

Acute Bronchitis: General Practitioners' Views Regarding Diagnosis and Treatment

Th J M VERHEIJ, J HERMANS*, A A KAPTEIN, D WIJKE† AND J D MULDER

Verheij Th J M, Hermans J, Kaptein A A, Wijkel D, Mulder J D. Acute bronchitis: general practitioners' views regarding diagnosis and treatment. *Family Practice* 1990;7:175-180.

A survey was conducted among 800 Dutch general practitioners to establish their views on the diagnosis and treatment of bronchitis and related disorders with reference to 12 theoretical patients. The answers of the 467 respondents (response rate 60%) showed no clear relationship between signs and symptoms of the patients and the diagnosis made. In the authors' opinion the diagnosis of pneumonia was made too often. The decision whether or not to prescribe an antibiotic for a coughing patient was based in part on the diagnosis made, but in part it was also made on the basis of the signs and symptoms, irrespective of the diagnosis. The authors have the impression that general practitioners tend to prescribe antibiotics too quickly to coughing patients. There is a need for guidelines for diagnosis and treatment of patients with acute bronchitis and related conditions.

In an average week of the year every general practitioner makes a diagnosis of acute bronchitis at least once.¹⁻³ As we pointed out earlier in this journal, there is still discussion about the definition and treatment of this frequent diagnosis.⁴ The International Classification of Health Problems in Primary Health Care-2 defined (ICHPPC-2 def.) defines acute bronchitis as a syndrome with cough and scattered or generalized abnormal chest signs.⁵ In most trials of antibiotics in acute bronchitis, however, cough with (purulent) sputum is used as a clinical entity.⁶⁻¹¹ This entity is also referred to as middle respiratory infection. The only conclusion to be drawn from the literature is that in all probability antibiotics are not indicated in milder forms of acute bronchitis.^{6,7,9} Whether antibiotics should be withheld from patients with more severe forms of bronchitis is still an unsolved question.

There is, therefore, much controversy in the literature on acute bronchitis, but where does the average general practitioner stand in this discussion? This study aimed to ascertain the views of general practitioners on the diagnosis and treatment of patients with bronchitis-like conditions in daily practice. The results of this study will be used in establishing guidelines for the management of acute bronchitis that are acceptable and familiar to the general practitioner.

Department of General Practice, and *Department of Medical Statistics, University of Leiden, and †Netherlands Institute for Primary Health Care Research, Utrecht, The Netherlands.

Correspondence to: Th J M Verheij, Department of General Practice, P O Box 2088, 2301 CB Leiden, The Netherlands.

METHODS

In order to gain more insight into the general practitioner's management of acute bronchitis and related disorders, we formulated the following research question: 'What are the general practitioner's current views on the importance of the signs: coughing-up yellow/green sputum, fever and presence of a few scattered rhonchi on auscultation, for the diagnosis and treatment of the patient?'

As our measuring device we presented 12 theoretical patients to general practitioners in the form of a questionnaire. To maximize response, we used the guidelines proposed by Erdos,¹² which include a pleasant appearance and good legibility of the questionnaire, with an enclosed letter explaining the purpose and importance of the study, and the sending of a number of reminders.

The questionnaire was sent to 800 general practitioners, chosen at random by NIVEL, the Netherlands Institute for Primary Health Care Research, from the complete list of general practitioners practising in the Netherlands ($n = 6205$ in February 1987). The age, type of practice and practical experience of these 800 GPs were known.

The questionnaire was mailed on 15 May 1987. In the following two months three reminders were sent out and entries were closed after three months. The 12 imaginary patients in the survey were said to not look particularly ill and had no dyspnoea. They all had a negative medical history, none smoked and all had been coughing for three to four days. The 12 patients

were actually assumed to be equal and in the same state of toxicity. They only differed from each other in the presence or absence of fever (39°C), purulent sputum and in having mild scattered rhonchi over both lungs when auscultated or having no auscultatory abnormalities. These three variables were combined in all eight possible ways. The age of all patients was given as 30 years.

Four patients aged 75 years, with four combinations of presence or absence of sputum, fever and rhonchi where also described. During a pilot study these had produced contradictory answers from the general practitioners. The 12 cases thus formulated are presented in Figure 1.

The questions about each of these 12 patients were: what diagnosis would be made and what drug treatment, if any, would be prescribed (Figure 2).

RESULTS

Of the 800 general practitioners, 19 were found to have ceased practising. Of the remaining 781, 518 (66%)

returned a completed questionnaire within three months. Due to an administrative error, 51 of these had gone out unnumbered so that no personal data about these respondents were known. To enable a correct estimate of the representativity of the answers, these 51 anonymous questionnaires were excluded from the analysis of the responses. The group of 467 (60%) respondents with known background data did not differ with respect to sex and type of practice from the group of non-responders, nor from the average Dutch GP. The differences between these three groups in age and duration of practice, although statistically significant, were so small (one or two years) that we have regarded them as irrelevant (Table I).

In patients aged 30 years with systematic variation Table II shows the diagnoses made by the 467 general practitioners for the eight 30-year-old patients.

The best diagnostic concurrence was obtained for the third case (a patient who besides cough had a fever of 38.9°C as the only sign): almost 80% of the respondents diagnosed 'upper respiratory tract infection'. For

FIGURE 1 The 12 hypothetical patients in the questionnaire (NFP=no further particulars)

Sputum	Patient's signs		Patient's descriptions
	Fever	Rhonchi	
-	+	-	1. A man aged 30 years, coughing since 4 days. Cough unproductive. Fever since yesterday. No other complaints. Phys. ex.: morning temperature 38.9°C. NFP.
+	-	+	2. A woman aged 30 years, coughing for 4 days with yellow-green sputum. No other complaints. Phys. ex.: morning temperature 36.8°C. Both lungs some scattered rhonchi. NFP.
+	+	-	3. A man aged 75 years, coughing since 4 days with yellow-green sputum. Fever since yesterday. No other complaints. Phys. ex.: morning temperature 39.1°C. NFP.
-	-	+	4. A man aged 30 years, coughing since 4 days. Cough unproductive. No other complaints. Phys. ex.: morning temperature 36.8°C. Lungs: a few scattered rhonchi bilaterally. NFP.
+	-	+	5. A woman aged 75 years, coughing since 3 days with yellow-green sputum. No further complaints. Phys. ex.: morning temperature 36.8°C. Lungs: a few scattered rhonchi bilaterally. NFP.
-	-	-	6. A woman aged 30 years, coughing since 3 days. Cough unproductive. Phys. ex.: morning temperature 36.7°C. NFP.
-	+	-	7. A man aged 75 years, coughing since 3 days. Cough unproductive. Fever since yesterday. No other complaints. Phys. ex.: morning temperature 39.1°C. NFP.
+	+	-	8. A woman aged 30 years, coughing since 4 days with yellow-green sputum. Fever since yesterday. No other complaints. Phys. ex.: morning temperature 39.1°C. NFP.
+	-	-	9. A man aged 30 years, been coughing up yellow-green sputum for 4 days. No further complaints. Phys. ex.: morning temperature 37.0°C. NFP.
-	-	+	10. A man aged 75 years, coughing since 3 days. Cough unproductive. No further complaints. Phys. ex.: morning temperature 36.8°C. Lungs: a few scattered rhonchi bilaterally. NFP.
-	+	+	11. A man aged 30 years, coughing since 4 days. Cough unproductive. Fever since yesterday. No further complaints. Phys. ex.: morning temperature 39.1°C. Lungs: a few scattered rhonchi bilaterally. NFP.
+	+	+	12. A man aged 30 years, coughing since 3 days with yellow-green sputum. Fever since yesterday. No further complaints. Phys. ex.: morning temperature 39.0°C. Lungs: a few scattered rhonchi bilaterally. NFP.

FIGURE 2 Enquiry questions

What is your probable diagnosis?
Tick the appropriate answer and explain it if you wish.

pneumonia
 upper respiratory tract infection
 bronchitis
 other,

Drug treatment
Tick the appropriate answer and explain it if you wish.
Several simultaneous alternatives are possible

no drug treatment
 antibiotic, viz
 other drugs, viz.....

the patient who, apart from coughing, also produced purulent sputum and had rhonchi, and for the patient who showed all the signs mentioned in the questionnaire, approximately 75% of the general practitioners made the diagnosis of 'bronchitis'. It should be noted, however, that for the first and third case in Table II the entries under 'other diagnoses' were nearly always: 'touch of flu', 'irritable cough', or 'common cold'. If for this reason we add the category 'other diagnoses' to 'upper respiratory tract infections', we could say that for the first case, also, there was almost complete concurrence about the diagnosis. For the other cases, the nature and the severity of the 'other diagnoses' were much more varied.

Table III shows for each case how often an antibiotic was prescribed. In the right-hand part of the table this is subdivided by diagnosis.

Over 80% of the general practitioners agreed that for the first four cases no antibiotic was indicated. For the last case, almost 90% of the GPs would have prescribed an antibiotic. With regard to the relative importance of the three signs, sputum, fever and rhonchi, Table III shows that presence or absence of none of the three signs coincided fully with prescription or non-prescription of an antibiotic. The number of signs was apparently of greater importance than which of the three signs were present.

Subdivision by diagnosis (right-hand half of the

table) makes possible a comparison of prescription behaviours for the diagnoses of upper respiratory tract infection and bronchitis. For the first two cases, the proportions of general practitioners prescribing an antibiotic is small for both diagnoses. For the other six cases, in the diagnosis 'bronchitis' this proportion is always considerable, and significantly larger (χ^2 test, $P < 0.05$) than in the diagnosis 'upper respiratory tract infection'.

A similar comparison between the numbers of general practitioners who diagnosed bronchitis and those who diagnosed pneumonia is valid only for the last two cases; in these, the proportions are about the same. This shows clearly that if a general practitioner diagnosed 'bronchitis', it was more probable that he would also prescribe an antibiotic than if he had diagnosed 'upper respiratory tract infection' in the same patient. From the other side of table III it also appears that prescribing an antibiotic for both diagnoses increases with the number of signs. In the second patient, for instance, of the 197 general practitioners who diagnosed bronchitis, only 19 (9.7%) prescribed an antibiotic, while in the last patient this proportion was 91.5%.

The answers concerning the 75-year-old patients were compared with the answers about the 30-year-old patients with identical signs and symptoms. It was found that the diagnoses of bronchitis and upper res-

TABLE 1 Characteristics of respondents, non-respondents and Dutch general practitioners

	Response (n = 467)	Non-response (n = 314)	Dutch GP (n = 6205)
Males (%)	91	89	90
Age (years) $\bar{x} \pm \text{sd}$	43.6 \pm 9.2	45.4 \pm 10.1	43
95% confidence interval for mean	42.8 - 44.4	44.3 - 46.5	
Established for (years) $\bar{x} \pm \text{sd}$	13 \pm 9.2	15 \pm 10.1	12
95% confidence interval	12.2 - 13.8	13.9 - 16.1	
Solo (%)	53	58	55
95% confidence interval	48 - 57	51 - 63	
With pharmacy (%)	16	18	13
95% confidence interval	13 - 19	14 - 23	

Age of non-responders is significantly higher compared with responders (2-sample *t*-test, $p < 0.01$) and compared with the entire population (1-sample *t*-test, $p < 0.05$). Mean duration of settlement significantly different between response group and non-response group (2-sample *t*-test, $p < 0.01$) and higher in both groups than in the entire population (1-sample *t*-test, $p < 0.05$).

naire within three
ve error, 51 of these
hat no personal data
own. To enable a cor-
ivity of the answers,
naires were excluded
ses. The group of 467
background data did
l type of practice from
nor from the average
een these three groups
, although statistically
or two years) that we
nt (Table I).
th systematic variation
ade by the 467 general
ear-old patients.
ence was obtained for
sides cough had a fever
ost 80% of the respon-
ory tract infection'. For

ys. Cough unproductive
ts. Phys. ex.: morning

lays with yellow-green
morning temperature
hi. NFP.

ays with yellow-green
complaints. Phys. ex.:

lays. Cough unproductive
g temperature 36.8°C.
ly. NFP.

3 days with yellow-green
x.: morning temperature
bilaterally. NFP.

3 days. Cough
erature 36.7°C. NFP.

days. Cough unproductive
ints. Phys. ex.: morning

e 4 days with yellow-green
er complaints. Phys. ex.:

up yellow-green sputum for 4
: morning temperature

3 days. Cough unproductive
ning temperature 36.8°C.
ally. NFP.

4 days. Cough unproductive
aplays. Phys. ex.: morning
attered rhonchi bilaterally. NFP.

3 days with yellow-green
rther complaints. Phys. ex.:
a few scattered rhonchi

TABLE 2 Diagnoses made in the eight patients aged 30 years ($n = 467$ responding general practitioners)

Patients' signs			Diagnoses										Total % GP
			Upper resp. tr.inf.		Bronchitis		Pneumonia		Other		Blank		
Sputum	Fever	Rhonchi	% GP	<i>n</i>	% GP	<i>n</i>	% GP	<i>n</i>	% GP	<i>n</i>	% GP	<i>n</i>	% GP
-	-	-	62.5	292	0.9	4	0.2	1	36.2	170	0.0	0	100
-	-	+	35.8	167	42.2	197	0.2	1	21.0	98	0.9	4	100
-	+	-	79.7	372	1.7	8	2.8	13	15.6	73	0.2	1	100
+	-	-	68.5	320	19.7	92	0.6	3	9.2	43	1.9	9	100
-	+	+	16.3	76	60.0	280	12.8	60	9.0	42	1.9	9	100
+	-	+	22.1	103	73.9	345	0.2	1	3.6	17	0.2	1	100
+	+	-	47.1	220	38.3	179	9.6	45	4.3	20	0.6	3	100
+	+	+	6.9	32	75.8	354	14.6	68	1.7	8	1.1	5	100

piratory tract infection were not made more often in older than in younger patients (McNemar's test, $P > 0.05$).

As Table IV shows, for three of the four combinations of signs the diagnosis of pneumonia was made significantly more often in the cases of the 75-year-old than in the 30-year-old patients with the same combinations of signs. Antibiotics were prescribed significantly more often for the older than for the younger patients (Table V).

No clear relationship was found, between the responding general practitioners' age, experience and type of practice on the one hand and their prescribing behaviour on the other (Student's *t*-test and χ^2 test, $P > 0.05$).

DISCUSSION

In view of the response rate of 60% and the respondents' characteristics, we believe that the answers obtained give a representative picture of the views of the average Dutch general practitioner.

The diagnoses listed in Table II show that general

practitioners probably do not have a uniform view of the differentiation between the clinical diagnosis acute bronchitis and upper respiratory tract infection. Our findings fail to confirm the conclusions of D *et al.*¹³ that GPs distinguish between acute bronchitis and upper respiratory tract infection on the basis of coughing-up of purulent sputum and presence of sputum abnormalities.

The respondents' answers further suggest the distinction between acute bronchitis and pneumonia is equally vague. The results of the questionnaire show that the more signs the patients display the more often the general practitioner diagnoses bronchitis or pneumonia. The number of general practitioners diagnosing pneumonia was noticeably large. In our opinion, this diagnosis was justified in none of the cases on the basis of the available data. Only the presence of signs such as tachypnoea or dyspnoea or crepitations or moist rales on auscultation of pneumonia be an acceptable hypothesis.^{5,14-17} Our findings in this connection are in agreement with the findings of a study by Melbye *et al.* who made roentgen

TABLE 3 Numbers of GPs prescribing antibiotics for patients aged 30 years

Patients' signs			GPs prescribing antibiotics ($n = 467$) per diagnosis per patient									
			GPs prescribing antibiotics ($n = 467$)		Upper resp.inf.			Bronchitis			Pneumonia	
Sputum	Fever	Rhonchi	<i>n</i>	%	†GP	†AB	‡%	†GP	†AB	‡%	†GP	†AB
-	-	-	1	0.2	292	1	0.3	4	0	0	1	0
-	-	+	27	5.8	167	6*	3.6	197	19*	9.7	1	1
-	+	-	31	6.6	372	17*	4.6	8	3*	37.5	13	1
+	-	-	89	19.1	320	46*	14.5	92	39*	42.9	3	1
-	+	+	274	58.7	76	18*	24.7	280	194	70.5	60	51
+	-	+	197	42.2	103	20*	19.6	345	174*	50.6	1	1
+	+	-	316	67.7	220	119*	54.3	179	150*	84.7	45	39
+	+	+	417	89.3	32	25*	78.1	354	321*	91.5	68	65

*per patient the percentage of GPs prescribing an antibiotic is significantly higher for the diagnosis 'upper respiratory tract infection' than for the diagnosis 'bronchitis' (chi-square test, $p < 0.05$).

†GP, number of GPs who made this diagnosis for this patient; †AB, number of GPs who made this diagnosis and prescribed an antibiotic; ‡%, percentage of antibiotic-prescribing GPs per diagnosis.

TABLE 4 Numbers of GPs who diagnosed pneumonia in the 75-year-old patients and not in the 30-year-old patients with the same signs, and vice versa.

Patient's signs	75 year: pneumonia 30 year: no pneumonia		75 year: no pneumonia 30 year: pneumonia		Total
	Sputum	Fever	Rhonchi		
+	-	+	10*	0*	10
+	+	-	105*	11*	116
-	-	+	4	1	5
-	+	-	59*	19*	78

*Numbers differ significantly ($P < 0.05$, McNemar's binomial test)

TABLE 5 Numbers of GPs who when prescribing an antibiotic had a different opinion about the 75-year-old patients than about the 30-year-old patients with the same signs

Patient's signs	75 years: antibiotics 30 years: no antibiotics		75 years: no antibiotics 30 years: antibiotics		Total
	Sputum	Fever	Rhonchi		
+	-	+	114*	22*	136
+	+	-	111*	5*	116
-	-	+	38*	15*	53
-	+	-	110*	22*	132

*Numbers differ significantly ($P < 0.05$, McNemar's binomial test).

and serological examinations in 71 in-patients with a diagnosis of suspected pneumonia made by the general practitioner.¹⁸ Only 15% of these patients were found to actually have pneumonia; it is probably a diagnosis which general practitioners make too often. Melbye does attach importance to the difference between bronchitis and pneumonia because he thinks pneumonia as a rule necessitates antimicrobial treatment while bronchitis does not. However, as stated in the introduction, it is far from settled that antibiotics are not indicated in particular forms of acute bronchitis.

As far as the treatment of the presented patients is concerned, the results of this survey suggest that many general practitioners in practice wish to prescribe an antibiotic even for the milder forms of bronchitis-like conditions. Furthermore, the general practitioners frequently combined the diagnosis of upper respiratory tract infection with the prescription of an antibiotic. Apparently the outcome of research performed in this field, which questions the effect of antibiotics in mild bronchitis and upper respiratory tract infections, does not yet seem to have much effect on the actual prescribing behaviour of the general practitioner. It seems that the prescription of antibiotics in these kind of syndromes is based only in part on the diagnosis and in part directly on the number of symptoms and signs of the patient. This is in accordance with findings obtained by Howie *et al.*^{19,20} The patient's age is also regarded as an important criterion. General practitioners tend to give antibiotics more quickly to elderly patients than to younger patients with the same signs and symptoms.

It is obvious that there is a need for guidelines for diagnosis and treatment of patients with acute bronchitis. We must realize that respiratory infections should be defined in terms of signs and symptoms rather than in pathological terms. Furthermore, more research is necessary on which patients with an acute cough will benefit from antibiotic treatment. In the next phase of our research project, therefore, we will start a randomized controlled trial of antibiotics in patients who cough up purulent sputum.

ACKNOWLEDGEMENTS

We thank Prof. Dr J D Dijkman, Prof. Dr R van Furth and an anonymous reviewer for their valuable advice.

REFERENCES

- Hoogen WJM van den, Huygen FJA, Schellekens JWG, *et al.* (eds.) *Morbidity figures from general practice*. Nijmegen: Nijmeegs Universitair Huisartsen Instituut, 1985;79.
- Lamberts H. *Morbidity in general practice*. Utrecht: Huisartsenpers BV, 1984;56-59.
- Ayres JG. Seasonal pattern of acute bronchitis in general practice in the United Kingdom 1976-83. *Thorax* 1986;41:106-110.
- Verheij TJM, Kaptein AA, Mulder JD. Acute bronchitis: aetiology, symptoms and treatment. *Fam Pract* 1989;6:66-69.
- Classification Committee of WONCA. *ICHPCC-2 Defined*. (3rd ed.) Oxford: Oxford University Press, 1983;72.
- Howie JGR, Clark GA. Double-blind trial of early demethylchlortetracycline in minor respiratory illness in general practice. *Lancet* 1970;ii:1099-1102.

Rank	Total	
	n	% GP
0	100	467
4	100	467
1	100	467
9	100	467
9	100	467
1	100	467
3	100	467
5	100	467

have a uniform view of the clinical diagnoses of respiratory tract infection. The conclusions of Dunlay between acute bronchitis and pneumonia on the basis of auscultation and presence of aus-

urther suggest that the chest and pneumonia is the questionnaire simply patients displays, the other diagnoses bronchitis of general practitioners noticeably large. In our study in none of the 12 available data. Only in the pneumonia or dyspnoea, and on auscultation might hypothesis.^{5,14-17} Our findings are in agreement with the results made on roentgenological

Pneumonia	†GP	†AB	±%
1	1	100.0	
13	10	76.9	
3	1	33.3	
60	51	91.1	
1	1	100.0	
45	39	86.7	
68	65	97.0	

osis 'upper respiratory tract' diagnosis and prescribed an

- ⁷ Stott NCH, West RR. Randomised controlled trial of antibiotics in patients with cough and purulent sputum. *Br Med J* 1976;**1**:556-559.
- ⁸ Franks P, Gleiner JA. The treatment of acute bronchitis with trimethoprim and sulfamethoxazol. *J Fam Pract* 1984;**19**:185-190.
- ⁹ Williamson HA. A randomized controlled trial of doxycycline in the treatment of acute bronchitis. *J Fam Pract* 1984;**19**:481-486.
- ¹⁰ Brickfield FX, Carter WH, Johnson RE. Erythromycin in the treatment of acute bronchitis in a community practice. *J Fam Pract* 1986;**23**:119-122.
- ¹¹ Dunlay J, Reinhardt R, Donn Roi L. A placebo-controlled, double-blind trial of erythromycin in adults with acute bronchitis. *J Fam Pract* 1987;**25**:137-141.
- ¹² Erdos PL. *Professional Mail Surveys* (rev. ed.) Malabar: Robert E. Krieger Publishing Company, 1983.
- ¹³ Dunlay J, Reinhardt R. Clinical features and treatment of acute bronchitis. *J Fam Pract* 1984;**18**:719-722.
- ¹⁴ Mandell GL, Douglas RS, Bennett JE (eds) *Principles and practice of infectious diseases*. (2nd ed). New York: John Wiley & Sons, 1985;385-401.
- ¹⁵ Christie AB. *Infectious Diseases*. (3rd ed). London: Churchill Livingstone, 1980;311.
- ¹⁶ Wijngaarden JB, Smith LH Jr (eds). *Cecil textbook of medicine*. London: W.B. Saunders Company. (17th ed). 1985;1696.
- ¹⁷ Diehr P, Word RW, Bushyhead J, et al. Prediction of pneumonia in outpatients with acute cough—a statistical approach. *J Chron Dis* 1984;**37**:215-225.
- ¹⁸ Melbye H, Straume B, Aasebo U, Brox J. The diagnosis of adult pneumonia in general practice. *Scand J Primary Health Care* 1988;**6**:111-117.
- ¹⁹ Howie JGR, Richardson IM, Gill G, Durno D. Respiratory illness and antibiotics use in general practice. *J R Coll Gen Pract* 1971;**21**:657-663.
- ²⁰ Howie JGR. Diagnosis—the Achilles heel? *J R Coll Gen Pract* 1972;**22**:310-315.