

Pharyngeal Culture Program in Colorado

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RHEUMATIC HEART DISEASE deserves our most vigorous efforts, because it starts in children and hits peak disability among those in the prime of life. Unlike other forms of heart disease which are receiving so much attention these days, the complete eradication of rheumatic heart disease is a realistic goal with the knowledge and ability we have available right now, because we can control the precursor, streptococcal infection (1).

The usefulness and the necessity of pharyngeal

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cultures for adequate treatment of streptococcal infection has been well covered (2,3). For processing these very essential cultures, there are several options open to the physician. Processing cultures in the physician's office has been adequately discussed by Markowitz (4). The cultures can be sent to hospital or private laboratories for processing, but this is usually excessively expensive (5). In some situations, such as those described by Phibbs and Zimmerman (6), the brunt of control is borne by volunteers working through the schools. All of these methods have proved to be effective when adequately applied.

My discussion is limited to the principal method used in Colorado and in several other States—the mass processing of cultures in central laboratories. Ideally, all physicians should have the proper training, equipment, and motivation to process pharyngeal cultures in their offices, but this situation does not always hold. Thus, in 1959 the Colorado Heart Association and the State

health department cooperatively established and promoted a mail-in culture service oriented to fit into the usual clinical practice (7).

Mechanics of Mail-in-System

When a patient has a respiratory infection, the physician makes his regular examination. During the examination of the pharynx he swabs with a dacron-tipped applicator, giving particular attention to the posterior pillar and to any inflamed or exudative areas noted. This is done to induce a gag reflex, which frequently brings unsuspected inflammatory areas into view. The swab is then rolled on a small filter paper strip provided by the health department. Before it is folded into its protective cover, the strip must be allowed to dry completely because there is selective action: streptococci dried in this manner will survive for weeks while many other confusing pharyngeal bacteria do not tolerate drying.

Each day the properly labeled specimens are mailed to the appropriate health department, where they are processed, including definitive identification by fluorescent antibody staining

(8). Unless indicated by purulent complications, antibiotics are withheld pending the culture results. Positive specimens are reported by telephone to the physician, often within 48 hours, but usually 72 hours; only rarely is the time interval more than 96 hours. When a positive report is received, the patient or his parent is contacted and requested to pick up an appropriate antibiotic prescription or to come in for a benzathine penicillin injection. Everyone living in the household is asked to come in for family contact cultures. Finally, all persons with positive specimens are asked to return 3 or 4 days after therapy for a followup culture.

Advantages

The mail-in system has several advantages. No equipment or space is required in the physician's office, and very little additional training is needed

Figure 1. Streptococcal culturing, Colorado's mail-in service

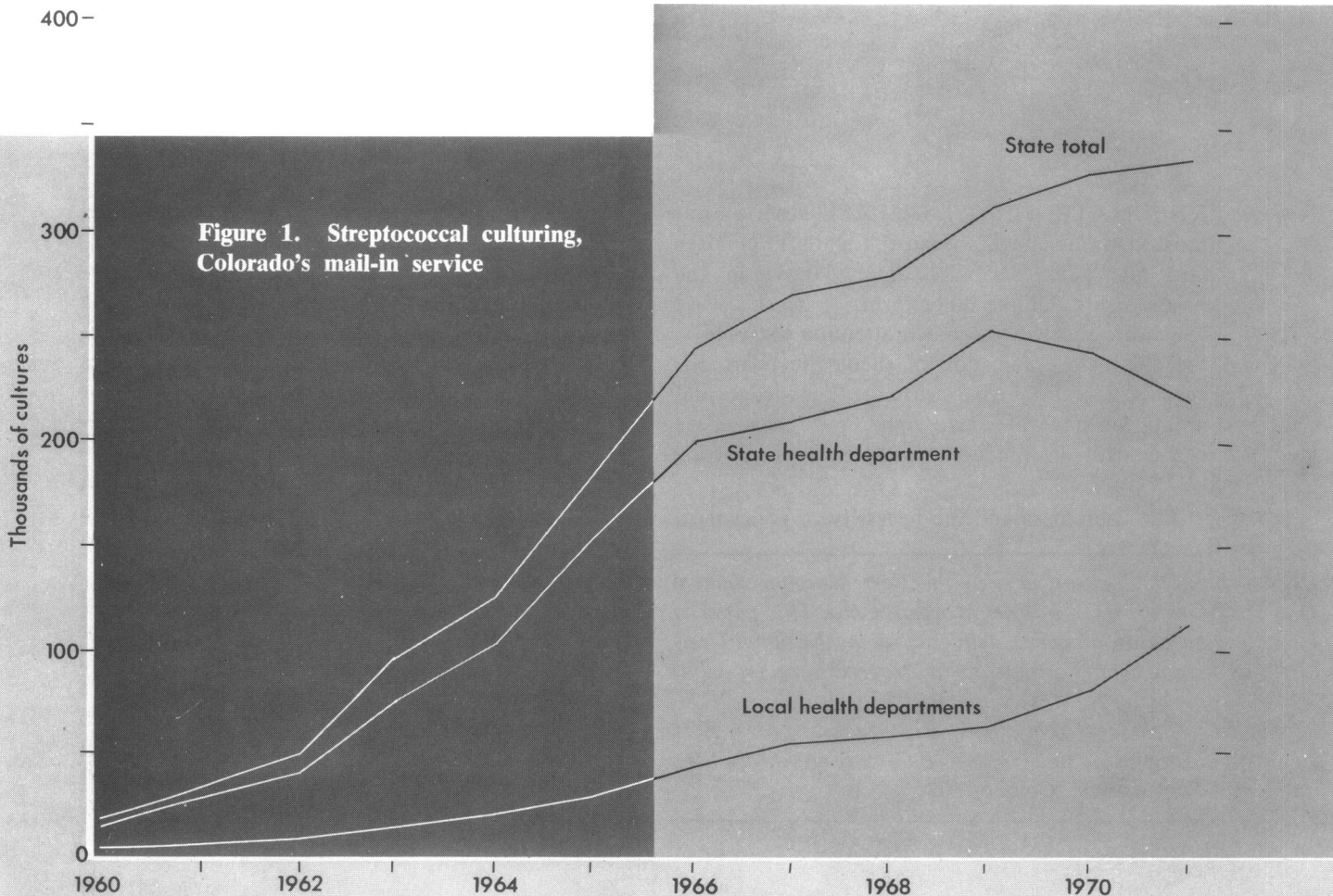
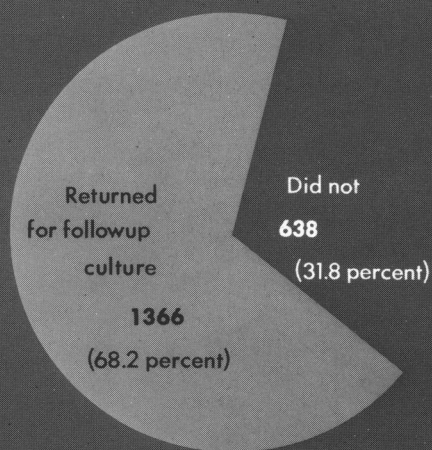
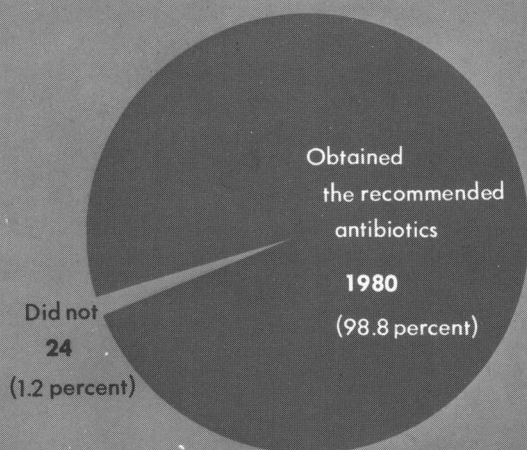


Figure 2. Acceptance of recommended treatment by 2,004 patients with streptococcal pharyngitis



for the physician or his office personnel. The method is readily adaptable to clinics, hospital outpatient departments, the visiting nurse service, and other health workers. It is also adaptable to screening programs, which are an effective tool in controlling streptococcal epidemics. With proper drying of the filter strips and good health department laboratory techniques, this method has the highest degree of accuracy of any of the culture processes available. In fact, it is more reliable than direct streaking. The cost is relatively low, 60 cents to \$1.29 per culture, depending on the volume being processed.

One final and important advantage of the mail-in system is that it allows monitoring the community prevalence of streptococcal infection. In the central laboratory, a chart can be maintained indicating the number of cultures from the various localities and the percentage of positive cul-

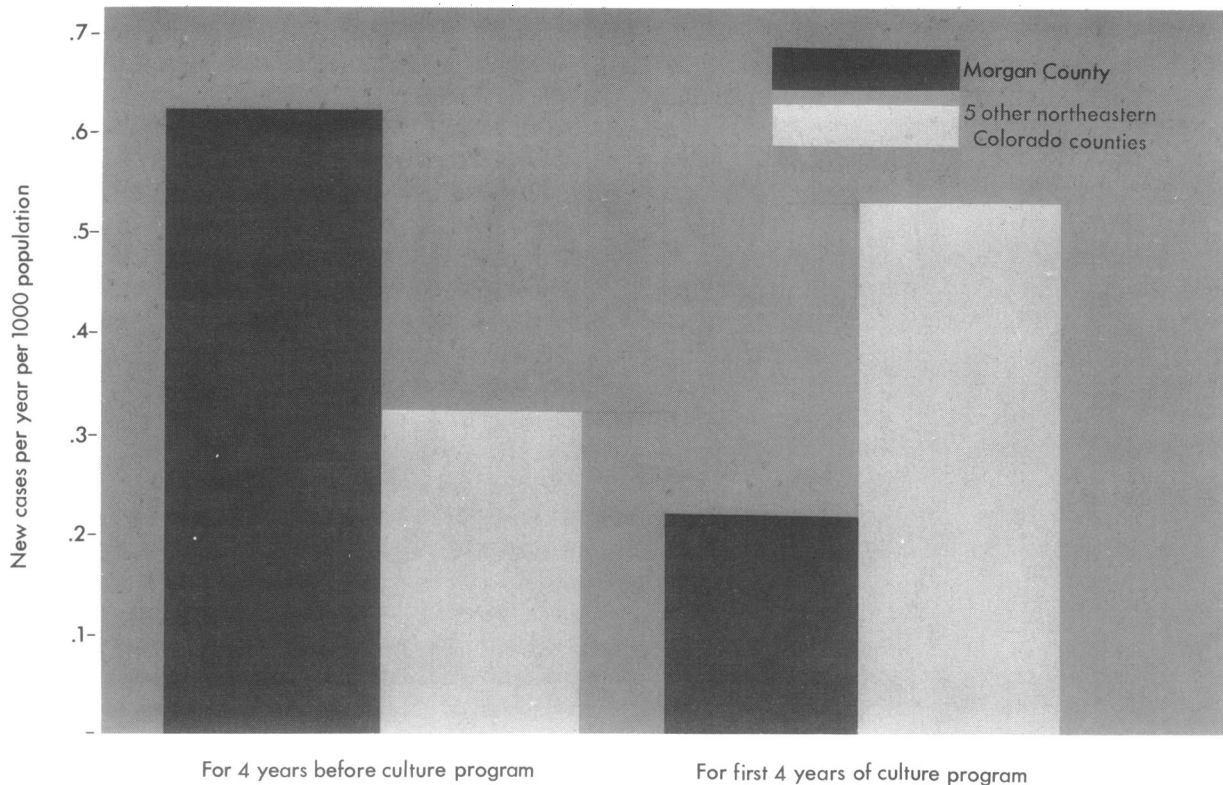
tures; thus, it is often possible to identify hotbeds of infection before the onset of a full-blown and potentially serious epidemic.

Results

The phenomenal growth of this program in Colorado is shown in figure 1. A survey was conducted in 1971 to obtain an estimate, by State, of the number of cultures being done, including the major laboratories and physicians' offices. (Tabulation of responses from all 50 States and the District of Columbia is available from the author.) The estimates indicate that Colorado was doing 136 cultures per 1,000 population each year. Only Wyoming indicated a greater rate, and only four States estimated more than 50 cultures per 1,000 population.

General acceptance by physicians was demonstrated in a detailed study by the Heart Association in 1967 (5). The acceptance by patients who are properly motivated is well illustrated in figure 2, which shows that not only do most patients return and obtain the medication recommended,

Figure 3. Use of pharyngeal cultures—comparisons of six counties of northeastern Colorado, 1961–63



but they also return for a followup culture upon the completion of medication. Most family members in their households are willing to come in for the recommended contact cultures (9).

The preliminary indications are that a vigorous culturing program is effective, as measured by the incidence of acute rheumatic fever (ARF) and the ARF death rate. A detailed study in northeast Colorado (9) showed that in Morgan County, where the culture program was implemented early and extensively, there was a marked reduction in the incidence of ARF as compared with five neighboring counties which were slower in adopting extensive culturing (figs. 3,4). In larger population groups, figures regarding the incidence of ARF are notoriously unreliable, but the actual numbers of deaths from ARF are less subject to error. In Colorado the average ARF death rate for the years 1965–67 was 1.54 per million, which is only 6.9 percent of the rate 15 years previously (22.5), as shown in the following table. (These figures are derived from the annual

statistical reports of the Department of Health, Education, and Welfare. Detailed tabulation is available from the author.)

Area	Average ARF death rates	
	1950-52	1965-67
National	11.3	¹ 2.09
Colorado	22.5	² 1.54

¹ 18.2 percent of 1950-52 rate.
² 6.9 percent of 1950-52 rate.

In ranking the States for ARF death rates from low to high, Colorado moved from 48th to 10th place during the same period. Data for all 50 States, as indicated in the following table, show that there may be a correlation between the level of culturing and improvement in ARF death

rates. (Detailed tabulation is available from the author.)

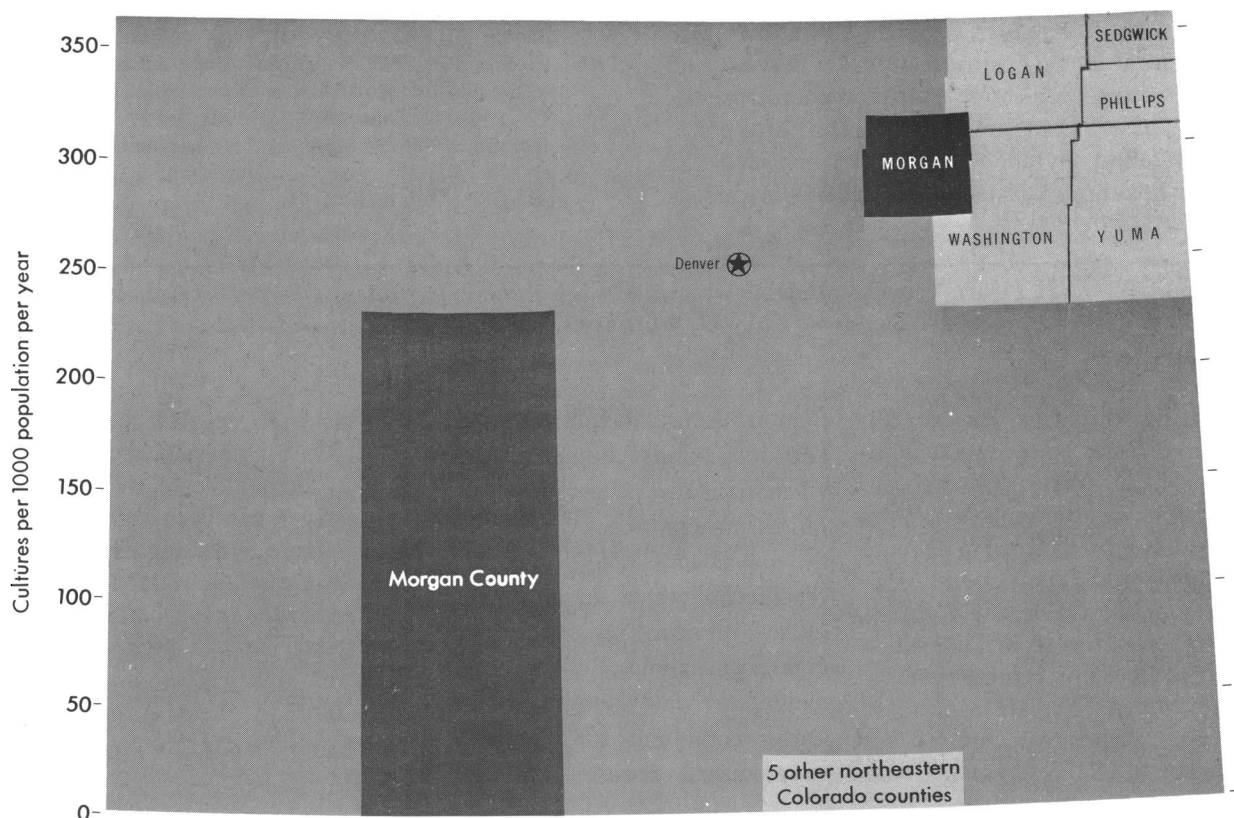
Culture rate	Average ARF death rates	
	1950-52	1965-68 ¹
High—6 States (more than 30 per 1,000)	13.5	1.31
Medium—11 States (15-30 per 1,000)	12.7	2.08
Low—14 States (5-15 per 1,000)	11.8	2.28
Minimal—19 States (below 5 per 1,000)	12.3	2.48

¹ These data were available for a 3-year period.

Strategy for ARF Program

Although all the details of why and how the ARF death rates were cut in Colorado cannot be detailed here, some salient factors can be pointed out. Physician education received early attention with the aid of a rheumatic fever diagnostic clinic established at the University of Colorado Medical School and financed by the heart association. The support of Dr. David McGuire, an enthusiastic

Figure 4. Rheumatic fever incidence in northeastern Colorado before and after Colorado Heart Association pharyngeal culture program



and knowledgeable State laboratory director, was of inestimable value.

Vigorous promotion by the heart association was a major factor in the success of Colorado's program. Informational materials were mailed to all practicing physicians. Physicians received both initial and subsequent editions of some pamphlets. Physicians also received several reprints concerning the control of rheumatic fever and on several occasions, small reminder leaflets.

The 1967 physician survey was a significant promotional effort. During streptococcal epidemics, physician education at the county medical society level has proved to be very effective, and extensive and continued use of the mail-in culture program usually occurs subsequently. Of great importance is lay education which not only teaches people to have due regard for sore throats, but also encourages them to apply pressure on practicing physicians to take specimens for culture. The public educational efforts have been extensive—many news articles year after year; heart fairs which have been well received and apparently effective; multiple programs at heart association assemblies; many public programs for PTA groups, women's civic clubs, and so on; wide distribution of leaflets; and finally, effective use of the news media during streptococcal epidemics.

The establishment of regional laboratories generates local interest, provides quicker service, and allows closer monitoring of streptococcal prevalence. These laboratories are the result of a cooperative effort by the heart association and the public health departments. In addition to public-

ity and promotional and educational activities, the heart association has often provided the initial startup money and support until the need for the laboratory could be adequately demonstrated to local health boards. Health departments initially provided personnel and space, but they soon assumed full responsibility for the operation of the laboratories.

REFERENCES

- (1) Taranta, A., et al.: Report of the Intersociety Commission for Heart Disease Resources: Prevention of rheumatic fever and rheumatic heart disease. *Circulation* 51: Suppl A1-15, May 1970.
- (2) Breese, B. B.: Culturing beta hemolytic streptococci in pediatric practice. Observation after 20 years. *J Pediatr* 75: 164-166 (1969).
- (3) A method of culturing beta hemolytic streptococci from the throat. American Heart Association Pamphlet No. 164, New York, 1965, pp. 1-6.
- (4) Rosenstein, B. J., and Markowitz, M.: Accuracy of throat cultures processed in physicians' offices. *J Pediatr* 76: 606-609, April 1970.
- (5) Jackson, H.: Rheumatic fever control measures, acceptance of routine pharyngeal cultures. *Am J Dis Child* 45: 570-575, May 1968.
- (6) Phibbs, B., and Zimmerman, R. A.: A community-wide streptococcal control project. *JAMA* 214: 2018-2024, Dec. 14, 1970.
- (7) McGuire, C. D.: State-wide streptococcus culture service of the Colorado Department of Public Health. *Bull Denver Rheumatic Fever Diagnostic Service* 8: 1, 2, May 1962.
- (8) Freeburg, P. W.: Rapid fluorescent-antibody stain technique with group A streptococci. *Appl Microbiol* 19: 940-942, June 1970.
- (9) Jackson, H., et al.: Streptococcal pharyngitis in rural practice. Rational medical management. *JAMA* 197: 385-388, Aug. 8, 1966.

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Rheumatic heart disease can be eradicated by adequate control of its precursor, streptococcal infection, by pharyngeal culturing. One method of adequate culturing is the mass mail-in system used in Colorado. Cultures are taken in the physician's office and mailed to central laboratories, where they are processed. Reports of positive cultures are telephoned to the physician, who

then institutes adequate therapy and does family contact cultures when indicated. This system requires no equipment or space in the physician's office, and it is readily adaptable to a visiting nurse service, screening programs, and clinics. It is low cost and offers the advantages of monitoring community prevalence of streptococcal disease. This sys-

tem has been widely accepted in Colorado by physicians and the public. Data indicate that rheumatic fever has been reduced in areas where culturing is extensive. An essential factor in the rapid growth and acceptance of Colorado's culture program has been the vigorous promotion by the Colorado Heart Association directed toward both physicians and the lay public.