

ASSESSMENT OF RESPONSE TO MASS MOTIVATION FOR ORAL HYGIENE

by

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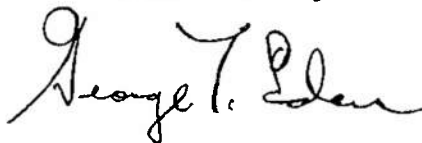
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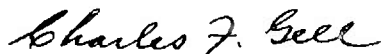
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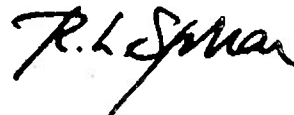
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SUMMARY PAGE

THE PROBLEM

To develop a means of assessing the value of mass-motivation programs needed to reduce the need for restorative dental services to more manageable levels.

FINDINGS

A modified form of a dental health questionnaire, developed in 1969 at NavSubMedRschLab for use with Naval enlisted personnel, was administered to a large population of Junior High School children. Analysis of the results yielded additional insight into the elements of mass motivation.

APPLICATION

When properly developed, the questionnaire method should have potential to yield an assessment of response to motivational methods through measured parameters which parallel the status of oral hygiene.

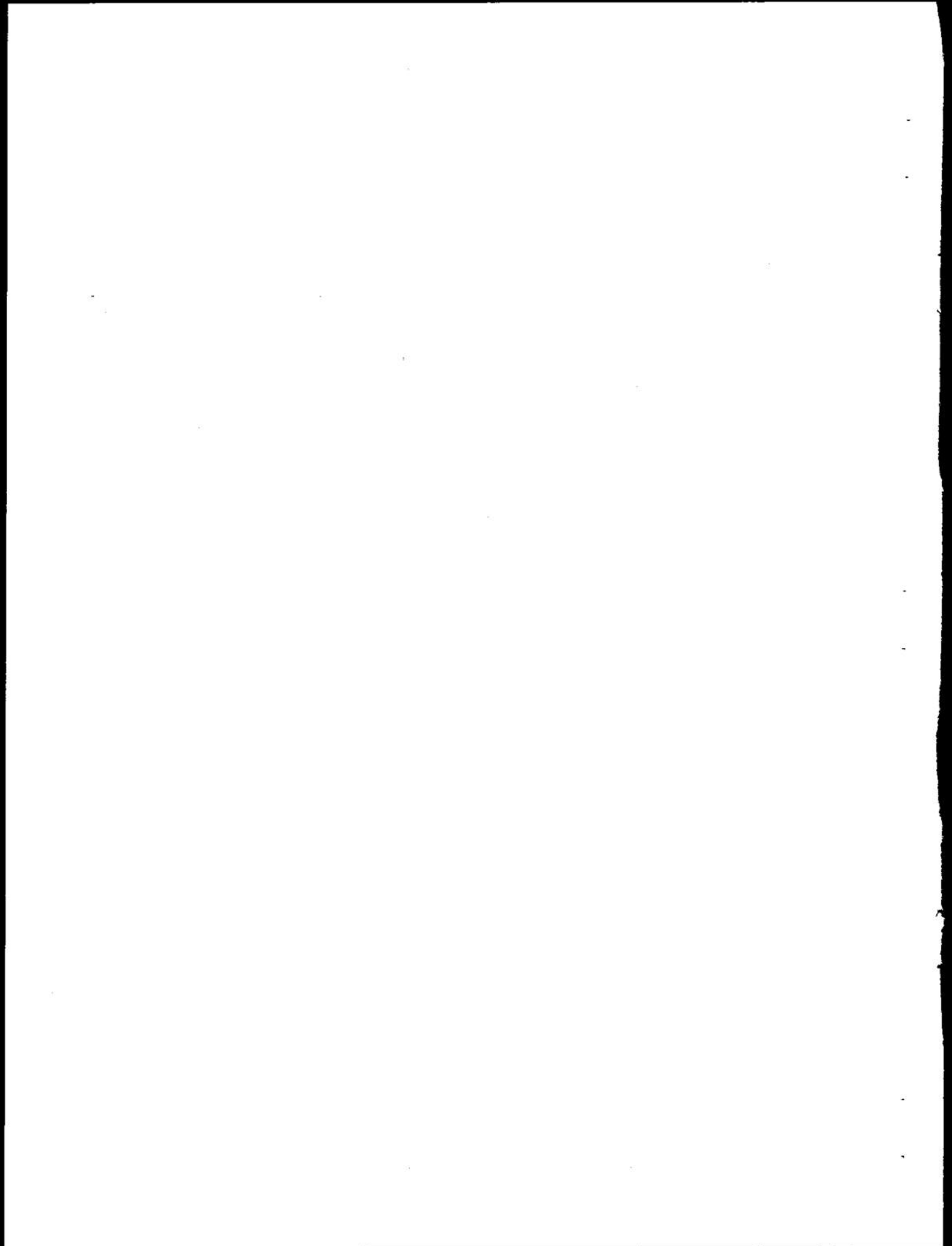
ADMINISTRATIVE INFORMATION

This investigation was conducted as part of Bureau of Medicine and Surgery Research Work Unit MF51.524.012-0015. The present report is Number one on the work unit. It was submitted for review on 18 June 1974, approved for publication on 24 July 1974 and designated as NavSubMedRschLab Report No. 789.

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ABSTRACT

A questionnaire was composed to assess the educational value of small-group motivational techniques utilized to stimulate individuals to practice effective oral hygiene. Fifteen hundred junior high school students were tested during a two-year period for changes in dental health knowledge following exposure to dental health education presentations. Although results indicated general improvement, some topics were poorly understood. The questionnaire method appears to provide an objective means for evaluating group response to presentations, and shows potential as an epidemiologic aid for indirect assessment of the oral health status of submarine personnel.



ASSESSMENT OF RESPONSE TO MASS MOTIVATION FOR ORAL HYGIENE

INTRODUCTION

Logic suggests that chronic, low-grade pain of dental origin may have a negative effect on performance efficiency of personnel. Shipboard medical staffs, however, generally have not recorded the existence of dental problems until they have reached a level requiring a "sick-day" or man-hour loss. The incomplete documentation of dental problems, together with expansion of the Submarine Force, and treatment facilities then overloaded by massive Vietnam mobilization probably contributed to the decision in 1970 to lower dental standards for submarine crew qualification. While the earlier standard of Class I ("Dental Treatment Not Required") left little question as to assessing the state of dental health, the current standard of Class II ("Routine, but not early treatment required") opened up a broad area of interpretation which historically has been known to vary over a wide range depending upon examiner bias and operational expediency. Although documentation is at present unpublished, discussions with recently deployed submarine medical officers indicate a significant frequency of dental illness during patrols. The development of the Trident submarine suggests the potential for even longer deployments, utilizing smaller crews.¹ The highly specialized nature of each crewmember makes the elimination of dental illness even more important.

One avenue of resolution is to reduce the possibility of dental illness by removing predisposing factors. A mode

for achieving a reduction in oral health problems exists in the motivation of crewmembers to improved levels of oral hygiene.² Most approaches to such stimulation are tied to some form of chairside instruction involving dental professionals in a one-to-one ratio with patients. While such a ratio seems ideal, current professional dental manpower levels contraindicate such usage due to a massive demand for restorative skills.³ Effective mass motivational techniques should be developed to help reduce the need for remedial dental care, especially as it relates to deployed crewmembers.

Studies at this Laboratory⁴ and elsewhere^{5,6} have shown no significant improvement in oral hygiene indices after subject exposure to several single-lecture mass-motivational techniques. Also, the one-time motivation approach presented to young adults seems to yield no sustained improvement in knowledge.⁷ Other studies, however, have shown short-term improvement in oral hygiene indices and dental health knowledge when groups have been exposed to a series of presentations.^{8,9} Generally, improvement in oral hygiene has been sustained only when stimulation to that end has been maintained.^{2,10}

While the authoritarian image of the dentist has proven desirable for conducting such group-motivation presentations,⁸ the demands placed on the dentist's chairside skills make his availability quite limited. Such a role, assumed by untrained non-professionals,

has been ineffective when implemented in a passive informational manner.¹¹ On the other hand, encouraging results have been reported from programs executed by trained and motivated non-professionals.⁹ If para-professionals in teaching positions could be motivated to assume this educational task, the involvement of dental professionals could more efficiently be used to evaluate the effectiveness of such programs, through elucidation of oral health indices.

Evaluation of dental knowledge should be an aid in determining the impact of attempts at preventive dentistry motivation. In exploring the possibility that basic levels of dental health knowledge might directly relate to oral health, this Laboratory conducted studies which suggested just such a correlation, relative to specific questions.¹² Dental knowledge alone has shown improvement following passive methods of programmed instruction.^{13,14} In some studies such impersonal approaches have produced positive increments of dental knowledge which have equalled or exceeded results from more intensive instructional techniques.¹⁰ Correlated oral health improvement, however, appears to be restricted to motivation methods actively involving subject participation.¹³ Although concurrent improvement in oral hygiene has not always been evident, improvement in knowledge alone has been shown to stimulate the seeking of restorative treatment, instead of neglect followed by relief through tooth removal.¹⁵

Correlation of certain topics of dental knowledge with oral hygiene indices suggests the use of a questionnaire method as an epidemiological tool for

expanded use in population determinations of baseline dental-knowledge levels and evaluation of mass motivation techniques.

Elucidation of those factors which can effect a willful behavioral change appears a most complex problem, even in the youngest age groups of Navy personnel. Mass-motivational efforts must function against the treatise that habits formed prior to the teen years cannot be altered.¹⁵

Indeed, the questionnaire developed in Shiller's¹² study demonstrated certain areas of negative attitudes concerning specific topics. An indication of that point in life at which such conditioning occurs could be useful in designing interceptive and remedial measures by educational methods. Some undesirable attitudes have been reported in groups even at the nine-year-old level.¹⁶

During annual participation in Children's Dental Health Week by Dental Officers at the Naval Submarine Base, Groton, Connecticut, this Laboratory incorporated a prototype questionnaire method with lecture presentations to school children in a nearby community. An approach to quantifying previously subjective evaluations of a traditional educational technique was attempted. Resulting insights into dental knowledge test design are intended as analytic tools for developing more effective methods for motivating Navy personnel.

MATERIALS AND METHODS

For Children's Dental Health Week, 1972, a questionnaire (Figure 1) was

DENTAL HEALTH QUESTIONNAIRE

INSTRUCTIONS:

Do not write your name. No grades will be given.

Please be honest in all your answers.

Although several answers may seem correct, check only the one best answer.

1. The best way to prevent tooth decay and periodontal disease (gum disease) at the same time is:
 a. By cutting down on sweets.
 b. By cleaning your teeth any convenient time when you can do a good job.
 c. By getting the germs (bacteria) off your teeth immediately after eating.
2. Germs (bacteria) on the teeth make acids from sugar in the food you eat.
 a. Yes b. No
3. Dental floss is necessary to clean between the teeth.
 a. Yes b. No
4. The one main reason the dentist cleans your teeth is to:
 a. Make them white.
 b. Remove calculus (tartar) and other rough deposits.
 c. Remove the germs (bacteria) that you miss.
5. Using fluoride for teeth:
 a. Kills the germs (bacteria) on the teeth.
 b. Make the tooth stronger.
 c. Don't know.
6. What causes tooth decay and gum (periodontal) disease?
 a. Candy b. Germs (bacteria) c. Fresh fruit
7. What does the toothbrush do?
 a. Makes the mouth feel good.
 b. Whitens the teeth.
 c. Removes germs (bacteria).
8. How can you tell if you have periodontal (gum) disease?
 a. Gums are red and bleed easily.
 b. Teeth have brown spots or stains.
 c. Breath is bad.

* Correct answer

Fig. 1 Dental Health Questionnaire

designed, based on Shiller's study,¹² and modified to determine levels of dental knowledge within a group (Group I, n = 564) of 7th grade students.

The questionnaire was administered only after the Dental Health presentations, as our objective at that time was to determine the relative desirability of each of several films for producing higher correct-response levels. After administration, the instructor reviewed the questionnaire with each participating class. Subsequent analysis showed no significant differences between effects of the various films. It was observed, however, that certain topics covered in the questionnaire met with uniformly low or high response levels, especially concerning reasons for professional cleaning and toothbrush function (questions 4 and 7). This project suggested the need to study specific response levels in terms of defined areas of dental knowledge.

During Children's Dental Health Week 1973, a broader-spectrum approach was attempted with the new 7th grade class at the same school. Since this class was also quite large (n = 600), the test was administered to approximately one-half of the class (Group B) before exposure, and to the remainder after exposure (Group II) to provide baseline as well as post-exposure response levels. Similar partitioning was effected for 8th grade subjects (n = 384) who had been exposed during Children's Dental Health Week in 1972 as 7th graders. The 8th graders were tested for retention after one year's lapse (Group R) and for response to a repeat lecture (Group i). The subse-

quent patterns of reaction demonstrated an assortment of interesting conditions.

RESULTS AND DISCUSSION

A baseline-knowledge level was established in 1973 for 7th graders from questionnaire responses obtained before exposure to the oral health presentation (Group B). Correct-response levels for all degrees of exposure were then compared with this baseline level. Trends toward improvement of dental knowledge were observed on most questions immediately after the presentation (Groups I and II). Three of the eight questions (Numbers 1, 6 and 8) showed significant increase in correct answering, over baseline responses, at a confidence level equal to or less than 5% for both years tested (Figure 2). Statistical analysis was performed on the basis of a chi-square proportions test.¹⁷

This encouraging picture of improvement broke down both years in one area of questioning (Figure 3). Question number 4, relative to assigning one main reason for professional cleaning, produced a dramatic reaction in terms of negative reinforcement. Both groups demonstrated pronounced lack of guidance to the correct answer established. Indeed, the "correct" answer is probably debatable. The entire question will have to be restructured.

Group I, which was exposed as 7th graders in 1972, had become 8th graders by 1973. This group was divided into two subgroups. One subgroup (R) was administered the questionnaire,

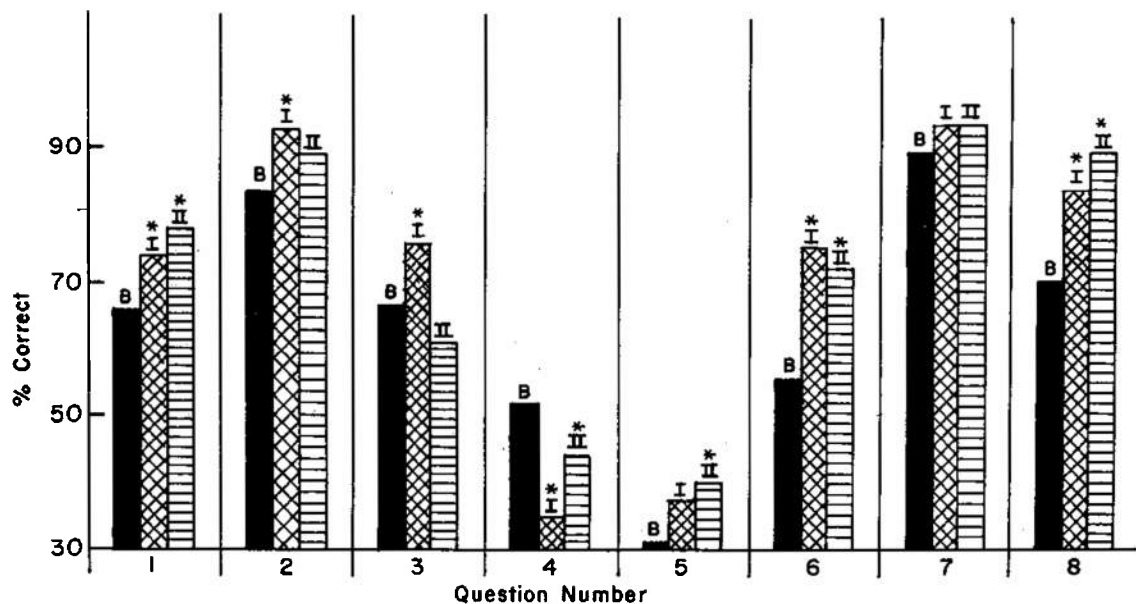


Fig. 2. Mean immediate-response levels of two groups of seventh-grade students after dental health education presentation.

B ■ Baseline mean response level of 7th graders, established in 1973. (n=370)

I ▨ Mean response level of 7th graders after 1972 presentation. (n=564)

II ▤ Mean response level of 7th graders after 1973 presentation. (n=230)

* Confidence level $\bar{p} < 5\%$.

before their repeat presentation, to test for retention.

Response levels observed after one year showed retention of significant improvement on all three of the aforementioned questions (Numbers 1, 6 and 8). Generally, the trend of response levels after one year was above baseline levels (Figure 4).

Of particular interest was the response to question 4. The initial untoward response level was not sustained over a one-year period. This phenomenon may be attributable to the review session held in every case after the questionnaires were administered.

The other Group I subgroup (i) was tested after repetition to observe the

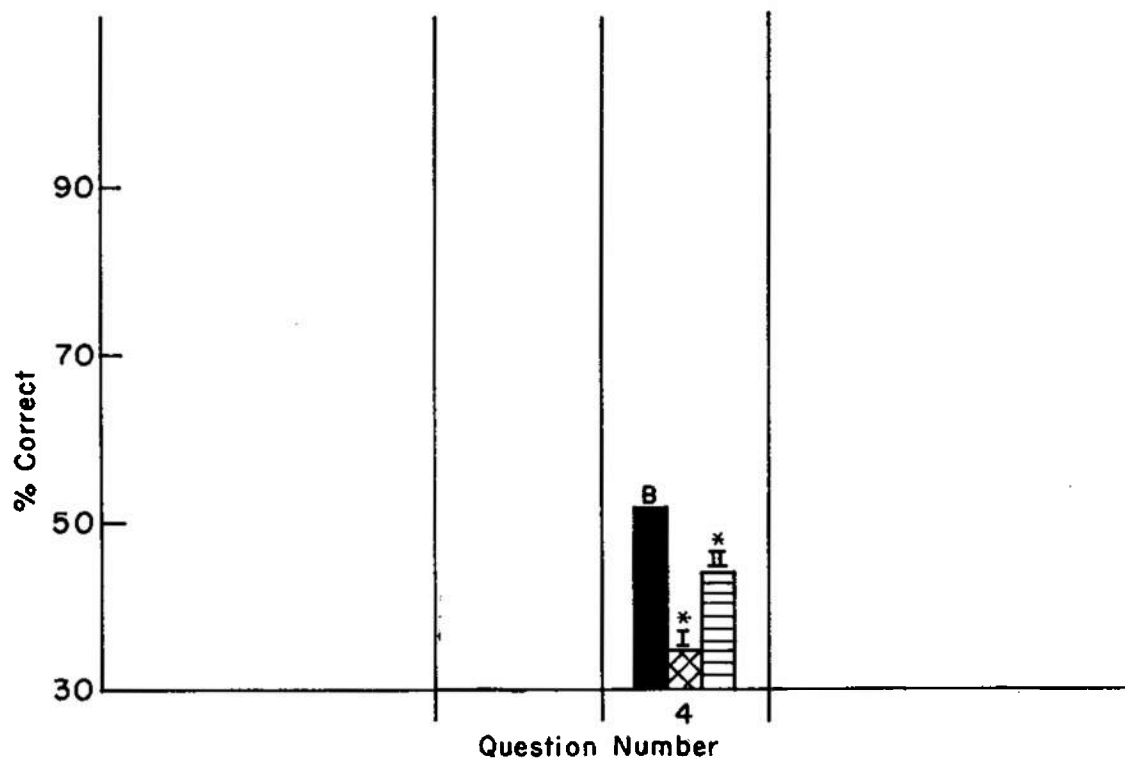


Fig. 3. Undesirable response levels of two groups of seventh-grade students to question number four.

B ■ Baseline mean response level of 7th graders, established in 1973. (n=370)

I ▨ Mean response level of 7th graders after 1972 presentation. (n=564)

II ▤ Mean response level of 7th graders after 1973 presentation. (n=230)

* Confidence level \geq 5%.

effect of reinforcement after one year. The overall profile of responses by Group I to the two-year experimental sequence is summarized in Figure 5.

The ingemination presentation after one year appeared to effect a reattainment of significant correct-response level to the floss question (number 3), and to produce a level of significance above baseline for the fluoride question (number 5). After one year, it also appeared more difficult to confuse the students relative to assigning the

"correct" main reason for professional cleaning (question 4). Without the post-exam discussion, one year previous, such response does not seem probable. These presentations were the only known mass dental education health measures presented to these children.

Retrospective assessment of this particular questionnaire suggests deficiencies, especially in light of negative reinforcement on question number 4. Some questions also demonstrated too high a baseline level response to allow

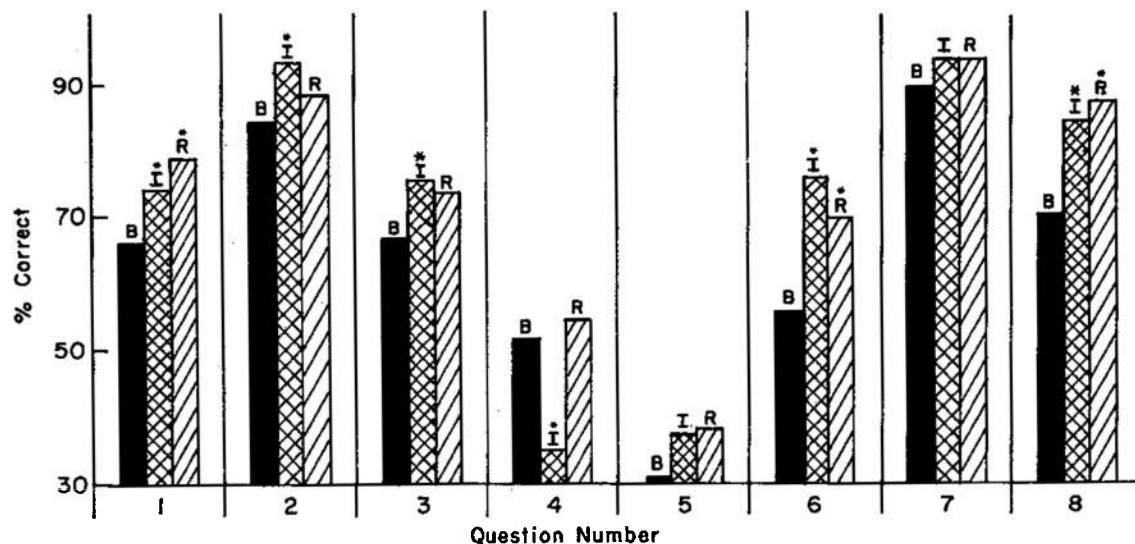


Fig. 4. Mean retention levels of Group I after a one-year period.

B. ■ Baseline mean response level of 7th graders, established in 1973. (n=370)

I. ▨ Mean response level of 7th graders after 1972 presentation. (n=564)

R. ▩ Mean response level before ingemination of half of Group I, as 8th graders, in 1973. (n=219)

* Confidence Level $>$ 5%.

for detection of significant improvement in groups of smaller size. The fact that many of the changes observed in this study were "statistically" significant can probably be attributed to the large number of subjects in each group, which varied from 165 to 564. An example of the effect of numbers is seen in Figure 5, on the bacteria question (question 2). While the mean values for Group I and subgroup i were almost the same, statistical significance was lost in Subgroup i probably due to its relatively small size (n = 165) as compared with Group I (n = 564).

CONCLUSION

The relationship between dental knowledge improvement and personal oral hygiene practice may be further defined by the questionnaire approach if serial measurements of oral health indices are correlated with results of dental knowledge testing.

While a questionnaire alone is not the ultimate measure of the worth of mass motivation efforts, it does appear to provide some useful information. The questionnaire used in this study, in

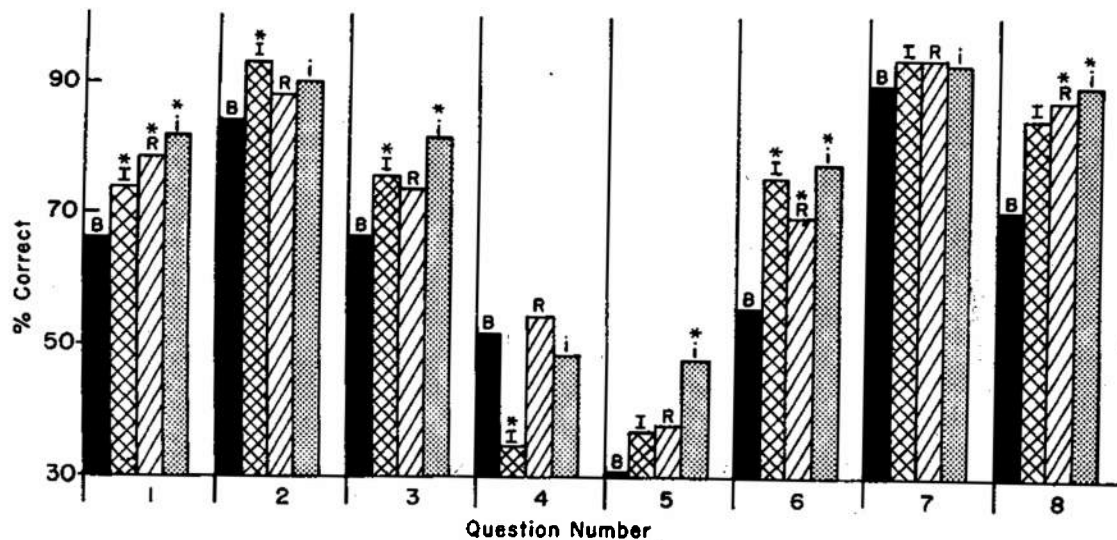


Fig. 5. Summation of response patterns of Group I.

- B ■ Baseline mean response level of 7th graders, established in 1973. (n=370)
- I ▨ Mean response level of 7th graders after 1972 presentation. (n=564)
- R ▨ Mean response level before ingemination of half of Group I, as 8th graders, in 1973. (n=219)
- i ▨ Mean response level immediately after ingemination of half of Group I, as 8th graders, in 1973. (n=165)
- * Confidence level $\bar{< 5\%$.

addition to validating the desirability of exposure to more than one presentation, pointed out specific areas of need for informational guidance, thereby supplementing efforts aimed at improvement of presentations.

Although restricted in scope, this questionnaire method for program effectiveness evaluation in this population thus far appears to lend a quantitative level of justification, at the learning phase, for continuing the expenditures of time and effort by busy practitioners during Children's Dental Health Week. Indications in this study of long-term

knowledge retention encourage the thought that pre-teen impressionability may provide a basis for behavioral guidance. The questionnaire itself also provides a matrix for group participation in discussion and for use as a lecture guide for dentists willing to participate, but with little or no time to design a presentation.

Several new questionnaire designs should be attempted in an effort to obtain a better baseline distribution in order to enhance the test's sensitivity, and subsequent analysis validity. Refinement of correlations between factors

of dental knowledge and oral health indices may provide epidemiologic guidance toward assessment of the dental health of selected populations.

Coupled with evaluations of oral hygiene, the questionnaire method shows a promise of providing a means of assessing the relative value of various mass-motivational techniques. The schooling of non-professionals to implement sustained educational programs seems an appropriate step toward more effective utilization of the skills of both classroom instructors and dental professionals within areas of their respective disciplines. In this way, both the motivational experience and the assessment of its worth could be provided more efficiently.

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REFERENCES

1. Helfer, Harold. Navy delving into diving problems. Navy Times, 19 December 1973, pp. 18.
2. Bureau of Medicine and Surgery and Office of Naval Research. Technical Workshop on Dental Research, Report of. 1973, pp. 154.
3. Ibid. Pp. 149.
4. Shiller, W. R. and Dittmer, J. C. Evaluation of some current oral hygiene motivation methods. J Periodontol 39:83-85, March 1968.
5. Podshadley, A. G. and Shannon, B. A. Oral hygiene performance of elementary school children following Dental Health Education. J Dent Child 37:298-300, Jul-Aug 1970.
6. Podshadley, A. G. and Schweikle, E. S. The effectiveness of two educational programs in changing the performance of oral hygiene by elementary school children. J Public Health Dent 30:(1)17-20, Winter 1970.
7. Gillig, J. L. Retention of health information. J Dent Child 36:56-60, Jan 1969.
8. Williford, John W., Muhler, J. C. and Stookey, G. K. Study demonstrating improved oral health through education. J. Am Dent Assoc 75(4):896-902, Oct 1967.
9. Masters, Donald H. The classroom teacher...effective dental health educator. J Sch Health 42: 257-261, May 1972.
10. Stolpe, John R., Mecklinburgh, R. E. and Lathrop, R. L. The effectiveness of an educational program on oral health in schools for improving the application of knowledge. J Public Health Dent 31(1): 48-59, Winter 1971.
11. Knowles, R. E., Jr. Role of the school teacher in gaining dental

health. J Public Health Dent 23:77,
Summer 1963.

12. Shiller, W. R. Personal factors in dental disease prevention: I. A test to measure dental health knowledge. NavSubMedRschLab Rpt. No. 578, May 1969.
13. Counsell, Lee A., and Scheiner, E. G. A comparison of the social persuasiveness of three conventional modes of dental health education. Nav Dent Resch Inst Prog Rprt 72-02, May 1972.
14. Minnich, W. and Latimer, L. Dental health education methods - A comparison of their effectiveness. J Am Dent Hygienists Assoc 44:40-45 1st Qtr., 1970.
15. Robinson, B. A., Mobley, E. L. and Pointer, M. B. Is dental health education the answer? J Am Dent Assoc 74(1)124-128, Jan 1967.
16. Roder, D. M. A study of dental knowledge and behavior in 1,000 Australian school children. Aust Dent J 14:327-330, Oct 1969.
17. Tate, Merl W. and McClelland, Richard C. (University of Pennsylvania). Nonparametric and Short-cut Statistics. Interstate Printers and Publishers, Inc., Danville, Illinois, pp. 84-87, Aug 1959.

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