

THE SYMPTOMATOLOGY AND COMPLICATIONS OF TONSILLITIS

(The North Midlands (Sheffield) Faculty)

This is a report of some results of the first attempt at research which was carried out by the North Midland (Sheffield) Faculty of the College of General Practitioners. In this work 1,458 cases of tonsillitis were seen by 94 general practitioners between 1 January and 31 December 1957.

For the purpose of definition tonsillitis was defined as "a short-term illness in which the main clinical feature is an inflamed appearance of the tonsils".

The aims of the investigation which are now reported were:

To study the symptom patterns

To study the relationship between the symptom patterns and the complications

The Record Card

A record card was designed to fit into the National Health medical record envelopes (E.C. 5 and 6). Figure 1 represents the front of the card, and figure 2 the back.

The date of onset was the date on which the patient first felt unwell, and not the date of the first doctor-patient contact.

The date of recovery was variously defined as follows: in the case of a child it was that date on which the child was well enough to be allowed out of doors; in the case of a housewife the date on which she considered herself recovered; and in the case of a working man it was that date on which he returned to work.

Doctors were asked to take a careful history, paying particular attention to the order in which the symptoms occurred, and to see each case again a month after the onset.

The physical signs at the first examination were also recorded. At the end of the month a note was made of any complications; if the case was not followed up, this too was recorded.

The record cards were collected and individually checked by the recorder. An attempt to elucidate any doubtful point was

TONSILLITIS

Dr.....

Patient's Name.....

Address.....

Sex.....

Date of birth

--	--	--

Date of Onset

Date of recovery

PRESENTING SYMPTOMS

ORDER OF OCCURRENCE		YES	NO
	Sore Throat		
	Vomiting		
	Abdom. Pain		
	Diarrhoea		
	Headache		
	Earache		
	Sneezing		
	Coughing		
	Photophobia		
	Musc. Aches		

SIGNS

	YES	NO
Raised Temp.		
Tonsils Enlarged		
" Reddened		
" Exudate		
Post Nasal Discharge		
Enl. Tons. Glands		
Strawberry Tongue		
Rash		

Figure 1.
The front of record card

COMPLICATIONS

NONE.....

Otitis Media	Rheumatic Fever
Quinsy	Nephritis
Lower Resp. Inf.	Other
Persist Tons. Adenitis	Not Seen

TREATMENT

Local.....

General.....

Total Dosage

Oral.....

Parenteral.....

Duration.....

Remarks:

Figure 2.
The obverse of record card

made by writing to the doctor. A sample of this part of the work showed that out of 222 cards, 12 per cent (27), lacked information of one kind or another.

Analysis

The analysis was conducted by numbering each item on the record card and transferring this information to punch cards which were subsequently put through a Powers-Samas machine. We are indebted to Dr John Pemberton of the Medical Research Council, Group for Epidemiological Research on Respiratory Diseases (Air Pollution) of the University of Sheffield, for the use of this apparatus, and to his statistician, Mr David Kerridge, who prepared the tables and commented on the results, and to Mrs Audrey Barrett who transferred the information from the record cards to the punch cards.

Results

Eleven symptoms were studied. In the analysis they were lettered thus:

- | | |
|-------------------|--|
| A. Sore throat | G. Sneezing |
| B. Vomiting | H. Coughing |
| C. Abdominal pain | I. Photophobia |
| D. Diarrhoea | J. Muscular aches |
| E. Headache | K. No symptom given—(or given without order of occurrence) |
| F. Earache | |

The first or presenting symptom is shown in table I. Only those

TABLE I
THE FIRST OR PRESENTING SYMPTOMS.

	Percentage	Number of cases
A. Sore throat	50.1	731
E. Headache	20.6	301
J. Muscular aches	6.6	96
B. Vomiting	5.2	75
H. Coughing	4.3	63
C. Abdominal pain	4.3	62
G. Sneezing	3.8	56
K. No order given	3.4	50
F. Earache	0.9	13
D. Diarrhoea	0.5	7
I. Photophobia	0.3	4
	100.0	1458

symptom triads in which sore throat was one of the first symptoms to present were used, as the numbers otherwise became too small.

Next the symptoms were taken in threes, or triads, and the observed number of each triad was paired with the number which would have been obtained if the symptoms had occurred the same total number of times, but the triads had been assembled by picking three different symptoms at random. Thus the observed rate of association of symptoms was compared with the expected rate. The results are shown in table II.

TABLE II
THE OBSERVED RATE OF ASSOCIATION OF SYMPTOM COMPARED WITH THE EXPECTED RATE.

<i>Triad</i>	<i>Observed</i>	<i>Expected</i>	<i>Triad</i>	<i>Observed</i>	<i>Expected</i>
ABC	23	8.8	ADK	7	3.9
ABD	5	2.4	AEF	67	61.0
ABE	108	88.3	AEG	46	47.2
ABF	5	11.2	AEH	67	80.2
ABG	2	8.7	AEI	11	9.9
ABH	12	14.8	AEJ	307	202.9
ABI	0	1.8	AEK	175	142.8
ABJ	18	37.8	AFG	6	6.0
ABK	15	26.5	AFH	17	10.2
ACD	3	1.3	AFI	0	1.2
ACE	46	47.7	AFJ	14	26.0
ACF	5	6.0	AFK	16	18.2
ACG	3	4.7	AGH	29	7.9
ACH	3	8.0	AGI	1	1.0
ACI	0	1.0	AGJ	4	20.2
ACJ	10	20.4	AGK	8	14.1
ACK	11	14.3	AHI	1	1.6
ADE	10	13.2	AHJ	13	34.3
ADF	1	1.6	AHK	30	24.0
ADG	1	1.3	AIJ	5	4.2
ADH	0	2.2	AJK	5	2.9
ADI	0	0.3	AJK	41	61.4
ADJ	2	5.6	AKK	110	*

* The expected value would not be very meaningful here.

In general, a variation of plus or minus the square root of the expected rate is of the order which is as likely to be exceeded as not; but whenever the observed value exceeds the expected value by a margin of more than twice the square root of the expected value, then a real and not a random association is proved.

Notably strong were the associations AEJ, AGH, ABC, that is:

Sore throat, headache and muscular aches

Sore throat, sneezing and coughing

Sore throat, vomiting and abdominal pain

TABLE V

RELATION OF SYMPTOM TRIADS TO COMPLICATIONS.

The complications are shown thus:—

- | | |
|-----------------------------------|---------------------------------|
| 0 — No complications | 5 — Other |
| 1 — Not seen | 6 — Otitis media |
| 2 — Persistent tonsillar adenitis | 7 — Lower respiratory infection |
| 3 — Recurrence | 8 — Nephritis |
| 4 — Quinsy | 9 — Rheumatic fever |

	0	1	2	3	4	5	6	7	8	9	Total
ABC	13	2	4	—	—	1	—	1	1	—	22
ABD	4	—	—	1	—	—	—	—	—	—	5
ABE	66	22	12	2	4	4	2	—	—	—	112
ABF	2	—	—	—	—	—	2	2	—	—	6
ABG	2	—	4	—	—	—	4	—	—	—	10
ABH	5	2	1	—	1	1	1	1	—	—	12
ABI	—	—	—	—	—	—	—	—	—	—	—
ABJ	11	3	2	1	—	1	—	—	—	—	18
ABK	7	6	2	1	—	—	—	—	—	—	16
ACD	—	1	1	—	—	1	—	—	—	—	3
ACE	26	12	6	2	—	1	1	—	—	—	48
ACF	2	1	1	1	—	1	—	—	—	—	6
ACG	1	—	1	1	—	—	1	—	—	—	4
ACH	2	1	—	—	—	—	—	—	—	—	3
ACI	—	—	—	—	—	—	—	—	—	—	—
ACJ	9	—	—	—	1	—	—	—	—	—	10
ACK	6	1	2	1	—	1	—	—	—	—	11
ADE	8	2	—	—	—	—	—	—	—	—	10
ADF	—	—	1	—	—	—	—	—	—	—	1
ADG	—	1	—	—	—	—	—	—	—	—	1
ADH	—	—	—	—	—	—	—	—	—	—	—
ADI	—	—	—	—	—	—	—	—	—	—	—
ADJ	2	—	—	—	—	—	—	—	—	—	2
ADK	3	3	1	—	—	—	—	—	—	—	7
AEF	44	6	9	1	5	1	2	—	—	—	68
AEG	32	8	3	2	—	1	1	1	—	—	48
AEH	46	13	3	2	1	—	1	1	—	—	67
AEI	8	1	2	—	—	—	—	—	—	—	11
AEJ	201	56	23	7	8	15	2	2	2	1	317
AEK	123	31	6	11	5	1	1	1	—	—	179
AFG	4	1	—	1	—	—	—	—	—	—	6
AFH	11	—	3	1	1	—	2	—	—	—	18
AFI	—	—	—	—	—	—	—	—	—	—	—
AFJ	11	1	1	—	1	—	—	—	—	—	14
AFK	11	2	—	—	1	—	2	—	—	—	16
AGH	18	6	3	2	—	1	1	—	—	—	31
AGI	1	—	—	—	—	—	—	—	—	—	1
AGJ	3	—	—	1	—	—	—	—	—	—	4
AGK	5	2	—	—	1	—	—	—	—	—	8
AIJ	4	—	—	—	—	—	—	—	—	—	4
AIK	4	1	—	—	—	—	—	—	—	—	5
AJK	34	2	2	2	—	—	—	1	—	—	41
AKK	74	18	8	7	5	—	2	—	—	—	114
	803	205	101	47	34	30	25	10	3	1	1259

The Relationship between Symptom Patterns and Complications

Some patients could not state the full order of occurrence of their symptoms. When a symptom was recorded without its order of occurrence, it was designated by the letter "K". So it came about that there were only 1,259 cards which contained triads composed of letters other than "K". It was these cards which were used to study the relationship between the symptom triads and the complications. Failure to achieve a record of the monthly follow up occurred in 14 per cent of this diminished number of cases, but despite this, the number of uncomplicated cases was closely similar (76.2 per cent) to the overall number for the entire series (77 per cent).

The complications studied were otitis media, quinsy, lower respiratory infection, persistent tonsillar adenitis, rheumatic fever, nephritis, and recurrence of tonsillitis within the follow up period. Any remaining complications were listed under the general heading of "other".

The full figures are shown in table V and it appears that no striking relationship appears between symptom patterns at the onset and the incidence of complications, except that there is a suggestion that otitis media and quinsy are slightly more common when earache is one of the first three presenting symptoms, and less likely when headache and muscular aches are present with a sore throat.

Complications

Complications occurred in 23 per cent of cases (338). No complications were recorded in 77 per cent of cases (1,120).

The overall figures are shown in table IV.

Rheumatic fever occurred in one case and nephritis in three cases.

Discussion

Such detailed attention to symptoms may be criticized on two counts. The first is that the list of symptoms is incomplete without mention of "fever" which is often a presenting feature and is very often the reason why the general practitioner is called to see a child. This illustrates one of the difficulties of research, that is the difficulty in making definitions. In this case fever was defined as a sign and not as a symptom which is, after all, a logical enough procedure when you come to think of it. The second objection which may be raised is that too much attention has been devoted merely to the study of symptoms. This would appear to be justified, however,

TABLE IV
INCIDENCE OF COMPLICATIONS.

<i>Complications</i>	<i>Percentage</i>	<i>Number of cases</i>
Persistent tonsillar adenitis	9	136
Recurrence	5	79
Other (including rheumatic fever and nephritis)	3	45
Quinsy	3	37
Otitis media	2	31
Lower respiratory infection	1	10
	23	338
Number uncomplicated	77	1120
Totals	100	1458

in view of the significant statistical results which have been found.

It will be seen from the design of the record card that some other objectives were envisaged. Some of these have been lost in the analysis and others emerged as it continued. During the year several lessons were learnt in the handling of a recorder group. These are the subject of another paper. Here, some further findings are discussed.

In order to see if the symptom triads were related to the signs, cross sorts were carried out. All the observed values were quite near the expected values and no association of signs with symptom groups was proved.

There was a clear association between the presenting symptom and age. Table VI shows these figures as percentages. The blanks indicate that the number of cases occurring was too small to use percentages.

No estimate of the population at risk was made and therefore the study of the age structure was not very useful. However, the analysis of a single year did show a sharp rise in the incidence of tonsillitis at the age four to five, and a smaller rise appeared at the age of nine.

In view of the age symptom differences it was felt that the issue might become confused unless the cards were sorted into a more homogeneous group for further work. This was done.

It may be criticized that the criteria for recovery were so wide

TABLE VI
THE RELATIONSHIP BETWEEN THE PRESENTING SYMPTOM AND AGE.

<i>First symptom</i>	<i>Percentage cases by age group</i>				
	<i>Year of birth</i>				
	1910-20	1921-30	1931-40	1941-50	1951-57
Sore throat ..	6	15	24	29	21
Vomiting ..	—	3	4	29	64
Abdominal pain	2	2	3	32	55
Diarrhoea ..	—	—	—	—	—
Headache ..	6	11	17	35	28
Earache ..	—	—	—	—	—
Sneezing ..	7	14	18	25	34
Coughing ..	3	11	13	25	43
Photophobia	—	—	—	—	—
Muscular aches	13	22	28	15	17

that it was difficult to evaluate the treatment. It was never the intention to do more than assess the current fashions of treatment, but having arrived at a set of figures the temptation to explore them was great. In fact the treatment duration analysis showed that treatment did not affect the duration. The longer duration with penicillin combined with sulphonamides could be due to the fact that the doctor initially selected these cases on account of their severity. It could also be due to the fact that the infection had not been completely beaten, and this is supported by the higher incidence of persistent tonsillar adenitis and recurrences in one of these groups. The full figures for treatment and complications by age and sex are shown in table VII. The most unusual results in that group were treated with penicillin and sulphonamides. Here it was found that in males under ten who received this treatment there were 17 per cent of recurrences, and in males over ten there was an identical incidence (17 per cent) of persistent tonsillar adenitis; yet no comparable changes were found in the female group.

There was no great variation with the age and sex proportions month by month. There was no strong relationship between the month of occurrence and the likelihood of complications, except perhaps that otitis media was more common in the winter. When

tonsillitis occurred between December and March—otitis media followed in 3 per cent of cases. When tonsillitis occurred between April and July—otitis media only occurred in 1 per cent of cases. When tonsillitis occurred in August to November—otitis media occurred in 2 per cent of cases. One should be cautious in interpreting this as the the same did not follow for quinsy.

Summary

A statistical analysis of 1,458 cases of tonsillitis of all ages seen over a period of a year by 94 general practitioners, showed that sore throat occurred as a presenting symptom in only half the cases.

There appeared to be clear evidence that three main symptom groups can be distinguished. These are an abdominal group in which sore throat, vomiting and abdominal pain are the leading symptoms; a respiratory group in which sore throat, sneezing and coughing are the leading symptoms; and a myalgic group in which sore throat, headache and muscular aches are the leading symptoms.

It is significant from the therapeutic aspect that rheumatic fever only occurred once and nephritis three times during the year.

It does not appear possible to predict the likelihood of complications from a study of the symptomatology at the first visit or attendance. The only possible exception is that otitis media and quinsy are both rather more likely to occur when earache is one of the first three presenting symptoms. Furthermore, otitis media is possibly more likely to occur during the winter months.

Doctors taking part in the investigation were:

J. F. Baker	J. L. Leadley	W. G. Niblock
B. Burns	P. C. Collinson	M. R. Potter
R. C. Burton	J. J. Magill	M. L. Walt
L. A. De Dombal	H. L. Beckitt	E. D. M. Wright
W. E. Dornan	G. H. Briggs	F. W. Lapage
H. W. Eldridge	R. L. Brown	F. F. Temple
J. Falk	K. J. Burnett	W. J. H. Lord
P. S. D. Gowers	E. D. Forster	J. S. Rivers
T. N. Grundy	W. Glasgow	S. L. Henderson-Smith
J. K. Maher	E. H. B. Gray	T. Ward
C. M. Marcus	C. J. Griffiths	A. T. Watson
E. Millar	J. F. Hanratty	Howard Wilson
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D. Valerio	B. F. B. Russell	C. K. Crawford
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W. F. Barkley	K. O. Warner	J. K. A. Burn
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C. J. C. Wilson	D. Horton	Fraser Darling
W. McW. Gray	D. A. MacLeod	
B. B. Jacobs	W. A. MacLure	

The Recorder was W. J. H. Lord.