

## Evaluation of the Approach of Primary Care Physicians to the Management of Streptococcal Pharyngotonsillitis

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### Abstract

**Background:** Streptococcal pharyngotonsillitis remains a common illness in children and can lead to serious complications if left untreated.

**Objective:** To evaluate the diagnostic and management approach of a sample of primary care physicians in the largest sick fund in Israel to streptococcal pharyngotonsillitis in children.

**Methods:** A questionnaire was mailed to all physicians who treat children and are employed by the General Health Services (Kupat Holim Klalit) in the Jerusalem District. The questionnaire included data on demographics, practice type and size, and availability of throat culture and rapid strep test; as well as a description of three hypothetical cases followed by questions relating to their diagnosis and treatment.

**Results:** Of the 188 eligible physicians, 118 (62.5%) responded, including 65 of 89 pediatricians (73%) and 53 of 99 family and general practitioners (53.5%). Fifty-six physicians (47.4%) had more than 18 years experience, and 82 (70%) completed specialization in Israel. Mean practice size was 950 patients. Fifty-three physicians (43%) worked in Kupat Holim community clinics, 25 (21%) worked independently in private clinics, and 40 (34%) did both. A total of 91 (77%) had access to laboratory facilities for daily throat culture. The time it took for the results to arrive was 48 to 72 hours. For the three clinical scenarios, 90% of the physicians accurately evaluated case A, a 1-year-old with viral pharyngotonsillitis, and 100 (85%) correctly diagnosed case C, a 7-year-old with streptococcal infection. As expected, opinions were divided on case B, a 3-year-old child with uncertain diagnosis. Accordingly, 75 (65.3%) physicians did not recommend treatment for case A, compared to 109 (92.5%) for case C. For case B, 22 (19%) said they would always treat, 43 (36%) would sometimes treat, and 35 (30%) would await the result of the throat culture. For 104 (88%) physicians the antibiotic of choice for case C was penicillin, while only 9 (7.5%) chose amoxicillin. However, the recommended dosage regimens varied from 250 to 500 mg per dose, and from two to four doses daily. For

case C, 110 physicians (93%) chose a 10 day duration of treatment.

**Conclusions:** The primary care physicians in the sample (pediatricians, general practitioners and family physicians) accurately diagnosed viral and streptococcal pharyngotonsillitis. However, there was a lack of uniformity regarding its management in general, and the dosage regimen for penicillin in particular.

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Pharyngotonsillitis is an extremely common illness in children [1]. Although viruses are the more prevalent etiological agents [2], up to 30% of cases are caused by group A  $\beta$ -hemolytic *Streptococcus*, which is very sensitive to antibiotic therapy [3].

Medical history and physical findings alone are insufficient to reach a diagnosis of streptococcal pharyngotonsillitis, and confirmation by throat culture is necessary [3]. The rapid strep test is increasingly being used for diagnosis in the office setting [4] but it is less accurate than throat culture, the accepted gold standard [5].

Although several studies have shown that throat culture tests lead to more judicious use of antibiotic treatment [6], some physicians prescribe antibiotics as soon as SPT is suspected [6,7], and some choose not to use it in order to prevent resistance [8] or to cut costs [9]. If left untreated, STP can lead to rheumatic fever, which has recently "reemerged" in the United States [10]. In addition, treatment leads to a more rapid resolution of the illness and prevents the spread of infection and suppurative complications.

For the last 40 years penicillin has been the universally accepted treatment for STP, and it remains the drug of choice despite problems of drug resistance and poor compliance [11]. The dosage, frequency of administration and length of treatment have also raised considerable debate [12]. In 1988, the American Academy for the Prevention of Rheumatic Diseases recommended a uniform dosage of 250 mg, three times daily for 10 days, for both adults and children [13]. A decade later, the American Academy of

SPT = streptococcal pharyngotonsillitis

Pediatrics [14] recommended a dosage of 250 mg two to three times a day for children and 500 mg two to three times a day for adolescents and adults. Effective alternatives to penicillin, such as erythromycin [15], cephalosporins [16], third-generation cephalosporins [17], and macrolides [18], with varying dosages and dose schedules have also been evaluated [15].

The aim of the present study was to investigate the approach of the primary care physician in Israel to the diagnosis and treatment of pediatric SPT, and to compare it to existing guidelines.

## Materials and Methods

In May 1997, we mailed a questionnaire to all primary care physicians working for the General Health Services in the Jerusalem district (this sick fund, Kupat Holim Klalit, is the largest in Israel), which comprises 48 urban community clinics and approximately 70 smaller outlying clinics. The questionnaire was based on previously validated instruments [19,20] and divided into two sections. The first covered background information: demographic data (country of professional qualification, years of practice in Israel, country of specialization, and years of experience); type of practice (community clinic, independent clinic, or both); practice size (number of patients aged up to 18 years); and availability and use of diagnostic aids (throat culture, RST). Throat cultures are universally available in Kupat Holim clinics and are sent to the Kupat Holim Central Laboratory in Jerusalem by messenger service. Results are received by electronic mail, or by fax if specially requested. Physicians were asked about the frequency of dispatches, and the estimated time for receipt of results. In the second section of the questionnaire, the respondents were presented with three hypothetical clinical cases (details presented in Table 1) and were asked to answer six identical questions relating to the diagnosis and management of each (total 18 questions), as follows:

- What are the chances of the diagnosis being SPT? (10%, 30%, 50%, >70%).
- Would you take a throat culture in this case and send it to the central laboratory? (yes, no, sometimes, would send if available, would not send even if available).
- Would you perform a RST? (yes, no, sometimes,

would send if available, would not send even if available)

- Would you initiate antibiotic treatment? (yes, no, sometimes, await result of throat culture/RST).
- If yes, which antibiotic would you prescribe (provided there was no drug sensitivity)? What dose and dosage schedule? (penicillin, amoxicillin, erythromycin, cephalexin, with a choice of at least two dosage regimens for each, taking into account the patient's age and weight, and an open option).
- What duration of treatment would you choose? (5,7,10, 14 days or other: specify).

The estimated time for completion of the questionnaire was 7 minutes.

## Statistical analysis

For statistical analysis, the physicians were divided into two groups by specialty — pediatricians and non-pediatricians (general practitioners and family physicians) — and by years of experience (qualified before or after 1980). The data were analyzed with the SPSSx2 statistical package. The distribution of discrete variables (gender, country of qualification, family physician or pediatrician, etc.) was analyzed by chi-square test, and the continuous variables (years of experience) were compared by two-tailed Student's *t*-test. A level of 5% was considered significant.

## Results

### Demographic data

Of the 188 physicians who received the questionnaire, 118 (62.8%) responded, including 65 of 89 pediatricians (73%) and 53 of 99 family and general physicians (53.5%). Table 2 summarizes the subgroups of physicians by specialty and gender.

Twenty-six (40%) of the pediatricians and 26 of 50 (52%) family physicians graduated in Israel. The significant difference between the two groups was the country of graduation, with 24 of 65 (37%) pediatricians having studied in Eastern Europe whereas only 5 of 50 (10%) family physicians had studied in Eastern Europe ( $P < 0.05$ , chi-square test).

Of the physicians who responded, 56 (47.4%) were qualified for more than 18 years. As a group, the pediatricians had more years of experience ( $P < 0.001$ , Student *t*-

Table 1. Clinical scenarios

	Case A	Case B	Case C
Age	1 yr	3 yr	7 yr
Weight	≈ 10 kg	≈ 15 kg	≈ 30 kg
Symptoms	Runny nose, cough, loss of appetite, fever 38°C	Sore throat, cough, loss of appetite, fever 38.5°C	Sore throat, vomiting, abdominal pain, fever 39°C
Signs	Red throat, no exudate, coarse rales	Red throat, no exudate, clear lungs	Red throat, exudate, enlarged cervical glands

Table 2. Physician's specialty by type and gender

Type	Male	Female	Total	%
<b>Pediatricians</b>				
Board-certified	31	15	46	39
Non-board-certified	4	15	19	16
<b>Family physicians</b>				
Board-certified	30	10	40	34
Residents	5	5	10	8.5
Other	1	2	3	2.5
<b>Total</b>	71	47	118	100

RST = rapid strep test

test). Mean practice size was 950 patients (median 750), with a wide variance. The pediatricians' practices were larger (1,090±887) than those of the family physicians (827±729), but the difference was not statistically significant.

Fifty-three physicians (43%) worked on a salaried basis at Kupat Holim clinics, 25 (21%) had independent practices in private clinics, and 40 (34%) did both. The difference in type of practice between the pediatricians and family physicians was significant ( $P<0.05$ , chi-square test), with the majority of family physicians (56%) working as salaried physicians, versus an almost equal distribution of the three types (32%, 29%, 37%, respectively) among the pediatricians.

Throat cultures were sent daily by 91 physicians (77%), and several times a week by 25 (21%). The time until the throat culture result arrived was 48 (53.5%) to 72 hours (40%); five physicians replied that the result took a week. RST was available to only 26 physicians (22%). There was no significant difference between pediatricians and family physicians regarding the availability of the tests or time for receiving results.

### Clinical scenarios (by hypothetical cases)

For case A, a 1-year-old with presumed viral upper respiratory infection, 106 physicians (90%) indicated a less than 10% chance of SPT. For case C, a 7-year-old with SPT, 100 physicians (85%) attributed a more than 70% probability of SPT, and 14 (12%) attributed 50%. For case B, a 3-year-old with uncertain diagnosis, opinions were divided, with 86 (72%) indicating a 30% or 50% chance of STP, and 21 (18%) rating it lower than 10%. Statistical analysis showed no significant difference in the replies by specialty or years of experience.

For each clinical case, the physicians were asked whether or not they would perform a throat culture or RST. Although they were given five options, for purposes of clarity we analyzed the answers "yes" and "sometimes" together. Recommendations for a throat culture were highest for case B (93%), followed by case A (40%) and case C (80%). There was less use of RST in each case (22%) because of its low availability.

The replies regarding antibiotic treatment are summarized in Table 3. It is noteworthy that for case A, the majority of physicians stated they would not offer treatment; whereas for case C almost all the physicians indicated immediate treatment. Table 4 shows the physicians' antibiotic preferences by case. Penicillin and amoxicillin were the preferred choices, whereas cephalixin or erythromycin were chosen by a few physicians only.

Of those who preferred 500 mg tabs, 23 (22%) recommended three doses per day, 1 (0.8%) recommended four doses per day, and 20 (19%) two per day. Of those who selected 250 mg tabs or syrup, 37 (36%) picked a three-times daily schedule and 23 (22%) a four-times daily schedule. For the three cases together, there were 39 (19%) decisions for twice daily treatment, 134 (65%) for

Table 3. Recommended treatment with antibiotics (n=118)

	Case A No. (%)	Case B No. (%)	Case C No. (%)
Yes always	3 (2.5)	22 (19)	109 (92.5)
No	75 (63.5)	7 (6)	1
Sometimes	25 (21)	43 (36)	0
Await throat culture	13 (11)	35 (30)	1
Result	1	10 (8.5)	3 (2.5)
According to RST			
Missing	1	1	4

Table 4. Type of treatment

	Case A No. (%)	Case B No. (%)	Case C No. (%)
None	58 (49)	0	0
Penicillin	25 (21)	77 (65)	104 (88)
Amoxicillin	24 (20)	25 (21)	
Other*	11 (10)	8 (7)	12** (10)
Missing	0	0	2 (1.5)

\* Including erythromycin and cephalixin

\*\* Including erythromycin, cephalixin and amoxicillin

three-times daily treatment, and 33 (16%) for four-times daily treatment, out of a total of 205 treatment decisions.

Regarding the duration of treatment, 110 (93%) stipulated 10 days for case C, and only 3 (2% opted for less than 10 days. For cases A and B the results were less clear: 40 (34%) and 93 (79%) chose 10 days, respectively.

There were very few significant differences between pediatricians and family physicians in their answers on the clinical scenarios, as well as their years of experience or country of qualification. In case B, non-board-certified pediatricians were less likely than the others to take a throat culture, but this did not reach statistical significance ( $P=0.06$ ). Likewise, regarding the question of whether or not to prescribe medication, 5 of the 19 (26%) non-board-certified pediatricians answered that they would not, compared to none of the board-certified pediatricians and only 2 of the family physicians (4%). There was no difference in duration of treatment except for case B, where only 47% of the non-board-certified pediatricians preferred 10 days compared to 84% of the pediatricians and 87% of the family physicians ( $P<0.01$ , chi-square test).

### Discussion

Western countries are facing a reemergence of streptococcal infections and rheumatic fever [21,22]. Therefore, continuing vigilance and reevaluation of existing practices and guidelines for the management of SPT are imperative.

The primary care physicians in our study were on the whole very experienced, with 47.4% having more than 18 years experience, and more than 36% having more than 1,000 children under their care. We found a very high competence in the clinical diagnosis of SPT on the one hand, and viral upper respiratory infection on the other. In the case representing uncertain diagnosis, the physi-

cians showed a greater inclination to use diagnostic aids, both throat culture (>93%) and RST (58%), than in the other two cases. On this issue, we found no significant difference between pediatricians and family physicians or between physicians with less or more experience. We also found it encouraging that very few physicians would prescribe antibiotics for case A (viral upper respiratory tract infection), but 98.5% would do so for case C (SPT). There was an 88% agreement rate on the choice of antibiotic (penicillin) for case C, which was in accordance with the most recent recommendations of the "Red Book" [14] and other studies [11]. For each of the other two cases, 20% of the physicians chose amoxicillin. Although penicillin is preferred for group A streptococcal pharyngitis, up to 40% of physicians prescribe amoxicillin [23] owing to its better taste [23], high effectiveness for otitis media — frequently associated with STP in young patients — and equal cost [24].

The guidelines for the prevention of rheumatic fever include 10 days of treatment [13]. In our study only 2% of the physicians indicated that they would prescribe a shorter treatment time for case C, but for case B (uncertain diagnosis) and A (viral), 10% and 30% would consider treatment for a week or less. This was apparently due to the uncertainty of the diagnosis, despite the identical treatment rationale.

The only issue on which there was a significant lack of agreement was the dosage regimen. Twenty-three percent of the physicians would prescribe antibiotics four times daily. This practice is not recommended, and it is well known that the fewer the doses, the better the patient compliance. Some studies have suggested that a twice-daily regimen may be equally effective [15]; even a once-daily regimen of amoxicillin is under consideration [25]. However, these have not yet been incorporated in the official guidelines of the American Academy [14].

The physicians chose a weight-related dose of penicillin. The American Heart Association [13] has approved a uniform dose regimen of 250 mg penicillin three times daily for adults and children. However, the Red Book [14] recommends 250 mg three times daily for children and 500 mg three times daily for adults. These recommendations are evidently not adhered to by the physicians in our study.

We do not know whether the attitudes to diagnosis and management of SPT found in our study reflect those of primary care physicians working for other sick funds. We suggest that a comprehensive nationwide study be conducted to address this question. Even if there is no basis for the suspicion that physicians have a different approach in real practice, the fact that we studied only the theoretical approach of physicians to the management of hypothetical cases can be seen as another limitation of the study.

We believe that the present study is important, not only because physicians in the study demonstrated that they are able to distinguish between suspected viral and bacte-

rial pharyngitis, but because it highlights the lack of uniformity among primary care physicians with respect to dosage regimens for penicillin in SPT and duration of treatment in uncertain cases. In this context, it is commendable that a comprehensive update on the diagnosis and management of SPT was published by Kupat Holim Klalit in October 1998 [26]. We believe that a simplification of dosage regimens, together with clear, locally published guidelines, are essential for optimal practice and prevention of rheumatic fever.

## References

- Hammerschlag MR. Pharyngitis. In: Oski FA, ed. Principles and Practice of Pediatrics. 2nd ed. Philadelphia: Lippincott, 1994:969–70.
- Cherry JD. Pharyngitis (pharyngitis, tonsillitis, tonsillopharyngitis, and nasopharyngitis). In: Feigin FD, Cherry JD, eds. Textbook of Pediatric Infectious Diseases. 3rd ed. Philadelphia: WB Saunders, 1992:159–66.
- Bisno AL, Gerber MA, Gwaltney JM, Kaplan EL, Schwartz RH. Group A streptococcal pharyngitis: diagnosis and management — a practice guideline. *Clin Infect Dis* 1997;25:574–83.
- Bryars CH, deGruy FV, Dickinson LC, Waller AM. The effects of the rapid strep test on physician management of streptococcal pharyngitis. *J Am Board Fam Pract* 1991;4:139–43.
- Dajani A, Taubert K, Ferrieri P, et al. Treatment of streptococcal pharyngitis and prevention of rheumatic fever: a statement for health professionals. *Pediatrics* 1995;96:758–64.
- Little PS, Williamson I. Are antibiotics appropriate for sore throats? Costs outweigh the benefits. *Br Med J* 1994;309:1010–1.
- Shvartzman P. Are antibiotics appropriate for sore throats? Careful prescribing is beneficial. *Br Med J* 1994;309:1011–2.
- Baquero F, Loza E. Antibiotic resistance of microorganisms involved in ear, nose and throat infections. *Pediatr Infect Dis J* 1994;13:S9–14.
- Mainou AG III, Zoorob RJ, Kohrs FP, Hagen MD. Streptococcal diagnostic testing and antibiotics prescribed for pediatric tonsillopharyngitis. *Pediatr Infect Dis J* 1996;15:806–10.
- Zangwill KM, Wald ER, Londino AV. Acute rheumatic fever in western Pennsylvania: a persistent problem in the 1990s: clinical and laboratory observations. *J Pediatr* 1991;561–3.
- Shulman ST, Gerber MA, Tanz RR, Markowitz M. Streptococcal pharyngitis: the case for penicillin therapy. *Pediatr Infect Dis J* 1994;13:1–7.
- Gerber MA, Randolph MF, DeMeo K, et al. Failure of once-daily penicillin in the treatment of streptococcal pharyngitis. *Am J Dis Child* 1989;134:153–5.
- Committee on Rheumatic Fever. A statement for health professionals by the Committee on Rheumatic Fever, Endocarditis, and Kawasaki Disease of the Council on Cardiovascular Disease in the Young, the American Heart Association. *Circulation* 1988;78:1082–6.
- American Academy of Pediatrics. Group A streptococcal infections. In: Peter G, ed. 1997 Red Book. Report of the Committee on Infectious Disease. 24th ed. Elk Grove Village, IL: American Academy of Pediatrics, 1997:483–94.
- Bass JW. Antibiotic management of group A streptococcal pharyngotonsillitis. *Pediatr Infect Dis J* 1991;10:S43–9.
- Pichichero ME. Cephalosporins are superior to penicillin for treatment of streptococcal tonsillopharyngitis: is the difference worth it? *Pediatr Infect Dis J* 1993;12:268–74.
- Aujard Y, Boucot I, Brahimi N, Chiche D, Bingen E. Comparative efficacy and safety of four-day cefuroxime axetil and ten-day penicillin treatment of group A beta-hemolytic streptococcal pharyngitis in children. *Pediatr Infect Dis J* 1995;14:295–300.
- Schaad UB, Heynen G and the Swiss Tonsillopharyngitis Study Group. Evaluation of the efficacy, safety and toleration of azithromycin vs. penicillin V in the treatment of acute streptococcal pharyngitis in children: results of a multicenter, open comparative study. *Pediatr Infect Dis J* 1996;15:791–5.
- Hofer C, Binns HJ, Tanz RR. Strategies for managing group A streptococcal pharyngitis. A survey of Board-certified pediatricians. *Arch Pediatr Adolesc Med* 1997;151:824–9.

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20. Cochi S, Fraser DW, Hightower AW, et al. Diagnosis and treatment of streptococcal pharyngitis: survey of US medical practitioners. In: Schulman ST, ed. Pharyngitis: Management in an Era of Declining Rheumatic Fever. New York, NY: Praeger Publishers; 1984:73–94.
21. Lloyd YT, Veasy G, Minich LL, et al. Is rheumatic fever still a problem in the United States? Experience with 411 consecutive cases. *Pediatrics* 1998;102(Suppl 2):685.
22. Klein JO. Reemergence of virulent group A streptococcal infections. *Pediatr Infect Dis J* 1991;10:S3–S6.
23. Nelson JC, McCracken GH. The Pediatric Infectious Disease Journal Newsletter. *Pediatr Infect Dis J* 1999;18 (No.2).
24. Combs JT. Amoxicillin therapy for strep throat [Letter]. *Pediatr Infect Dis J* 1992;11:32.
25. Feder HM, Gerber MA, Randolph MF, et al. One-daily therapy for streptococcal pharyngitis with amoxicillin. *Pediatrics* 1999;103:47–51.
26. Ashkenazi S. Streptococcal pharyngotonsillitis — diagnosis and treatment. *Refuon Klalit* 1998;5 (Hebrew).
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