arrest caries? This article focuses on an attempt to engage parents of young children at high risk in controlling caries in early childhood.

EARLY CHILDHOOD CARIES

Early childhood caries, or ECC, is a severe disease of the teeth of infants and toddlers. The condition first affects the primary maxillary incisors, then involves the primary molars.¹⁰ In nonindustrialized countries and disadvantaged populations (immigrants, ethnic minorities) in industrialized countries, the prevalence rate is as high as 70 percent.¹¹ ECC has a lasting impact on the dentition. Children with ECC have a much greater probability of subsequent dental caries, in both the primary and permanent dentitions.¹²⁻¹⁶ Because access to dental care is a problem

for low-income children, the ineffectual management of this disease results in public health treatment programs overrun with childhood caries and caries-related emergencies.¹⁷

ACHIEVING BEHAVIORAL CHANGE

Traditional health education. Education of the parents of children at high risk of developing caries would seem to be the answer. However, traditional health education may be insufficient to change parents' behavior in relation to their at-risk children. While some parents of children with ECC are unaware of the etiology of this disease,^{12,13,18} research does not support the efficacy of providing information to the parents or caretakers.¹⁹⁻²¹ Educating patients—or, in the case of pediatric patients, their parents—in dental and medical settings frequently is an exercise in overt persuasion. What appears to be a convincing line of reasoning to the dental professional falls on deaf ears or result in reluctance to change. Patients and their parents have reservations about “being told what to do.”²² More fundamental is the possibility that direct persuasion, whatever the patient's or parent's degree of readiness to change, pushes him or her into a defensive position. A possible mechanism underlying this paradox is the phenomenon of psychological reactance,²³ in which threats to personal freedom (being told what to do) result in a corresponding increase in attempts to maintain independence (resisting, rationalizing existing behavior, verbally assenting without intent of following through).

While health education has not been successful, counseling has shown promising results. Harrison and Wong²⁴ reported that children whose mothers had at least two counseling sessions had significantly fewer carious surfaces than children at baseline. The approach featured one-on-one counseling by a lay worker, personalization of recommendations and follow-up with mothers via telephone.

Stages of change. Most patients do not go to health professionals in a state of readiness to change patterns of behavior that are well-established. A straightforward advice-giving approach will be of limited value.²⁵ Patients at the precontemplative stage do not see their behavior as a problem and have no intention of changing it. They are unaware of the problem, or are unable

or unwilling to acknowledge that a problem exists. Those at the contemplative stage are aware that a problem exists, are ambivalent and consider action but are not yet committed to action. After action, the patient has concern about maintaining the new behaviors and avoiding relapse. The “Stages of Change” perspective has been useful in providing an eclectic, integrative framework that is critical in understanding how people change a wide range of problem behaviors, from smoking to lack of exercise to lack of condom use.^{28,29}

The motivational interviewing approach. While the “stages of change” theory allows understanding of the process of change, motivational interviewing, or MI—a brief counseling approach that focuses on skills needed to motivate others—provides strategies to move patients from inaction to action.³⁰ The MI approach began as a technique for working with the most difficult-to-change

behaviors, those related to alcohol and drug addiction. Typically, counselors confront people with addictive behaviors, using tactics that can seem heavy-handed and coercive, and such tactics unfortunately evoke resistance in most people. The MI approach attempts to create an atmosphere in which the person can explore problems safely and face difficult realities. It has demonstrated success in controlling alcohol use,^{25,29,30} heroin use,^{31,32} marijuana use³³ and tobacco smoking.³⁴

The MI program also is proving useful in helping manage nonaddictive problems. For example, studies have been reported with positive outcomes regarding behaviors that put a person at risk of contracting HIV,³⁵ behaviors related to living with diabetes,³⁶⁻³⁸ adherence to medication regimens³⁹ and behaviors regarding diet.⁴⁰ Recent meta-analyses indicated that treatment effects for MI ranged from .25 to .57.⁴¹

The MI approach, with its theoretical framework of self-regulation, appears promising for application in a pediatric population. Understanding and influencing parents' representations of health threats and perceptions of the relevance of actions have not been accomplished regarding ECC and other illnesses of young children.

Applying the MI counseling approach helps uncover motivation and leads patients from the precontemplative to the contemplative stage; it also helps resolve ambivalence and facilitates

Motivational interviewing provides strategies to move patients from inaction to action.

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progress to change. It is axiomatic within this approach that people change when they hear themselves talk about the need to change. As rapport is established, MI counselors ask open-ended questions, listen carefully and encourage the patient to talk, thereby identifying a discrepancy between present behaviors and important goals (in this case, the dental health of the child). MI counselors avoid giving premature advice—advice provided before a relationship has been formed or before the recipient gives the counselor permission to provide advice.

Once the counselor identifies the patient's self-motivation, he or she explores and subtly encourages the change the patient needs to make. The counselor promotes self-efficacy and affirms the patient's competence, along with encouraging additional self-motivational statements.

While the MI counselor provides advice, the MI approach emphasizes patient choice. Once a patient desires to change, a number of possible plans to act are provided. A menu format is a useful way in which to present the options to the patient.

Reactance (resistance) is normal and anticipated. Arguing, interrupting, blaming others and inattention all are signs of resistance. Reactance signals that the patient is not ready to change at that particular moment. How the counselor responds to reactance often will determine whether the patient changes. Useful strategies, for example, are to emphasize choice, avoid arguing or even agree with the patient, saying that he or she has a valid point (even if you disagree). (A specific description of the application of MI counseling to the dental environment can be found in Weinstein.⁴²)

We undertook a study to compare two approaches to the prevention of caries in a population of children at high risk of developing the disease: an MI approach and a traditional health education approach.

SUBJECTS AND METHODS

Subjects. This project was a joint undertaking of the University of Washington, Seattle, and the University of British Columbia, Vancouver, Canada, in collaboration with the Progressive Intercultural Services Society, or PICSS, a com-

munity organization for South Asian immigrants in Surrey, British Columbia. We had obtained ethical approval for the project from the University of British Columbia Behavioural Research Board.

By visiting temples and fairs in the South Asian Punjabi-speaking community in Surrey, we recruited and enrolled the mothers of 240 healthy infants aged six to 18 months from that community. We chose this population because children of South Asian immigrants are at high risk of developing ECC.⁴³⁻⁴⁶ The only exclusion criteria focused on whether the child had a serious acute or chronic disease that would interfere with our ability to examine the child or would prevent the child and parent from participating fully.

Design and groups. We conducted a randomized clinical trial with two groups. We assigned subjects to either an MI counseling or a health education group using a table of random numbers, after we stratified children into two age

groups (six to 12 months and older than 12 months) within each sex. We implemented age stratification to account for individual differences in number of erupted teeth and time of exposure to cariogenic foods, and sex stratification to account for parenting differences that may affect caries risk.

Control group. Each subject in the control group received a pamphlet designed by the staff of the local health unit and also viewed a video called "Preventing Tooth Decay for Infants and Toddlers." This 11-minute educational video was available in five languages,

including Punjabi, and was produced by the Vancouver/Richmond Health Board with the advice of one of the investigators (R.H.).

We modified the pamphlet and the video to include dietary and nondietary ECC-preventive strategies appropriate to the local South Asian community. The pamphlet and video also encouraged parents to take their children to the PICSS to have fluoride varnish applied to the child's dentition.

Experimental group. Parents in the experimental group received the same pamphlet and video, as well as one 45-minute counseling session and two brief follow-up telephone calls during the period of preparation for change and while change was occurring (at two weeks and one month after

Counselors ask open-ended questions, listen carefully and encourage the patient to talk, thereby identifying a discrepancy between present behaviors and important goals (in this case, the dental health of the child).

initial contact). To promote maintaining the behavior change, we called parents in the experimental group four times during the maintenance stage (up to six months after the initial contact). We also sent two postcard reminders. Table 1 provides an overview of the experimental counseling program.

MI counseling initial visit protocol. We trained three South Asian women as interventionists. We provided them with a detailed 15-page protocol. We periodically reviewed audiotapes of the interventions to ensure that the MI protocol was being delivered consistently.

(Author’s note: The entire protocol is available from the corresponding author.) Below, we present the sections of the protocol focusing on establishing rapport and need and on presenting and discussing the menu of options.

Establishing rapport and need. The protocol begins by showing concern and getting the mother to talk. The protocol requires the interventionist to do the following:

- Ask questions about mother and child’s welfare and health (“Any other children besides [child’s name]?” “Tell me about [child’s name].” “What is it like to be his or her mom and have other children?”).
- Ask about the mother’s and the family’s dental health, contact with dentistry and dental expenses.
- Determine the mother’s dental wants and desires for her child by asking one of these questions:
 - “What do you want for your child’s teeth for the future?”
 - “What are your worst fears concerning your child’s teeth?”

**To promote
 maintaining the
 behavior change, we
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 maintenance stage.**

- “How would you like things to turn out?”
- “If I (or God) could grant you one wish for your child’s teeth (a dental miracle), what would it be?”
- “Tell me more” or “Anything else?”
- Paraphrase the mother’s dental wants or desires for child (“Let me be sure I understand, you would like your child to ...”) and write them down.

Presenting the menu of options. At this point, the counselor begins a discussion of the menu of caries-preventive options. The transition can be made easily by describing what other parents are willing to do.

- “In order to (paraphrase dental health wish), I want to share with you some things we have recently learned.”
 - “We have spoken to many Punjabi mothers in small groups about the dental health of their children and the steps they are willing to take. They recommended the steps I will talk to you about. These steps are on a menu I would like to show you.”
 - “Let’s begin by looking at the items on the list, then talk about them briefly and begin to decide which ones may be for you.”
- Discussing the options.* The counselor next elicits commitment from the mother and encourages her to talk by asking questions such as those that follow.
- “Now that you have looked at the items of the menu, which one(s) would you try?”
 - “Let’s talk about the ones you feel most comfortable with.”
 - “How do you think each one will work? You are the expert on your family.”
 - “What might go wrong? Who can help?”

- “Is this what you want to do?”

Menu items for the MI counseling program include both dietary and nondietary items that were identified in focus groups of South Asian women. (The focus groups

TABLE 1

DESCRIPTION OF EXPERIMENTAL COUNSELING PROGRAM.	
CONTACT	GOAL
Initial Visit	Establish rapport and need; discuss menu options; use strategies that structure and reinforce change
Phone Call/Postcard Reminders	Cue and reinforce change and solve any problems
Follow-Up Phone Calls	Promote maintenance and help re-establish change, if needed
Phone Call/Postcard Reminders	Cue and reinforce change

were led by local South Asian women whom we trained for the role.) The menu is presented in the box.

Measures. *Caries.* We assessed caries with visual examinations using a modification of the criteria of Radike.⁴⁷ We wiped teeth with cotton gauze and then examined them using front-surface mirrors and a dental light. We used explorers primarily to remove plaque and to verify cavitation of the enamel periodically. One of three calibrated examiners evaluated children in the “knee-to-knee” position. After any examination, the examiner made treatment referrals and fulfilled restorative needs at the parent’s discretion. (This project did not provide restorative care.)

Behavior. Each parent completed two interview schedules that have been used in previous studies of children at high risk of developing caries.⁴⁸⁻⁵¹ One assessed many diverse parenting practices such as tooth cleaning and putting the baby to bed with a bottle.⁴⁸ The other—the modified Evens instrument^{49,50}—assessed children’s diet. We administered these instruments to parents at one-year assessments. Results of these measures will be published elsewhere.

RESULTS

We made baseline comparisons between control and experimental subjects. We found no differences between the groups in terms of demographic variables (such as child’s sex, mother’s marital status, mother’s time in Canada, mother’s rural or urban status, mother’s residence history and number of household members); perinatal factors; child health parameters; or exposure to fluoride supplements, antibiotics and vitamins (as assessed via a self-report questionnaire). Two of the children of parents in the MI group had caries at baseline, compared with four children of parents in the control group, and this prevalence was not significantly different ($\chi^2 = 0.75$, two-tailed, $P > .10$). Similarly, 26 children of parents in the

BOX

MENU OF CARIES-PREVENTIVE OPTIONS FOR PARENTS.

- Do not let anyone add anything sugary to your child’s bottle.
- Clean your baby’s teeth as soon as they appear. Cleaning can be done with a small soft toothbrush or face cloth.
- Use a very small amount (smaller than a pea) of fluoride toothpaste.
- Hold your baby when feeding him or her, then lay the baby down to sleep; if the baby awakens, give him or her water, not milk or juice.
- Limit the time your child spends in sipping and snacking, because the longer he or she takes, the greater the chance of decay.
- Use a cup.
- Offer no more than two or three snacks per day.
- Bring your child to the dental clinic at least twice a year so the dentist can protect the baby’s teeth by painting a safe fluoride medicine on them.

.....
Results of this study suggest that motivational interviewing counseling has an effect on children’s health that is greater than the effect of traditional health education.

MI group had an unerupted dentition, compared with 16 children of parents in the control group, and this prevalence was also not significantly different ($\chi^2 = 2.50$, two-tailed, $P > .10$). Only the factor of child’s age at initial recruitment differed between groups, with children of parents in the control group being slightly older at parents’ recruitment into the study than were children of parents in the experimental group (12 months versus 11 months, $t[238] = 2.06$, two-tailed, $P < .04$). Therefore, we included age in the subsequent analyses.

When we compared carious surfaces after one year for the experimental and control groups, we found that the children in the MI group had .71 carious surfaces (standard deviation, or SD, = 2.8, range = 0-25), while those in the control group had 1.91 (SD = 4.8, range 0-25) carious surfaces ($t[238] = 2.37$, one-tailed, $P < .01$). Table 2 presents the results of stepwise logistic regression analysis of caries incidence, which suggest that both age and treatment had an effect.

DISCUSSION

Effects of the intervention. Results of this study, at this time the only clinical dental study using MI counseling, suggest that MI counseling has an effect on children’s health that is greater than the effect of traditional health education. The results appear to be clinically meaningful. While we cannot compare specific parenting behaviors between mothers in the two groups, we did record visits for fluoride varnishes for all sub-

TABLE 2

RESULTS OF STEPWISE LOGISTIC REGRESSION ANALYSIS OF LIKELIHOOD OF CARIES INCIDENCE.			
VARIABLE	ODDS RATIO	CONFIDENCE INTERVAL	P VALUE
Step 1			
Sex	1.353	(.685 to 2.670)	.383
Age	1.087	(1.022 to 1.155)	.008
Step 2			
Sex	1.412	(.711 to 2.804)	.325
Age	1.080	(1.014 to 1.150)	.016
Treatment	1.927	(.967 to 3.842)	.062

jects. Results indicated that parents in the two groups, on average, took their children to the dentist for varnish application the same number of times.

Advantages of MI counseling. The MI approach appears to be useful in other dental settings—especially periodontal maintenance, in which long-term success rates are low.⁵² Since the 1960s, dentistry has become much more holistic and preventive in orientation. With increased awareness of the importance of interpersonal relationships, the integration of dental and general health, and improvement of self-care behaviors, the ability to maximize health seems tied to patients’ motivation. In addition, we now are aware of the risks of smoking and alert to the effects of systemic diseases (such as diabetes) and other conditions (such as xerostomia) on oral health. However, eliminating harmful habits and establishing protective ones is easier said than done. Health education does not appear to be sufficient.⁵³

As a result of health professionals’ frequent failure in helping patients change their behavior, there is considerable frustration and skepticism among them regarding such attempts. Preventive efforts wane or become automatic; providers give the same “spiel” to everyone. Motivating patients (and, in the case of pediatric patients, their parents) appears to be a fruitless task that leads initially enthusiastic dental health professionals to a state of burnout. Even the conscientious dentist, dental hygienist or dental assistant routinely runs out of resources. MI may present an answer.

The MI approach may be mastered with minimal training; it does not require a health-profession background. MI is appropriate for use by the community health workers frequently found in

governmental programs such as Head Start and Women, Infants and Children. On the other hand, old habits die hard. Some practice is required. (An MI workbook aimed at training dental personnel⁴² may be of use.)

It is important

to note that in this study, MI was used successfully in a crosscultural setting. The majority of the counseling and follow-up were done in the Punjabi language. It may be that the MI approach helped create a bridge between the Western dental culture and the subjects’ South Asian culture.

Limitations. Our study compared two treatment groups; we did not have a placebo control group. It is impossible to tease apart the effect of the staff’s enthusiasm for the MI approach from the effect of the intervention strategy. Moreover, we made no attempt to assess the cost-effectiveness of the MI intervention. Lay community workers met with mothers for less than one hour and contacted them by phone six times—an estimated two to three hours per MI subject. It should be pointed out that all the parents in this study were volunteers. Therefore, it may not be possible to generalize the results of this study to entire populations. Our results also suggest that a high proportion of our volunteers, as assessed by the Readiness Assessment of Parents Concerning Infant Dental Decay scale,⁵¹ already were at the contemplative state and willing to consider change.

CONCLUSION

Motivational interviewing, a brief form of counseling, presents promise in working with the parents of young children to prevent caries in those children, especially children at high risk of developing the disease. ■

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1. Featherstone JD. The science and practice of caries prevention. *JADA* 2000;131(7):887-99.
2. Tinanoff N, Douglass JM. Clinical decision making for caries management in children. *Pediatr Dent* 2002;24(5):386-92.
3. Raadal M, Espelid I, Mejare I. The caries lesion and its management in children and adolescents. In: Koch G, Poulsen S, eds. *Pediatric dentistry: A clinical approach*. Copenhagen, Denmark: Munksgaard; 2001:173-212.
4. Raadal M. Management of early carious lesions in primary teeth. In: Hugoson A, Falk IM, Johansson S, eds. *Consensus conference on caries in the primary dentition and its clinical management*. Jönköping, Sweden: The Institute for Postgraduate Dental Education; 2002:48-57.
5. Milgrom P, Weinstein P. Early childhood caries: A team approach to prevention and treatment. Seattle: University of Washington in Seattle, Continuing Dental Education; 1999.
6. Murdoch-Kinch CA, McLean ME. Minimally invasive dentistry. *JADA* 2003;134:87-95.
7. Edelstein BL. Disparities in oral health and access to care: findings of national surveys. *Ambul Pediatr* 2002;2(supplement 2):141-7.
8. Milgrom P, Mancl L, King B, Weinstein P, Wells N, Jeffcott E. An explanatory model of the dental care utilization of low-income children. *Med Care* 1998;36:554-66.
9. Weinstein P. Breaking the worldwide cycle of pain, fear and avoidance: uncovering risk factors and promoting prevention. *Ann Behavior Med* 1990;12:141-7.
10. Tinanoff N, O'Sullivan DM. The association of early dental caries patterns with caries incidence in preschool children. *J Public Health Dent* 1996;56(2):81-3.
11. Milnes AR. Description and epidemiology of nursing caries. *J Public Health Dent* 1996;56(1):38-50.
12. Johnsen DC, Gerstenmaier JH, Schwartz E, Michal BC, Parrish S. Background comparisons of pre-3 1/2-year-old children with nursing caries in four practice settings. *Pediatr Dent* 1984;6:50-4.
13. Johnsen DC, Gerstenmaier JH, DiSantis TA, Berkowitz RJ. Susceptibility of nursing-caries children to future approximal molar decay. *Pediatr Dent* 1986;8:168-70.
14. Kaste LM, Marianos D, Chang R, Phipps KR. The assessment of nursing caries and its relationship to high caries in the permanent dentition. *J Public Health Dent* 1992;52:64-8.
15. O'Sullivan DM, Tinanoff N. Maxillary anterior caries associated with increased caries risk in other primary teeth. *J Dent Res* 1993;72:1577-80.
16. Peretz B, Ram D, Azo E, Efrat Y. Preschool caries as an indicator of future caries: a longitudinal study. *Pediatr Dent* 2003;25(2):114-8.
17. Weinstein P. Public health issues in early childhood caries. *Community Dent Oral Epidemiol* 1998;26(supplement 1):84-90.
18. Dille GJ, Dille DH, Machen JB. Prolonged nursing habit: a profile of patients and their families. *ASDC J Dent Child* 1980;47(2):102-8.
19. Johnsen DC. Characteristics and backgrounds of children with 'nursing caries.' *Pediatr Dent* 1982;4(3):218-24.
20. Benitez C, O'Sullivan D, Tinanoff N. Effect of a preventive approach for the treatment of nursing bottle caries. *ASDC J Dent Child* 1994;61:46-9.
21. Tinanoff N, Daley NS, O'Sullivan DM, Douglass JM. Failure of intense preventive efforts to arrest early childhood and rampant caries: three case reports. *Pediatr Dent* 1999;21(3):160-3.
22. Stott NC, Pill RM. 'Advise yes, dictate no': patients' views on health promotion in the consultation. *Fam Pract* 1990;7(2):125-31.
23. Brehm SS, Brehm JW. Psychological reactance: a theory of freedom and control. New York: Academic Press; 1981.
24. Harrison R, Wong T. An oral health program for an urban minority population of preschool children. *Community Dent Oral Epidemiol* 2003;31: 392-9.
25. Rollnick S, Heather N, Bell A. Negotiating behavior change in medical settings: the development of brief motivational interviewing. *J Mental Health* 1992;1:25-37.
26. Prochaska JO, DiClemente CC. Stages of change in the modification of problem behaviors. *Prog Behav Modif* 1992;28:184-218.
27. Prochaska JO, Velicer WF, Rossi JS, et al. Stages of change and decisional balance for 12 problem behaviors. *Health Psychol* 1994;13(1):39-46.
28. DiClemente CC. Motivational interviewing and the stages of change. In: Miller WR, Rollnick S, eds. *Motivational interviewing: preparing people to change addictive behavior*. New York: Guilford; 1991:191-202.
29. Miller WR, ed. *Motivational enhancement therapy manual: A clinical research guide for therapists treating individuals with alcohol abuse and dependence*. Washington: U.S. Department of Health and Human Services; Public Health Service; Alcohol, Drug Abuse, and Mental Health Administration; National Institute on Alcohol Abuse and Alcoholism; 1992.
30. Heather NS, Rollnick S, Bell A, Richmond R. Effects of brief counseling among heavy male drinkers identified on general hospital wards. *Drug Alcohol Rev* 1996;15:29-38.
31. Van Bilsen HP, van Erst AJ. Heroin addiction and motivational milieu therapy. *Int J Addict* 1986;21:707-13.
32. Saunders B, Wilkinson C, Phillips M. The impact of a brief motivational intervention with opiate users attending a methadone programme. *Addiction* 1995;90:415-24.
33. Andersen MD. Personalized nursing: an effective intervention model for use in drug-dependent women in an emergency room. In: Ashery RS, ed. *Progress in the development of cost-effective treatment for drug abusers*. Rockville, Md.: U.S. Department of Health and Human Services; Public Health Service; Alcohol, Drug Abuse, and Mental Health Administration; National Institute on Drug Abuse; 1985:67-82.
34. DiClemente CC, Prochaska JO, Fairhurst, S, Velicer WF, Velasquez MM, Rossi JS. The process of smoking cessation: an analysis of precontemplation, contemplation and preparation stages of change. *J Consult Clin Psychol* 1991;59:295-304.
35. Baker A, Dixon J. Motivational interviewing for HIV risk reduction. In: Miller WR, Rollnick S, eds. *Motivational interviewing: Preparing people to change addictive behavior*. New York: Guilford; 1991:293-302.
36. Stott N, Rollnick S, Pill RM. Innovation in clinical method: diabetes care and negotiating skills. *Fam Pract* 1995;12(4):413-8.
37. Woollard J, Beilin L, Lord T, Puddey I, MacAdam D, Rouse I. A controlled trial of nurse counselling on lifestyle change for hypertensives treated in general practice: preliminary results. *Clin Exp Pharmacol Physiol* 1995;22(6-7):466-8.
38. Smith DE, Heckemeyer CM, Kratt PP, Mason DA. Motivational interviewing to improve adherence to a behavioral weight-control program for older obese women with NIDDM: a pilot study. *Diabetes Care* 1997;20(1):52-4.
39. DiIorio C, Resnicow K, McDonnell Soet J, McCarty F. Using motivational interviewing to promote adhere antiretroviral medications: a pilot study. *J Assoc Nurses AIDS Care* 2003;14(2):52-62.
40. Bowen D, Ehret C, Pedersen M, et al. Results of an adjunctive dietary intervention program women's health initiative. *J Am Diet Assoc* 2002;102(11):1631-7.
41. Burke BL, Arkowitz H, Menchola M. The efficacy of motivational interviewing: a meta-analysis of controlled clinical trials. *J Consult Clin Psychol* 2003;71:843-61.
42. Weinstein P. Motivate your dental patients: A workbook. Seattle: University of Washington; 2002.
43. Williams SA, Fairpo CG, Curzon MEJ. An inquiry into the caries experience of preschool children in an inner city area (abstract 166). *J Dent Res* 1987;66:853.
44. Prendergast MJ, Williams SA, Curzon ME. An assessment of dental caries prevalence among Gujarati, Pakistani and white Caucasian five-year-old children resident in Dewsbury, West Yorkshire. *Community Dent Health* 1989;6:223-32.
45. Williams SA, Hargreaves JA. An inquiry into the effects of health related behaviour on dental health among young Asian children resident in a fluoridated city in Canada. *Community Dent Health* 1990;7:413-20.
46. Prendergast MJ, Beal JF, Williams SA. The relationship between deprivation, ethnicity and dental health in 5-year old children in Leeds, UK. *Community Dent Health* 1997;14:18-21.
47. Radike AW. Criteria for diagnoses of dental caries. In: Principles for the clinical testing of cariostatic agents: Adapted from a conference held at American Dental Association, Chicago, Illinois, October 14-16, 1968. Chicago: Council on Dental Research and Council on Dental Therapeutics, American Dental Association;1972:87-8.
48. Weinstein P, Domoto P, Wohlers K, Koday M. Mexican-American

parents with children at risk for baby bottle tooth decay: pilot study at a migrant farmworkers clinic. *ASDC J Dent Child* 1992;59:376-83.

49. Evens CC. Snacking patterns as a risk factor for early childhood caries (dissertation). Seattle: University of Washington; 1997.

50. Evens C, Critchlow C, Rivera-Torres A, Beresford S, Weinstein P, DeRouen T. Snacking patterns as a risk factor for early childhood caries. Indianapolis: American Public Health Association; 1997.

51. Weinstein P, Riedy CA. The reliability and validity of the

RAPIDD scale: readiness assessment of parents concerning infant dental decay. *ASDC J Dent Child* 2001;68(2):129-35.

52. Wilson TG Jr. How patient compliance to suggested oral hygiene and maintenance affect periodontal therapy. *Dent Clin North Am* 1998;42(2):389-403.

53. Kay EJ, Locker D. Is dental health education effective? A systematic review of current evidence. *Community Dent Oral Epidemiol* 1996;24(4):231-5.