A Study of Periodic School Medical Examinations

I. Methodology and Initial Findings

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Are the avowed purposes of periodic medical examinations of school children realistic, or are they rationalizations advanced to justify anachronistic procedure? A study has been undertaken to provide answers to this and collateral questions.

School health services originated as the response to a need for control of the sanitary problems and communicable diseases that disrupted group living in the community and in the school. As they evolved, they assumed other functions: first, the early detection and follow-up of children with adverse health conditions; later the individual health teaching of pupils and parents and the education and counseling of school staff in matters relating to the health of pupils. These changes in the purpose of service are reflected in changes of medical titles: the school physician was first known as a medical inspector, next as a medical examiner; today he is often referred to as a medical adviser. It is evident that the amount of time and skill a physician can devote to advisory and counseling services is conditioned by the amount of time and skill he must devote to the periodic examination of school children per se.

The purpose of a periodic medical examination or appraisal, as distinguished from medical examination of a pupil referred for cause, is to detect adverse conditions in the school population, to advise concerning the need for care of the conditions detected, and (in the process of performing the appraisal) to educate parent and child. Are these purposes realistic today or are they rationalizations advanced to justify an anachronistic procedure? How necessary is periodic medical examination of the entire school population (a costly investment of professional skills) for detecting adverse conditions? How frequently should such examinations be performed to achieve their stated purposes? What is the annual increment of adverse conditions detectable only by medical examination in a school population? How many conditions, detected by such an examination, are already under care and so render case-finding and counseling services superfluous? Since the major responsibility for health of the school child rests with his family, does the periodic school medical examination strengthen or weaken that responsibility? What educational

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values, if any, can be said to result from periodic medical examinations?

Answers to these questions should help to define more accurately the role of periodic medical examinations in the school health program and clarify the role of the school physician. This report will describe the plan of a study exploring some of these questions during the first four years of elementary school experience. The findings of the first of four periodic medical examinations will be analyzed.

Materials and Methods

The city of Rochester, N. Y., with a population of 332,488 in 1950, had an elementary school population of 42,000 in the fall of 1952. These children attended 39 public and 31 nonpublic (parochial) schools. There were 6,906 children in the first grade of these 70 schools.

Both public and nonpublic schools receive health services through the Rochester Health Bureau. The Rochester elementary school health program calls for a medical examination at the time of school entrance (usually kindergarten) and a periodic medical examination in the fourth grade. Energetic efforts are made to encourage parents to have these examinations performed by private physicians.

The 70 elementary schools in Rochester were placed in one of three socioeconomic groups: upper, Group I; middle, Group II; lower, Group III. These groupings were made on the basis of neighborhood characteristics as expressed in 1950 census data and in the judgment of the public health nurse serving the neighborhood and its school. From each group four or more schools were selected so that the first-grade population in each group of selected schools would represent a 15 per cent sample of the total first-grade population of the base group with respect to both public and parochial schools. The final sample consisted of 13 schools.

Beginning with the first-grade population in the school year 1952–1953, annual examinations have been or will be performed on the same children for a period of four years. Each year after the first a "control" group at the same grade level, but attending other schools, will be examined. All examinations have been or will be performed by the same pediatrician (R.A.L.) using the same technics and standards of judgment. Additional studies, based on interviews with parents and testing of children, are planned as a method of evaluating the educational aspects of these examinations.

The medical examinations performed for this study consist of a complete and careful medical history and a physical examination of all systems (including fundoscopic examination). These procedures require an average of 30–40 minutes per parent and child to perform. They are done without reference to the school medical records. On the basis of this appraisal, a decision is made whether an adverse condition affecting health and justifying medical care or continuing medical observation is or is not present. The diagnosis of an adverse condition is made only if the examining pediatrician is thoroughly convinced of its existence on the basis of all information at hand. In cases of doubt, referral for further study is made. Thirty-three of the first 1,056 children examined were referred because of such uncertainty. Of this number, nine were eventually classified as healthy and are so recorded in the data to be presented.

A decision is also made whether the children with adverse conditions are or are not receiving appropriate medical care. This decision is based upon information supplied by the parent and confirmed by the physician or agency rendering care.

After these decisions are made, the

Table 1—Number of First-Grade School Children and Percentage Distribution by Socioeconomic Group and Status of "Study" Examination (13 Schools, Rochester, N. Y., 1952–1953)

Status of "Study" Examination	Number of Children	Percentage Distribution			
		Total (1,086)	Group I (364)	Group II (313)	Group III (410)
Total examined	1,056	97	99	97	95
Parent interviewed	(887)	(81)	(92)	(80)	(72)
Parent completed questionnaire	(169)	(16)	(7)	(17)	(23)
Not examined	30	3	1	3	5
Total	1,086	100	100	100	100

school medical records are reviewed and classroom teachers and public health nurses serving the schools are interviewed. On the basis of this additional information a decision is made whether or not an observed adverse condition is known to exist by the school. If an adverse condition is unknown to the school or not currently receiving appropriate medical care, the reasons for this apparent failure of communication or service are determined whenever possible.

Because the purpose of this study is to define only the role of a periodic medical examination requiring the professional time and skill of a physician, acute infections and minor skin diseases and adverse conditions of the teeth are not tabulated in our results. Since tests for visual acuity and hearing loss and other possible laboratory screening tests (such as Hb, urinalysis, and tuberculin tests) do not require the services of a physician, they were neither performed nor evaluated in this study.

Because of the wide variety of medical diagnoses it was necessary to group conditions found into diagnostic categories. The categories used are based, in general, on the "International Statistical Classification of Diseases, Injuries and Causes of Death," [1] the main exception being that congenital anomalies of bones and joints and residual paralysis resulting from poliomyelitis are included under orthopedic conditions in the data to be presented.

Results of Initial Examination

This initial report is based on an examination of 1,056 children, 97 per cent of the total 1952–1953 first-grade population of the 13 selected schools, 1,027 of these examinations being performed on first-grade children during the school year 1952–1953. The remaining 29 children, although registered as first graders in the same school, were not examined until the school year 1953–1954 when in the second grade.

Eighty-one per cent of the children were examined with a parent present and medical history obtained directly by the examining pediatrician assisted by a public health nurse. In the remaining cases, parents completed a detailed questionnaire relating to the medical history of the child. The percentage of examinations performed with a parent present varied from 92 per cent in Group I to 72 per cent in Group III (Table 1).

All but 59 of the first-grade children examined had been previously examined when they were kindergarten students as a part of the regular school health

Table 2—Frequency Distribution of 1,056 First-Grade School Children by Status of Prior School Entrance Examination and Socioeconomic Group (13 Schools, Rochester, N. Y., 1952–1953)

School Entrance Examination Prior to Present Study by:	Total	Group I	Group II	Group III
Family physician	516	244	143	129
School physician	370	76	105	189
Unknown	111	25	36	50
No previous examination	59	13	18	28
Total	1,056	358	302	396
Ratio: Family M.D./School M.D.	1.40	3.21	1.36	0.68

program. For these prior examinations, the ratio of those performed by family physician to those performed by school physician was 1.4, varying from 3.2 in Group I to 0.68 in Group III (Table 2).

Of the 1,056 children examined, 221 (21 per cent) were found to have a condition affecting health adversely; 20 children had adverse conditions in more than one diagnostic category. The over-all percentage of children with adverse conditions did not vary significantly by sex or socioeconomic group (Table 3).

An adverse orthopedic condition was found in 4.8 per cent of the children. Two-thirds of these conditions consisted of pronated feet and extremely flat arches, usually accompanied by knock-knees. These conditions of the feet were not considered significant unless accompanied by symptoms or clearly in-

Table 3—Number of Adverse Conditions Among 1,056 First-Grade * School Children and Percentage of Children with Given Condition by Socioeconomic Group and Diagnostic Category (13 Schools, Rochester, N. Y., 1952–1953)

Diagnostic Category of Adverse Condition	Number of Children with Given Condition	Percentage of Children with Given Condition: Total (1,056)	Group I (358)	Group II (302)	Group III (396)
Orthopedic	51	4.8	5.6	6.6	2.8
Allergic	41	3.9	6.4	2.0	3.0
Emotional	36	3.4	4.5	3.3	2.5
Ear, nose and throat	34	3.2	2.0	4.6	3.3
Nutritional	25	2.4	2.2	1.7	3.0
Genito urinary	15	1.4	0.8	1.6	1.8
Cardiac	9	0.9	1.1	0.7	0.8
Neurological	9	0.9	0.6	1.3	0.8
All other	22	2.1	1.7	2.0	2.4
Total	221	21.0	21.5	22.8	18.7

* Includes 29 children examined when in the second grade

Table 4—Status of Care of 210 Previously Examined First-Grade Children with One or More Adverse Conditions by Socioeconomic Group (13 Rochester, N. Y., Schools, 1952–1953)

Status of Care	Number of Children	Percentage Distribution in S-E Group			
		Total (210)	Group I (73)	Group II (67)	Group III (70)
Under care	164	78	81	72	80
(known)	(129)	(61)	(55)	(57)	(70)
(unknown)	(35)	(17)	(26)	(15)	(10)
Not under care	46	22	19	28	20
(known)	(25)	(12)	(12)	(13)	(10)
(unknown)	(21)	(10)	(7)	(15)	(10)
Total	210	100	100	100	100

terfering with gait and coordination. Postural abnormalities (lordosis, scoliosis) were considered significant only if accompanied by structural change. No purely functional defects of posture are included in the orthopedic category. The prevalence of orthopedic conditions in Group III is lower than that in Groups I and II, the difference being significant at the 2 per cent level.

One or more manifestations of allergic disease occurred in 3.9 per cent of the children. Asthma was diagnosed in almost one-half of this group, eczema in one-third, and allergic rhinitis in one-quarter. The prevalence of allergic conditions in Group I is higher than that in Groups II and III, the difference being significant at the 2 per cent level.

Those considered to have an emotional disorder were 3.4 per cent of all the children. This is a conservative figure, since the diagnosis was made only if warranted by a clearly definable pattern of disturbed behavior or personality, such as enuresis, tics, extreme aggression, hostility, withdrawal, or anxiety. The variation in prevalence by socioeconomic group is not statistically significant.

Of the 34 children considered to have an adverse condition of the ear, nose, and throat, 29 had chronically infected adenoids and tonsils. This diagnosis was made only if warranted by a history of severe, frequent sore throats and cervical nodes, chronic mouth breathing, or hearing loss. A diagnosis was not made solely on the appearance of the oropharynx.

Nutritional disorders occurred in 2.4 per cent of the children. This condition was diagnosed only if warranted by clinical evaluation of the whole child, including familial characteristics, dietary intake, and physical examination findings. About one-half of the children in this group were "below-par" in energy, muscle tone, and general appearance. The remainder were clearly obese.

There were nine children with significant cardiac disease. This diagnosis was made only on the basis of a diagnostic work-up, more extensive than the school examination itself and performed in the office of family physician or pediatric clinic. Functional cardiac murmurs were not considered adverse conditions.

Of the 221 children with adverse conditions, 210 had been previously examined as kindergarten students by a family or school physician. The significance of selecting these 210 children from the remainder of the previously

examined school population depends upon whether or not they were already receiving appropriate medical care and whether or not their adverse conditions were already known to the school health service.

Of these 210 children, 78 per cent were already receiving medical care and an additional 12 per cent had an adverse condition known to the school health service, although not under care (Table 4). The proportion of Group II children receiving care was less than that in Groups I or III, although the difference is not significant statistically.

A child with an adverse condition was more likely to be receiving care if his "school entrance" examination had been performed by a family physician than if it had been performed by a school physician (Table 5). This was true in all three socioeconomic groups and the over-all difference was significant at the 2 per cent level. This difference in status of care did not seem to be dependent upon inferior case finding by a school physician. The adverse condition of 16 of the 83 children previously examined by a school physician was already known to the school (and thus "found") even though the condition was not under care. This was true of only six of the 106 children previously examined by a family physician.

Of particular importance from an evaluative standpoint are the 21 children, selected out of 997 previously examined children who, at the time of the special examination performed for this study, were found to have an adverse condition neither known to the school nor receiving medical care. These are the only children whom this periodic medical examination can be said to have benefited from a case-finding viewpoint. The remaining 976 children were apparently healthy, had a condition already under care, or had a condition

Table 5—Status of Care of 210 Previously Examined First-Grade Children with One or More Adverse Conditions by Type of Previous (School Entrance) Examination and Socioeconomic Group (13 Rochester, N. Y., Schools, 1952–1953)

Socioeconomic Group	Prior Examination Performed By:	Number	Percentage Distribution of Status of Care		
			Under Care	Not Under Care	Total
Group I	Family physician	49	82	18	100
	School physician	15	74	26	100
	Unknown	9	89	11	100
	Total	73	81	19	100
Group II	Family physician	37	79	21	100
	School physician	25	56	44	100
	Unknown	5	100	..	100
	Total	67	72	28	100
Group III	Family physician	20	90	10	100
	School physician	43	72	28	100
	Unknown	7	100	..	100
	Total	70	80	20	100
Total	Family physician	106	82	18	100
	School physician	83	67	33	100
	Unknown	21	95	5	100
	Total	210	78	22	100

already known to the school (and therefore capable of being followed up without "rediscovery").

Ten of these 21 children had conditions (six in the orthopedic category) which obviously had existed for some years and had been missed or unreported at the prior "school entrance" examination. Five children had conditions (in emotional and ENT categories) which were grossly symptomatic during the previous school year, but which had not been reported to the school health service. In three cases (one mesenteric cyst, one postpoliomyelitic residual paralysis, and one chronic tonsillitis) the dates of onset were uncertain. The remaining three children had an adverse condition that had developed since the previous examination and which could not have been observed by the classroom teacher. Two of these children had Baker's cysts of the knee. The third child had epileptic seizures which occurred only at night. In all three instances the parent was aware of the existence of the adverse condition and its onset was within the past three or four months.

Discussion

The prevalence of adverse conditions among school children has been generally reported to be much higher than was observed in this study. There are three possible reasons for this discrepancy. Previously published reports and currently available data [2, 3] deal with an entire school population, whereas the data here reported deal only with the first-grade population. In the second place, our data, by definition, have excluded children with dental caries, refractory errors, and hearing loss. Dental caries is practically universal and the remaining two conditions are known to be at least as common as any of the diagnostic categories covered in this report.

However, even if these conditions are taken into account, certain obvious differences remain. Allergic conditions have not hitherto been reported with such prominence in a school population. Nutritional, ear-nose-throat, and cardiac conditions generally receive much more prominence than our data give them. It is believed that these differences are due to the unusually careful medical examinations (particularly the medical history) and the diagnostic follow-ups on which our criteria and data are based. The prevalence data presented are based on a relatively small number of children. Their principal value lies in the base line established for future reports of this study. Such reports will be able to compare data gathered by the same observers using the same methods.

A somewhat surprising finding was the lack of relationship between over-all prevalence and status of care of adverse conditions and socioeconomic group. It should be remembered in this connection that our data, by definition, do not necessarily reflect acute illnesses, disabling illnesses, or absenteeism which have been shown to be related to socioeconomic group.[4, 5] The meaning of observed differences in the prevalence of specific diagnostic categories (orthopedic and allergic) by socioeconomic group is not clear.

Reports of "defects" found at periodic school medical examinations do not ordinarily take into account whether or not an observed condition is already receiving care. Yet, this is of considerable significance, since if a condition is already under medical care, this fact, as well as the existence of the adverse condition itself, could have been ascertained without performing a medical examination. The finding that four out of every five children with an adverse condition fell into such a category increases the significance of this point.

It was not surprising to find that a child with an adverse condition whose

"school entrance" examination had been performed by his family physician was more likely to be receiving care than a child previously examined by a school physician. This may be due to the fact that the parent who has sought out private medical services in the past is more likely to have done so because of the adverse condition itself or more likely to have followed medical advice. It may also be due to the inherent follow-up advantages of periodic examinations performed by private physicians.

More than half of the children with an adverse condition not receiving care were already known to the school to have had this condition. The reasons why they were not under care will be discussed in another report. A detailed analysis of the 21 children with adverse conditions that were neither known nor under care has been presented. It disclosed that only one child, an epileptic, can be said to have had a serious condition requiring prompt medical attention that was neither present at the time of the "school entrance" examination nor could have been discovered through teacher referral. The significance of discovering even this child is questionable. Her mother was concerned about the nocturnal seizures and had sought help from a druggist. She stated that she was waiting for the examination at school in order to discuss the seizures with a doctor. If she had not known of the pending school examination, she might have sought medical care sooner.

It is important to recognize that the inferences that can be drawn from this first report of a four-year study relate only to a periodic school medical examination performed on first-grade children who had been examined on entering kindergarten the previous year. There seems no doubt that complete examination of this entire grade was valueless from a case-finding standpoint. Further reports will extend these observations and inferences through the fourth grade of elementary school.

Summary

1. A plan of study, seeking to evaluate periodic school medical examinations in a sample of 13 schools in an urban community has been described. The entire first-grade population of these 13 schools has been examined carefully, and this examination will be repeated at annual intervals through the fourth grade.

2. The results of the first-grade examination have been analyzed by diagnostic category, socioeconomic group, and status of medical care at the time the examination was performed. The significance of these results is discussed.

3. Of the children examined, 21 per cent were found to have an adverse condition as defined in the study. Almost all these children had been previously examined as part of the regular school health program on entry to school. Four out of five of the previously examined children were already under medical care for the observed adverse condition.

4. Half the children not under care were already known to the school health service as having the adverse condition observed.

5. Analysis of the remaining 21 children, selected out of 997 previously examined children as having an adverse condition neither under care nor known to the school, revealed only one child with a serious condition which had developed since the previous examination and could not have been observed by a classroom teacher.

6. It is concluded that this school medical examination of first-grade children who had been previously examined in kindergarten was valueless from a case-finding standpoint.

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