Epidemiologic study

Consumers' Motivation and Acceptance of Urinary Screening of School Children

WARREN F. DODGE, M.D., and EVELYN F. WEST, R.N.

PREVENTING or controlling a chronic disease during its presymptomatic stage is of equal importance with curative or palliative medical care. Although prevention or control largely obviate the mental anguish, physical pain, pretreatment disability, and loss of productivity associated with curative or palliative care, preventive care has not been exploited to its full potential. This failing is perhaps the result of the classic pattern of medical training (*1*). Further, despite current changes in medical education, some authorities predict that curative and palliative care will continue to occupy a disproportionate role because of the increasing shortage of physicians (*1*). If so, innovative methods of delivering preventive care will be required to complement medical care for established illnesses provided by the patient's physician.

In that regard our experiences, gained from specific screening tests given to children of school age, are of interest. Although these studies were concerned primarily with development of predictors of hypertension and chronic renal disease, they were also peripherally concerned with both the means for delivering health care and motivating consumers. Data on delivery of care and motivation provide the basis for this report.

Dr. Dodge is associate professor, department of pediatrics and department of preventive medicine and community health, University of Texas Medical Branch, Galveston. Miss West is also with the department of pediatrics.

The investigation was supported by Public Health Service grant No. 79-480 from the National Center for Health Services Research and Development.

Methods

The study population is composed of all boys and girls enrolled in the appropriate three grades of public, private, and parochial schools in Galveston County, Tex. Initially about 10,000 children were chosen to allow for the expected effects of school population dynamics on the cohort (that is, reduction to 35 percent of the initial group at high school graduation) and to insure the cohort size required to permit statistical correlations at the termination of the investigation. During the initial year of the project (1967–68 school year) the study group consisted of first-, second-, and third-grade children. Because the investigation is longitudinal, the grades included are advanced by one in each subsequent year. For example, during the 1968–69 school year the study group consisted of second, third, and fourth graders.

Previous studies of health care programs (*2*, *3*) have demonstrated that consumer participation is related to four sociocultural factors—basic education, specific information, personality, and group membership. To insure maximum consumer recruitment, the authors cited recommended enlisting the aid and participation of key persons and organization leaders early in the planning period. In addition, these authors suggested that community cognizance should be enhanced by means of the mass media and by dissemination of information through

existing organizations and by person-to-person contact.

In this study, the program envisioned for annual testing of school children was first presented to individual physicians, school superintendents, and school board members. Appropriate changes were then made in accord with their suggestions. These changes were incorporated in the program to permit those medical and school professionals to motivate the larger community and to facilitate approval and support for the program from key organizations. For similar reasons, an advisory board was also appointed during the summer months before the opening of schools for the 1967–68 school year. The president of the county medical society, superintendents of public schools, and the principals of private and parochial schools assisted in making the appointments to the advisory board. The board is composed of an equal number of members from the medical, school, and lay community and, through them, the program has advocates in a variety of other community organizations. The members actively participate in decisions concerned with the operation of the program and, of equal importance, they provide channels of two-way communication between the community and the project staff.

Annually, about 3 weeks before scheduled testing at a specified school, parental consent was requested. A letter of explanation accompanied each permit so parents would have the necessary information about the program. Efforts to enhance community cognizance included assisting local newspapers in preparing feature articles and editorials. The program also was described at regularly scheduled PTA meetings during both the 1967–68 and 1968–69 school years. By arrangement with PTA officers for each of the 41 elementary schools, these presentations were scheduled 3 to 6 weeks in advance of the time the children at that school were to be tested. A printed summary was given each parent and teacher as they entered the meeting and a question-and-answer period followed the prepared presentation. Usually it was also possible to discuss the program with the principal and school nurse individually before the public presentation.

Those children for whom parental permission had been received were tested at their school by one of four examining teams. Each team was composed of a nurse and two assistants; all were specifically trained for the duties they performed. The duties included determination of blood pressure, height, weight, and arm circumference; collection of clean catch urine specimens; preparation of quantitative pour-plate urine cultures; performance of urinary screening tests; and recording and electronic key punching of these data. Urine cultures and urinary screening tests were performed in the project's central laboratory under the supervision of a technician. The technician also performed, when indicated, microscopic examinations of urinary sediment and identified and determined antimicrobial (disk) sensitivity of organisms isolated from the urine cultures.

The results of these tests were promptly mailed to the parents and, if the results of the tests were abnormal, to the school nurse and physician or clinic of the parents' choice as well. A followup medical evaluation was then requested from that physician approximately 3 months later. Demographic data, past medical history, and consumer opinion were obtained by structured interviews with the parents of 455 of the 504 children whose tests were abnormal. In addition, the same interview data were obtained from parents of a randomly selected portion of all children eligible for enrollment in the program. Included were the parents of 1,996 of the 9,539 children tested and found to be normal, 271 of the 567 children for whom parental permission was refused, and 178 of the 388 children for whom a permit was not returned. The interviews were conducted with parents during both school years. With appropriate weighting at the time of analysis, the interview sample is representative of about 24 percent of the universe (study) population.

Results

Demographic data. During the 1967–68 school year the study population consisted of 9,411 children and during the 1968–69 school year, of 9,915 children (table 1). In both years the distribution by sex was 51 percent boys and 49 percent girls, and the ethnic distribution, 62 percent Anglo-American, 27 percent Negro-American, and 11 percent Mexican-American. In addition, the socioeconomic distribution of

the weighted interview sample was 7.5 percent upper level, 5.2 percent upper-middle level, 16.1 percent middle level, 41.3 percent lower-middle level, and 29.1 percent lower level. For 0.9 percent the data were incomplete. Hollingshead's methods were used to determine the family's socioeconomic level.

Past medical history. At the time of interview each mother was asked the following questions. Had the child "ever been tested for kidney infection or kidney disease?", "When was the last time that (name of child) was taken to a doctor or clinic for a checkup or illness?", and "What was the reason for that visit?"

Of the interviewed mothers, 12.5 percent reported that their child had had a kidney test in the past. This varied from 22 percent for children from families in the upper socioeconomic level to 9 percent for children from families in the lower socioeconomic level. Fifty-three percent of the children had been to their physician or clinic within the past year and 64 percent within the past 2 years. Significant differences for the reasons for these visits were observed when analyzed by the child's age and his family's socioeconomic level. For children 7 years of age or less, 24 percent had been for a checkup within the past year whereas only 16 percent of 10-year-old children had been to the physician for a checkup during that time. For children from families in the upper socioeconomic level, 26 percent had been for a checkup within the past year whereas this was the reason for visiting a physician within the past year for only 19 percent of children from families in the lower socioeconomic level.

Consumer motivation. Since this epidemiologic investigation is longitudinal, maximum participation of the study group annually is highly desirable. For that reason, considerable attention has been given to participation by each sociocultural segment of the cohort. Although the children will be the ultimate consumers, their parents make the decision to accept or reject this preventive program. Thus, in practical terms, an evaluation of the proportion of eligible children participating in the program (table 1) is an evaluation of their parents.

A daily logbook was kept by each of the four team captains to monitor continuously parental acceptance of the program. We discovered that participation was being reduced not only by parental refusal but also by the failure of some parents to return a permit. Our impression at the time was that parents who did not return a permit came principally from lower socioeconomic levels while parents who refused permission were principally from upper socioeconomic levels. Demographic data in percentages for the parents, according to their response to the request for permission to make the tests during the 1967–68 school year, follow.

Demographic data	*Permission granted*	*Permission refused*	*Permit not returned*
Total	91	5	4
Ethnic group:			
Anglo-American	90	7	3
Negro-American	91	3	6
Mexican-American	93	4	3
Annual family income:			
More than $10,000	92	6	2
$7,000 to $10,000	92	5	3
$4,000 to $7,000	91	4	5
Less than $4,000	89	3	8
Socioeconomic level:			
Upper and upper-middle	92	7	1
Middle	92	6	2
Lower-middle and lower	90	4	6
Mother's education:			
College graduate	94	5	1
High school graduate	92	5	3
Junior high school graduate	91	4	5
7 years or less	87	8	5
PTA attendance:			
Regularly	93	5	2
Occasionally	92	5	3
Hardly ever	89	7	4
Never	89	6	5

While awaiting confirmation by subsequent parental interviews, we made several adjustments. School personnel were requested to send additional permit forms home with children whose parents did not promptly return the first form. We also increased our efforts to get existing community organizations (school nurses, public health nurses, and neighborhood workers from the community action council) to assist and encourage these parents to return the completed permit form. In addition, we also increased our efforts, by telephone, to inform parents of the purpose of the program and of the type of tests being used. Telephoning, however, was principally directed toward parents who refused permission for the tests, because we were usually able to contact these parents by telephone. Further, during the second school year (1968–69) we began mailing a letter to the

parents of each child for whom a permit was not received. This letter explained to the parents why we did not examine their child with his class and invited them to participate the next year.

The combination of the procedures reduced nonparticipation because of failure to receive a permit form from 3.8 percent in 1967–68 to 1.4 percent in 1968–69 (table 1) and to 0.6 percent during the 1969–70 school year. In contrast, nonparticipation because of parental refusal has remained relatively static; 5.3 percent in 1967–68, 5.2 percent in 1968–69, and 5.1 percent in 1969–70.

Community participation. The attitudes and opinions of the members of the medical and school communities affected the results of this preventive program in two important areas. First, without their collective approval and assistance the program could not have been attempted. Second, they had considerable personal influence upon the opinions and attitudes of the parents of their patients and students.

Following receipt of official sanction from the county medical society, approval was prompt, unanimous, and only a formality for seven of the eight independent school districts and for 10 of the 12 private and parochial elementary schools. Approval from the eighth independent school district was unanimous but was granted only after three separate school board meetings. The deliberations of that board are unavailable since they were held in executive session. Similarly, the reasons for refusal by the nonparticipating parochial schools are unknown, since a representative of this program was not present when those decisions were reached.

Evaluation of the influence of the opinions and attitudes of individual school personnel (principals, teachers, and school nurses) can be judged, in part, by comparing individual classrooms within a school and different elementary schools. This comparison alone will not provide a completely valid evaluation, however, since the family characteristics—for example, the sociocultural group—of children attending certain schools may influence the rate of participation in a manner which may be either similar or opposite to the attitudes of the personnel at that school.

Our current impression is that there is a definite interplay between the attitudes of parents and personnel of individual schools. For example, in schools where the principal or school nurse, or both, were obviously enthusiastic about the program, parental participation was 100 percent and thus seemed unrelated to the possible effects of sociocultural group. In addition, the variability for the rate of participation between different classrooms at the same school suggested that the attitudes of individual teachers were also important. This observation could result, however, from the clustering of children from similar types of families or from the influence of one or more student leaders in a classroom.

The effect of individual members of the medical community was difficult to assess and therefore to evaluate. For example, analysis of the demographic data from parental interviews suggests that residential clustering of families with similar characteristics was as likely an explanation for the observed variability in rate of participation for different communities in

Table 1. Participation during the first and second project years of study population, by sex and ethnic group

Sex and ethnic group	Permission granted		Permission refused		Permit not returned	
	1967–68	1968–69	1967–68	1968–69	1967–68	1968–69
Boys, total	4, 389	4, 830	212	194	216	74
Anglo-American	2, 738	3, 042	155	168	94	34
Negro-American	1, 179	1, 270	26	8	101	25
Mexican-American	472	518	31	18	21	15
Girls, total	4, 168	4, 435	283	320	143	62
Anglo-American	2, 447	2, 705	222	286	71	31
Negro-American	1, 172	1, 263	45	15	61	26
Mexican-American	549	467	16	19	11	5

the county as was the possible influence of the physicians practicing in that locale. The response of local physicians to our request for followup medical evaluation provided some measure of their commitment to this program. In that regard, 70 percent of the physicians returned all or the majority of the questionnaires sent them, while only 20 percent returned no questionnaires. Even more revealing is that only five physicians (10 percent) accounted for more than half of the unreturned questionnaires.

Outcome of referral for medical care. Maximum effective control of a chronic disease must include not only motivating the consumer to avail himself of early diagnosis but also, once the disease is detected, of obtaining prompt medical care. As noted previously, data for outcome of referral for medical care of children noted to have an abnormal test result are incomplete. For example, 6 percent of the parents did not provide the name of their physician or clinic, and not all questionnaires were returned. Thus, analysis of observed differences in outcome was made in duplicate, that is with and without unknown results, and are considered significant only if the P value is less than 0.05 for both.

The differences observed for outcome of referral when analyzed by ethnic group (table 2) are highly significant ($P < 0.005$). Possible explanations include differences in the parents' urgency rating (*4, 5*) or in their ability to obtain medical care. Although no direct information concerning urgency rating is available from the present interview data, no significant differences for outcome were noted when analyzed by the level of the mother's education, the child's sex, or the type of abnormality reported—for example, bacteriuria compared to proteinuria. Ability to obtain medical care might have monetary or logistical aspects. For example, a mother employed outside the home, unmarried, or both, or a mother who has many other children to care for may find it difficult to obtain medical care for her children. Demographic data for those children referred to their physician, where both the outcome of the referral and information from parental interview were available, follow.

Demographic data	*Total referrals (number)*	*Referral successful (percent)*	*Referral unsuccessful (percent)*
Total	370	84	16
Upper and upper-middle socioeconomic level:			
Anglo-American	49	96	4
Negro-American	3	100	0
Middle socioeconomic level:			
Anglo-American	51	86	14
Negro-American	4	100	0
Lower-middle socioeconomic level:			
Anglo-American	94	91	9
Negro-American	26	62	38
Mexican-American	12	83	17
Lower socioeconomic level:			
Anglo-American	44	86	14
Negro-American	63	65	35
Mexican-American	24	83	17
Mother's marital status:			
Married	314	85	15
Other	56	73	27
Place of residence:			
City of Galveston	152	84	16
Remainder of county	218	83	17
Family size:			
4 or less members	100	87	13
5 or 6 members	164	86	14
7 or more members	106	76	24

The differences in outcome of referral by mother's marital status were just barely significant ($P=0.05$) while those by family size, by whether or not the mother worked outside the

Table 2. Results of outcome of referral of 415 children for medical care, by ethnic group

Ethnic group	Total referrals	Successful [1]		Unsuccessful [2]	
		Number	Percent	Number	Percent
Anglo-American	254	229	90	25	10
Negro-American	112	76	68	36	32
Mexican-American	49	41	84	8	16
Total	415	346	83	69	17

[1] Seen by physician or clinic subsequent to referral from this program.

[2] Not seen by physician or clinic subsequent to referral from this program.

NOTE: Referrals for children whose results were unknown are excluded.

home, and by place of residence were not statistically significant. In addition, the differences in outcome of referral were statistically significant by socioeconomic level ($P<0.025$), and by ethnic group for children from families in the lower-middle socioeconomic level ($P<0.005$) and in the lower socioeconomic level ($P<0.025$). On the other hand, the differences in outcome of referral by socioeconomic level were not statistically significant within individual ethnic groups. Of interest also is the lack of a significant difference in outcome of referral for children from families whose annual income was less than $4,000 and for families in the lower socioeconomic level, when analyzed by residence, despite the fact that those children who live in the city of Galveston are eligible for care in a children and youth program.

Discussion and Conclusions

A urine culture made annually has been known for a decade to be an important aspect of comprehensive health care for school-age girls (*6*). Analysis of the present parental interview data, however, indicate that, outside of this program, only about 15 percent of the girls in this community receive a kidney test. In the past, cost for routine urine cultures probably limited its use specifically to those children suspected of having a symptomatic urinary infection (*7*). The cost of the tests would also seem to account for the differences observed among those receiving a kidney test in the past. Analysis by socioeconomic level indicated that 25 percent of girls in the upper socioeconomic level had been tested, but only 10 percent of girls in the lower socioeconomic level had been tested. For similar reasons, the observations in this locale probably do not differ strikingly from those of other communities. If so, the recently available tests (*7, 8*), which are not only simple and accurate but inexpensive as well, could allow annual screening for significant bacteriuria in the near future for most girls.

The child's own physician would, for several reasons, seem the ideal person to make this test and most other screening tests as well. First, the patient's past and present medical history is already known by that physician. Second, the delay between detection and receipt of additional diagnostic studies or therapy, or both, would be minimal. An important determinant, however, is suggested by our observation that only about one-fifth of the school-age children in this locale are seen currently by a physician for an annual checkup. Thus, either parents must be educated to obtain an annual checkup by a physician for their school-age children or some other delivery system, which would assure greater consumer participation, should be provided. In that regard, if the increasing shortage of physicians limits their efforts principally to clinical triage and remedial action as predicted (*1*), other methods for delivering preventive care to children appear to be mandatory. One method, immediately applicable to children of school age, is to incorporate appropriate preventive care measures into existing school health programs.

Use of the school system to deliver health care has certain advantages, some distinct, but the system also shares at least one disadvantage (*4, 5*) with other delivery systems. First, the test results for the majority of children can be expected to be normal and, therefore, will not require the physician's time or attention. This fact is particularly true when the screening test's specificity and sensitivity (*9*) are sufficient to prevent an excessive number of false positive results. In addition, verification of positive results by repeating the screening test before the child's referral insures maximum use of his physician's therapeutic knowledge and skill. Second, not only are some tests for urinary screening, such as Testuria and Hemacombistix, inexpensive but they require only minimal laboratory facilities. In addition, because of the simplicity of these tests, they can be performed accurately by volunteer PTA mothers or other interested persons who have no medical training. Further, these tests require only a short period of training to collect a clean catch specimen of urine and perform the tests, and the testers need only minimal continuing supervision. Third, the school health program is an acceptable delivery system for the majority of parents, and there are no significant differences, by sociocultural group, in acceptance (*10*). In addition, our experience indicates that if this program is incorporated in the school health services, the service will be used by the majority of parents.

In contrast, however, our experience also indicates that a sizable proportion of those children referred to their personal physician or clinic because of abnormal test results do not receive subsequent medical attention and that this observation is not explained by differences in availability of medical care. On the other in availability of medical care. Further, since this apparent lack of concern by patient or parent seems to be a disadvantage common to several health care delivery systems (*11*), future investigations should focus specifically upon delineation of those factors which motivate consumers to seek medical care. That knowledge will allow an effective system for followup to be designed and, in turn, permit improved comprehensive care for children of all sociocultural levels.

Summary

A prospective epidemiologic study of hypertension and chronic renal disease provided a unique opportunity to investigate factors affecting consumer acceptance and participation. The study population was composed of all children enrolled in the appropriate three grades of public, private, and parochial schools in Galveston County, Tex. Annual participation of each of the 10,000 eligible school children was predicated upon receipt of parental permission for the tests. Demographic data, past medical history, and consumer opinions were obtained by structured interview with the parents of about one-fourth of the eligible children. Outcome of referrals for medical care of children found to have abnormal test results was obtained from their personal physicians.

Our observations indicate that only about one-fifth of school-age children in this locale received an annual checkup. Thus, either their parents need to be educated as to the importance of seeking periodic health care or else a system which would assure more complete delivery appears necessary. Our experience suggests that incorporation of appropriate preventive care services into school health programs provides a delivery system which is immediately applicable to children of school age and, of equal importance, is acceptable to and will be used by the majority of parents.

In contrast, our experience also indicates that a sizable portion of referred children will not receive subsequent medical attention and that this observation is not explained by differences in availability of medical care. On the other hand, provision of screening tests through school health programs will permit maximum utilization of the therapeutic knowledge and skills of the community's physicians since, for the majority of children, the test results can be expected to be normal.

REFERENCES

(*1*) Schuman, L. M.: Approaches to primary prevention of disease. Public Health Rep 85: 1–10, January 1970.

(*2*) Merril, M. H., et al.: Attitudes of Californians toward poliomyelitis vaccination. Amer J Public Health 48: 146–152, February 1958.

(*3*) Johnson, A. L., Jenkins, C. D., Patrick, R., and Northcutt, T. V.: Epidemiology of polio vaccine acceptance. Florida State Board of Health Monograph series No. 3. Undated.

(*4*) Cauffman, J. G., Petersen, E. L., and Emrick, J. A.: Medical care of school children: factors influencing outcome of referral from a school health program. Amer J Public Health 57: 60–73, January 1967.

(*5*) Gabrielson, I. W., Levin, L. S., and Ellison, M. D.: Factors affecting school health follow-up. Amer J Public Health 57: 48–59, January 1967.

(*6*) Kunin, C. M., Southall, I., and Paquin, A. J.: Epidemiology of urinary tract infections. New Eng J Med 263: 817–823, Oct. 27, 1960.

(*7*) Dodge, W. F., West, E. F., Fras, P. A., and Travis, L. B.: Detection of bacteriuria in children. J Pediat 74: 107–110, January 1969.

(*8*) Scherstén, B., et al.: Screening test for bacteriuria with a test paper for glucose. JAMA 204: 113–116, Apr. 15, 1968.

(*9*) Gullen, W. H., and Bearman, J. E.: Observations on the diagnostic capabilities of laboratory tests. Minn Med 50: 681–685, May 1967.

(*10*) Dodge, W. F., et al.: Patterns of maternal desires for child health care. Amer J Public Health. In press.

(*11*) Nolan, R. L., Schwartz, J. L., and Simonian, K.: Social class differences in utilization of pediatric services in a prepaid direct service medical care program. Amer J Public Health 57: 34–47, January 1967.

Tearsheet Requests

Warren F. Dodge, M.D., Division of Pediatric Nephrology, University of Texas Medical Branch, Galveston, Tex. 77550