

Impact and Cost of Public Health Nurse Telephone Follow-up of School Dental Referrals

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Abstract: The effect and cost of nursing follow-up services on school dental screening outcomes were investigated. Experimental and control groups were randomly assigned. A positive difference in dental visit rate occurred for all nurses, with the overall dentist visit-no visit, experimental-control odds ratio being 1.64 (95% CL = 1.15, 2.35). The service averaged 27.7 minutes and \$8.92 per family contacted, suggesting that nursing follow-up increased dental care utilization after screening at low cost in this population. (*Am J Public Health* 1986; 76:1348-1349.)

Introduction

Among public health nursing activities, home visits and telephone calls to monitor health status and health behavior have long been typical field services. In spite of the long history of public health nursing, the investigation of major nursing services regarding outcomes has been minimal.¹⁻⁴

Currently, given the substantially higher cost of home visits in comparison with telephone calls, the latter are being used increasingly by public health nurses due to budgetary and time constraints. Professional nursing follow-up and case management involves health education, counseling, community resource use, agency liaison, and referrals requiring skills such as those listed in the nurse checklist used in this study (Figure 1). This project explored the cost and effect on dental visits of nursing follow-up service after dental caries screening in a school district.

Methods

All 2,792 fifth and sixth grade students in the Oakland Unified School District in the San Francisco Bay Area of California received an invitation to participate in the study. Signed parental consent forms were returned by 2,010 students (72 per cent) and 1,883 students (67 per cent) were screened (mouth mirror and explorer) by a single registered dental hygienist.

Parents or guardians of all screened children received notification letters as to the child's dental condition. All 1,883 students were classified according to dental condition severity: class 1—requiring no treatment; class 2—requiring treatment but not of an urgent nature; class 3—requiring early treatment; and class 4—needing emergency treatment. A total of 934 students (experimental $n = 462$, control $n = 472$) were selected as subjects by stratified randomization, from the groups in class 2 and class 3. Stratifiers were age, sex, ethnicity, insurance coverage, school attended, and dental condition severity. The remaining 949 children included those who required no treatment (class 1) and those needing emergency treatment (class 4).⁵ Notification letters were sent to all screened children.

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Each nurse ($n = 11$) was assigned an experimental and a control group in her usual school(s). Three training sessions with the nurses were conducted by the principal investigator for instruction and practice in completing a telephone call checklist and time-task form. The checklist was used by each nurse for all calls to ensure consistency of follow-up content. Follow-up calls were made by the nurse to the experimental subjects' parents within two weeks of the notification letter mailing. After the two-month intervention period, a non-professional project staff member called the parents or guardians of each nurse's experimental/control group subjects on a blind basis to determine receipt of the notification letter and any dental visit(s) made. Finally, all dental providers named by the parents were contacted to verify office visits made within the four-month period from nurse follow-up to dental visit verification.

For cost documentation, the time-task form reported telephone activity in five minute units. Incomplete calls were assigned an arbitrary three minute period by collective agreement of the nurses. The time entered included incidental activities such as checking phone numbers with the administrative office, reviewing records, etc., that are realistically part of the function. The time expended was totaled for each nurse and cost determined relative to her annual salary.

Results

The final subject group allotments with usable data were: experimental $n = 324$ and control $n = 287$. About one-third of the subjects were excluded from the analysis because of missing or incomplete information relating to dentist visit. The visit verification process was made more difficult due to the number and variety of dental providers involved. However, visit accuracy was assured by not relying solely on parental information and recall ability.

The findings indicated an overall positive experimental-control difference of dental visit rate of 10.9 per cent. The odds ratio of visiting or not visiting a dentist after follow-up service was 1.64 in this multicultural inner-city school population. Results of the randomized assignment to experimental or control groups are shown in Table 1.

For the randomization stratifying factors other than school, the within-factor-level results are also summarized in Table 1. Dentist visit rates were nearly as high for males as for female subjects. Severity of caries had little evident effect. With respect to insurance categories, the largest positive effect occurred for the group with no insurance coverage. Results varied between ethnic groups. The White group showed a high overall visit rate but no experimental-control difference; the Black and Latino groups evidenced moderate differences (9-12 per cent), and the two Asian subgroups showed substantial differences (29 per cent). The number already in treatment when screened was too small for meaningful findings.

A positive experimental-control group difference occurred in 13 of the 19 schools, with the difference exceeding 10 per cent in nine of these schools. Only one of the negative differences exceeded 10 per cent, in a school in which visit information was obtained for a very small number of subjects ($n = 13$). Within-

FIGURE 1—Nurse Follow-up Checklist on School Dental Referrals

1. Clarification and interpretation of letter.	_____ (health counseling, communication)*
2. Reinforcement of initial letter regarding need for dental care.	_____ (health counseling, health education)
3. Elicitation of information as to status of dental condition and treatment—initiated, continuing, completed.	_____ (interviewing)
4. Provision of educational information regarding dental health.	_____ (health education)
5. Provision of additional information regarding dental care services or related accessibility problems.	_____ (health counseling, community resources)
6. Contact person within school for future problems or concerns pertaining to the dental care referral program.	_____ (communication, liaison)
7. Name, address, and phone number of dental care provider.	_____
Office visit date(s).	_____

*Required nursing competencies, in parentheses, were not on original worksheet used in the study.

TABLE 1—Rate of Visit to Dentist Compared between Experimental and Control Groups, Overall and Within Level of Stratifying Factors

	Experimental		Control		Odds Ratio	95% Confidence Limits
	N	% Visit	N	% Visit		
Overall Stratifying Factor/Level	324	38	287	27	1.64	1.15,2.35
Sex						
Female	182	40	162	28	1.70	1.05,2.76
Male	138	36	123	27	1.55	0.88,2.73
		(4)**		(2)**		
Insurance (Dental)						
Private	140	46	109	34	1.64	0.95,2.85
Public*	115	31	106	27	1.21	0.65,2.26
None	50	36	45	16	3.05	1.04,9.69
		(19)**		(27)**		
Severity						
Some caries/small	221	39	193	28	1.60	1.04,2.47
Many caries/large	103	36	94	24	1.73	0.89,3.39
Ethnicity						
Black	199	29	183	20	1.64	0.99,2.73
Chicano/Latino	45	47	40	35	1.62	0.62,4.29
White	35	60	29	62	0.92	0.92,2.82
Asian	20	60	13	31	3.38	0.63,19.9
Southeast Asian	13	38	11	9	6.25	0.50,324
Other	12	58	7	43	1.87	0.20,18.6
				(4)**		

*MediCal or DentiCal (California's Medicaid)

**Missing information

school odds ratios ranged from 0.80 to 5.61. However, these variations were not related to nurse characteristics.

The eight (of 11) nurses who provided usable data for cost documentation purposes averaged from 15.1 minutes to 37.4 minutes per completed call (mean = 26.7) performing follow-up services. Using the annual salaries of the nurses (average = \$21,059) as a computation basis, the cost per call ranged from \$4.65 to \$14.11 with a mean of \$8.92 per completed follow-up call, exclusive of support costs (Table 2).

Discussion

The data suggest that nursing follow-up service in the schools was an effective means of increasing the utilization of dental service after screening in this population. An unex-

TABLE 2—Mean Nurse Time and Cost Per Completed Follow-up

Nurse	Minutes	Salary (\$)	F/U Cost (\$)
1	15.1	20,037	4.65
2	18.7	20,051	5.79
3	19.5	16,701	5.01
4	23.7	20,051	7.33
5	30.8	20,051	9.53
6	30.9	22,823	10.87
7	37.4	24,382	14.07
8	37.5	24,382	14.11
	\bar{X} —26.7 min.		\bar{X} —\$8.92
	S.D.— 8.7 min.		S.D.—\$3.84

pected finding was that the subjects who had no dental insurance showed a greater effect of the intervention than those with public or private insurance. The intervention effect was highest among the Southeast Asian and Asian groups and lower for Black, Chicano/Latino and White groups. The average cost of this nursing field service at \$8.92 per completed follow-up call is considerably less than another major public health nursing activity, the home visit, that currently costs approximately \$70 in the same geographic area.* While specific situations may indicate the appropriateness of a home visit versus a telephone call, the choice may be determined by service effectiveness and cost information where nurse discretion or program options exist.

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REFERENCES

1. Hightower ME: The status of community health nursing research. *Nurs Res* 1977; 26:183-192.
2. Roberts DE: How effective is public health nursing? *Am J Public Health* 1962; 52:1077-1083.
3. Chavigny K, Kroske M: Public health nursing in crisis. *Nurs Outlook* 1983; 31:312-316.
4. Roberts DE, Heinrich J: Public Health nursing comes of age. *Am J Public Health* 1985; 75:1162-1172.
5. American Dental Association: Official policies of the American Dental Association. Chicago, IL: ADA, 1957.

*Personal communication from Irma Anderson, Director of Public Health Nursing, Contra Costa County, October 1985.