Prognosis of primary care patients aged 80 years and older with lower respiratory tract infection

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ABSTRACT

Background

Predictors for a complicated course of a lower respiratory tract infection (LRTI) episode among patients aged ≥80 years are unknown.

Aim

To determine prognostic factors for hospital admission or death within 30 days after first onset of LRTI among primary care patients aged ≥80 years.

Design of study

Retrospective cohort study.

Setting

Utrecht General Practitioner Research Network.

Method

Data were obtained using the computerised database of the research network over the years 1997 to 2003. Multivariable logistic regression analysis was applied to estimate the independent association of predictors with 30-day hospitalisation or death.

Results

In all, 860 episodes of LRTI were observed in 509 patients; 13% of patients were hospitalised or died within 30 days. Type of LRTI, diabetes, use of oral glucocorticoids, use of antibiotics in the previous month, and hospitalisation in the previous 12 months were independently associated with the combined outcome. Patients with insulin-dependent diabetes mellitus had a greater risk of 30-day hospitalisation or death compared with patients with non-insulin-dependent diabetes.

Conclusion

Independent of age, serious comorbidity — notably the presence of insulin-dependent diabetes or exacerbation of chronic obstructive pulmonary disease requiring oral glucocorticoids — increases the risk for complications, including hospital admissions, in patients aged ≥80 years with an LRTI.

Keywords

elderly; primary health care; prognosis; respiratory tract, infections.

INTRODUCTION

Lower respiratory tract infections (LRTIs) including pneumonia, acute bronchitis, and exacerbation of chronic obstructive pulmonary disease (COPD) are frequently diagnosed by GPs.[1,2] In the Netherlands the incidence of GP-diagnosed LRTI is 23 per 1000 adults, but 70 per 1000 for patients aged ≥75 years.[3] LRTIs are a major threat to the older population[4–6] because, compared with younger patients, older patients are more prone to develop complications. Moreover, they have a greater burden of underlying diseases and a different response to therapy. To be able to target interventions efficiently, risk stratification is of high importance.

Many prognostic studies have been performed in patients with LRTI, but results from only a few studies can be applied to predict the prognosis in older patients in primary care. The reasons for this range from exclusively including patients in a hospital setting,[7–16] to selecting patients with community-acquired pneumonia only.[7–13,15–20] Some studies investigated the aetiological factors and

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How this fits in

Lower respiratory tract infections (LRTIs) are a major threat for the older population because older people are prone to develop complications. To be able to target interventions efficiently, this study tried to determine prognostic factors for hospital admissions and death within 30 days of the first consultation. Results showed that serious comorbidity, notably insulin-dependent diabetes mellitus and chronic obstructive lung disease requiring oral corticosteroids, increases the risk for complications in patients aged ≥80 years with an LRTI. Age in itself was not a risk factor in this age group.

used a case–control design,[15–18] others tested the validity or usefulness of an existing prediction rule.[10,13] Of note, the number of patients aged ≥80 years in most studies was low, or it was not totally clear how many older patients were included.[7–9,15,20,21]

In a recent study from the authors' group in which a prediction rule was developed for older primary care patients with LRTI aged ≥65 years, it was shown that age was an independent predictor of clinical outcome.[22] However, older patients, for example, those aged ≥80 years, were not analysed separately. The prognosis of this subgroup is relevant because the number of older patients is increasing rapidly and their complications are relatively severe. The purpose of this study was to determine prognostic factors for being admitted to the hospital or dying within 30 days among primary care patients diagnosed with LRTI aged ≥80 years.

METHOD

Patients and setting

Data from a large cohort of older patients with LRTI, used by Bont *et al*,[22] were analysed. The data originated from the database of the Utrecht GP Research Network. In this network 35 GPs have been registering morbidity in electronic medical files of approximately 58 000 patients since approximately 1990. These patients are a reflection of the Dutch population with respect to age and sex. Contact data and diagnoses are registered according to a protocol using the International Classification of Primary Care (ICPC) codes and, when necessary, additional detailed definitions of diagnoses. Data were collected from January 1997 to February 2003. Patients aged ≥80 years at the time of LRTI diagnosis were selected and analysed.

Definition of LRTI and exclusion criteria

LRTI episodes were selected according to ICPC codes. Pneumonia (R81) was defined as evidence of pulmonary consolidation based on physical examination or chest X-ray; acute bronchitis (R78) was defined as coughing with diffuse abnormalities on pulmonary examination (wheezing and crepitations); and the definition of exacerbation of COPD (R91, R95) was based on the criteria of Anthonisen *et al*.[23] Multiple episodes in the same patient were included provided there was at least a 3-week symptom-free interval.

Patients were excluded if they were treated with antibiotics within the previous 3 weeks for another respiratory problem. Other exclusion criteria were: lung or haematological malignancy, HIV infection or AIDS, using immunosuppressive medication, or hospitalisation during the 2 weeks prior to the diagnosis.

Potential predictors

The choice of potential predictors was based on relevant literature.[7–12,14–17,21,22,24–26] Age, sex, current use of medication, comorbidity, and healthcare use in the previous 12 months, including hospitalisation and GP visits, were regarded as potential predictors. Current use of medication was defined as medication prescribed on the day of diagnosis and ≥1 week prior to that day. Previous use of antibiotics was scored positive if the last tablet of a course was prescribed <1 month prior to diagnosis of LRTI. Comorbidity was scored using the ICPC codes in the patient record. The following illnesses were recorded: chronic bronchitis, COPD or emphysema (R91, R95), asthma (R96), malignancies (other than haematological or lung), congestive heart failure (K77, K82), myocardial infarction or other ischaemic heart diseases (K75, K76), angina pectoris (K74), stroke/cerebrovascular accident (K90), dementia (P70), neurological diseases including multiple sclerosis and Parkinson's disease (N86, N87, N99), diseases of the kidney and urinary tract (U99), diseases of the liver such as hepatitis and cirrhosis (D72, D97), and diabetes (T90).

Definition of the outcome

The combined outcome was defined as the occurrence of hospitalisation or death within 30 days after LRTI diagnosis, regardless of the primary cause. The outcome mortality was also analysed separately. Hospitalisation was regarded as an outcome if the patient stayed at least one night in the hospital.

Data analysis

Descriptive statistics and mean (standard deviation) were calculated in patients with or without the outcome. Multivariable logistic regression analysis was used to estimate the

independent association between the combined clinical outcome and potential predictors. As many patients had more than one episode of LRTI and observations could be dependent, generalised estimating equations were used to adjust for within-person dependency.[27] A univariable analysis was performed, and the variables found to have an association with the outcome ($P \leq 0.2$) were included in the multivariable analysis. Odd ratios and their 95% confidence intervals (CI) were estimated as approximation of the relative risk. Data analyses were performed using SPSS (version 15.0).

RESULTS

In all, 509 patients aged ≥80 years with 860 episodes of LRTI were included in the data analysis. Acute bronchitis, exacerbation of COPD, and pneumonia were diagnosed in 308 (35.8%), 343 (39.9%), and 209 (24.3%) episodes respectively. Hospitalisation or death within 30 days after diagnosis occurred in 109 (12.7%) episodes, and 51 (5.9%) of them were fatal. Mean age of the subgroup was 85.2 years, 62.3% were female, and comorbidity was present in 91.9%. As expected, the outcome and some comorbid conditions like COPD/asthma, heart failure, and neurological diseases were common in older patients (Table 1).

In the multivariate analysis, the following predictors were independently associated with hospitalisation or death within 30 days: type of LRTI, diabetes, use of oral glucocorticoids, use of antibiotics in the previous month, and hospitalisation in the previous 12 months (Table 2). The Hosmer–Lemeshow goodness-of-fit statistic was 0.35 and the area under the receiver operating curve (ROC) for the combined endpoint was 0.74 (95% CI = 0.68 to 0.79). For the separate endpoint mortality, the area under the ROC was 0.73 (95% CI = 0.65 to 0.81; Appendices 1 and 2). It was observed that patients with insulin-dependent diabetes mellitus had a greater risk of 30-day hospitalisation or death in comparison with patients with non-insulin-dependent diabetes mellitus (50% versus 17%, $P = 0.001$).

DISCUSSION

Summary of main findings

Five variables were identified that were independently associated with 30-day hospitalisation or death in primary care patients aged ≥80 years with a LRTI: type of LRTI, diabetes, the use of oral glucocorticoids, the use of antibiotics in the previous month, and hospitalisation in the previous year.

Strength and limitations of the study

This study has various strengths. First, data for the predictors were obtained from a large database that has been shown to be valid in many previous studies of respiratory infections.[28–30] The participating GPs are trained and register diagnoses according to a protocol using ICPC codes. Second, a relatively low number of predictive factors (five) were found that are readily available in the patients' files and can be routinely used in daily practice. A potential shortcoming is that it was not possible to validate the data in another cohort. It was also not possible to collect clinical data on patients' history or physical examination because of the retrospective study design. Other studies examining prognostic factors of pneumonia or LRTIs have identified several clinical predictor variables, such as confusion, respiratory rate, temperature, and blood pressure.[7,8,11–13,16,17,24]

Future studies should use a prospective design and also take clinical data into account. While these studies are not available yet, the authors believe that the present results are very useful for GPs. Regarding the endpoints, it should be noted that hospital admission is a marker of disease severity but also of social circumstances and subjective decisions. However, whatever the cause of the admission to hospital is, it is a very relevant endpoint for patients that it is important to anticipate.

Table 1. Baseline characteristics of lower respiratory tract infection episodes in patients ≥80 years (n = 509).

Characteristic	
Number of episodes	860
Sex, %	
Male	37.7
Female	62.3
Mean age, years (range)	85.2 (80–104)
Diagnosis, %	
Acute bronchitis	35.8
Exacerbation of COPD	39.9
Pneumonia	24.3
30-day hospitalisation or death	12.7
Death	5.9
Comorbidity, %	
Overall (for example, ≥1 illnesses)	91.9
COPD/emphysema/asthma	40.6
Diabetes[a]	15.1
Heart failure	33.4
Neurological disease[b]	25.1

[a]Insulin-dependent diabetes mellitus + non-insulin-dependent diabetes mellitus. [b]Stroke, transient ischaemic attack, dementia, and neurological disease in general. COPD = chronic obstructive pulmonary disease.

Table 2. Univariable and/or multivariable associations between possible predictors and 'hospitalisation or death within 30 days' for patients ≥80 years.

Variable	No hospitalisation or death, *n* (%)	Hospitalisation or death, *n* (%)	Univariable OR (95% CI)	Multivariable OR (95% CI)
Episodes	751	109		
Demographics				
Age, ≥90 years	121 (16.1)	22 (20.2)	1.3 (0.8 to 2.3)	NS
Sex, males	278 (37)	46 (42.2)	1.4 (0.9 to 2.1)	NS
Healthcare use[a]				
GP visit for pneumonia ≥1	43 (5.7)	16 (14.7)	2.2 (1.3 to 3.8)	NS
No hospitalisation	651 (86.7)	73 (67)	Reference	Reference
Hospitalisation once	87 (11.6)	21 (19.3)	2.1 (1.2 to 3.4)	2.1 (1.2 to 3.7)
Hospitalisation ≥ twice	13 (1.7)	15 (13.8)	8.6 (3.2 to 23.1)	7.3 (3.8 to 14.2)
Comorbidity				
None	62 (8.3)	7 (6.5)	0.8 (0.3 to 1.8)	NS
COPD/emphysema/asthma	306 (40.7)	43 (39.4)	0.9 (0.6 to 1.4)	NS
Malignancies	140 (18.6)	19 (17.4)	1.0 (0.6 to 1.9)	NS
Diabetes[b]	100 (13.3)	30 (27.5)	2.2 (1.3 to 3.9)	2.2 (1.3 to 3.7)
Congestive heart failure	240 (32)	47 (43.1)	1.5 (0.9 to 2.4)	NS
Myocardial infarction	69 (9.2)	9 (8.3)	0.7 (0.3 to 1.5)	NS
Angina pectoris	135 (18)	30 (27.5)	1.5 (0.9 to 2.6)	NS
Stroke	88 (11.7)	12 (11)	1.1 (0.5 to 2.0)	NS
Dementia	39 (5.2)	8 (7.3)	1.7 (0.8 to 3.7)	NS
Neurological disease[c]	41 (5.5)	9 (8.3)	1.8 (0.8 to 4.1)	NS
Renal disease	17 (2.3)	4 (3.7)	1.8 (0.6 to 5.1)	NS
Liver disease	3 (0.4)	1 (0.9)	2.2 (0.2 to 21.5)	NS
Medication use[d]				
Oral glucocorticoids	20 (2.7)	12 (11)	2.6 (0.7 to 10.3)	2.7 (1.1 to 6.2)
Benzodiazepines or antidepressants	209 (27.8)	38 (15.4)	1.2 (0.7 to 1.9)	NS
Antibiotics <1 month[e]	47 (6.3)	15 (13.8)	2.1 (1.2 to 3.7)	2.2 (1.1 to 4.1)
Diagnosis				
Acute bronchitis	290 (38.6)	18 (16.5)	Reference	Reference
Exacerbation of COPD	309 (41.1)	34 (31.2)	1.5 (0.8 to 2.8)	1.5 (0.8 to 2.8)
Pneumonia	152 (20.2)	57 (52.3)	5.2 (2.9 to 9.1)	5.7 (3.1 to 10.5)

[a]Healthcare use was measured over the year preceding the diagnosis. [b]Insulin-dependent diabetes mellitus + non-insulin-dependent diabetes mellitus. [c]Stroke, transient ischaemic attack, dementia, and neurological disease in general. [d]Medication had to be used for ≥1 week at the start of the episode. [e]The last tablet had to be taken within the previous month. OR = odds ratio. COPD = chronic obstructive pulmonary disease. NS = non significant (P-value>0.05).

Comparison with existing literature

The five predictors found were reported earlier in other populations. It has been shown that diabetes mellitus is associated with an increased susceptibility to infection,[31–33] and that patients with diabetes have an increased risk of complications when they have an LRTI.[22,31] The present results show that, in particular, patients with insulin-dependent diabetes mellitus had a greater risk for the combined outcome. The same is probably true for other chronic diseases. It was found that the use of oral glucocorticoids is a predictor for the outcome. This probably means that patients with severe COPD do have an elevated risk, while mild cases do not. The use of previous antibiotic is probably also an indicator of serious underlying disease, and the fact that this also predicted poor outcome supports the study's other findings.

It was remarkable that no clear association was found between heart failure and age with mortality and hospitalisation. Heart failure was very common in the study subgroup (33.4%). Presumably, many older persons have mild heart failure that overall does not clearly increase their risk for complications. However, it is well known that patients with severe cardiac failure have an unstable health condition and a high complication rate.[34] It was not possible to distinguish between mild and severe cardiac failure. A few other studies on cardiac failure in patients with LRTI show conflicting results.[18,21,22,25]

There is also discussion about age as a risk factor for complications.[7,9,11,12,14,17,19–22,24,26] In one of these studies it is suggested that age could lose specific weight as a prognostic factor for community-acquired pneumonia when including older patients only.[11] Especially in the older population, age in itself could become less important, and other factors, most notably underlying diseases, could have more prognostic value.

Implications for clinical practice and future research

Serious comorbidity, especially insulin-dependent diabetes and serious COPD indicated by use of oral glucocorticoids, elevates the risk for complications in persons aged ≥80 years with LRTI. This risk is independent of age. The analysis in this study should be repeated in a validation cohort, and prospective studies should examine to what extent signs and symptoms could further improve risk assessment of patients aged ≥80 years with LRTI. In addition, intervention studies should assess to what extent the use of prognostic models like the present one would support management of these patients.

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Ethical approval

Not applicable

Competing interests

The authors have stated that there are none

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REFERENCES

1. Macfarlane J, Holmes W, Gard P, *et al.* Prospective study of the incidence, aetiology and outcome of adult lower respiratory tract illness in the community. *Thorax* 2001; **56(2):** 109–114.
2. Verheij RA, Te Brake JHM, Abrahamse H, *et al.* Landelijk Informatienetwerk Huisartsenzorg. *Reasons for encounter: top-20 of ICPC-codes, classified according to gender.* Utrecht/Nijmegen: NIVEL/WOK, 2005. http://www.LINH.nl (accessed 19 Sept 2008).
3. Hak E, Rovers MM, Kuyvenhoven MM, *et al.* Incidence of GP-diagnosed respiratory tract infections according to age, gender and high-risk co-morbidity: the Second Dutch National Survey of General Practice. *Fam Pract* 2006; **23(3):** 291–294.
4. Loeb M. Pneumonia in older persons. *Clin Infect Dis* 2003; **37(10):** 1335–1339.
5. Janssens JP. Pneumonia in the elderly (geriatric) population. *Curr Opin Pulm Med* 2005; **11(3):** 226–230.
6. Janssens JP, Krause KH. Pneumonia in the very old. *Lancet Infect Dis* 2004; **4(2):** 112–124.
7. Conte HA, Chen YT, Mehal W, *et al.* A prognostic rule for elderly patients admitted with community-acquired pneumonia. *Am J Med* 1999; **106(1):** 20–28.
8. Ewig S, Bauer T, Hasper E, *et al.* B. Prognostic analysis and predictive rule for outcome of hospital-treated community-acquired pneumonia. *Eur Respir J* 1995; **8(3):** 392–397.
9. Farr BM, Sloman AJ, Fisch MJ. Predicting death in patients hospitalized for community-acquired pneumonia. *Ann Intern Med* 1991; **115(6):** 428–436.
10. Fine MJ, Orloff JJ, Arisumi D, *et al.* Prognosis of patients hospitalized with community-acquired pneumonia. *Am J Med* 1990; **88(5N):** 1N–8N.
11. Garcia-Ordonez MA, Garcia-Jimenez JM, Paez F, *et al.* Clinical aspects and prognostic factors in elderly patients hospitalised for community-acquired pneumonia. *Eur J Clin Microbiol Infect Dis* 2001; **20(1):** 14–19.
12. Lim WS, van der Eerden MM, Laing R, *et al.* Defining community acquired pneumonia severity on presentation to hospital: an international derivation and validation study. *Thorax* 2003; **58(5):** 377–382.
13. Myint PK, Kamath AV, Vowler SL, *et al.* The CURB (confusion, urea, respiratory rate and blood pressure) criteria in community-acquired pneumonia (CAP) in hospitalised elderly patients aged 65 years and over: a prospective observational cohort study. *Age Ageing* 2005; **34(1):** 75–77.
14. Hak E, Wei F, Nordin J, *et al.* Development and validation of a clinical prediction rule for hospitalization due to pneumonia or influenza or death during influenza epidemics among community-dwelling elderly persons. *J Infect Dis* 2004; **189(3):** 450–458.
15. Farr BM, Bartlett CL, Wadsworth J, Miller DL. Risk factors for community-acquired pneumonia diagnosed upon hospital admission. British Thoracic Society Pneumonia Study Group. *Respir Med* 2000; **94(10):** 954–963.
16. Lim WS, Macfarlane JT. Defining prognostic factors in the elderly with community acquired pneumonia: a case controlled study of patients aged ≥75 years. *Eur Respir J* 2001; **17(2):** 200–205.
17. Riquelme R, Torres A, El-Ebiary M, *et al.* Community-acquired pneumonia in the elderly: a multivariate analysis of risk and prognostic factors. *Am J Respir Crit Care Med* 1996; **154(5):** 1450–1455.
18. Farr BM, Woodhead MA, Macfarlane JT, *et al.* Risk factors for community-acquired pneumonia diagnosed by general practitioners in the community. Respir Med 2000; 94(5): 422–427.
19. Koivula I, Sten M, Makela PH. Risk factors for pneumonia in the elderly. *Am J Med* 1994; **96(4):** 313–320.
20. Pachon J, Prados MD, Capote F, *et al.* Severe community-acquired pneumonia. Etiology, prognosis, and treatment. *Am Rev Respir Dis* 1990; **142(2):** 369–373.
21. Fine MJ, Auble TE, Yealy DM, *et al.* A prediction rule to identify low-risk patients with community-acquired pneumonia. *N Engl J Med* 1997; **336(4):** 243–250.
22. Bont J, Hak E, Hoes AW, *et al.* A prediction rule for elderly primary-care patients with lower respiratory tract infections. *Eur Respir J* 2007; **29(5):** 969–975.
23. Anthonisen NR, Manfreda J, Warren CP, *et al.* Antibiotic therapy in exacerbations of chronic obstructive pulmonary disease. *Ann Intern Med* 1987; **106(2):** 196–204.
24. Seppa Y, Bloigu A, Honkanen PO, *et al.* Severity assessment of lower respiratory tract infection in elderly patients in primary care. *Arch Intern Med* 2001; **161(22):** 2709–2713.
25. Hak E, Bont J, Hoes AW, Verheij TJ. Prognostic factors for serious morbidity and mortality from community-acquired lower respiratory tract infections among the elderly in primary care. *Fam Pract* 2005; **22(4):** 375–380.
26. Houston MS, Silverstein MD, Suman VJ. Risk factors for 30-day mortality in elderly patients with lower respiratory tract infection. Community-based study. *Arch Intern Med* 1997; **157(19):** 2190–2195.
27. Zeger SL, Liang KY. Longitudinal data analysis for discrete and continuous outcomes. *Biometrics* 1986; **42(1):** 121–130.
28. Hak E, Buskens E, van Essen GA, *et al.* Clinical effectiveness of influenza vaccination in persons younger than 65 years with high-risk medical conditions: the PRISMA study. *Arch Intern Med* 2005; **165(3):** 274–280.
29. Plasschaert AI, Rovers MM, Schilder AG, *et al.* Trends in doctor consultations, antibiotic prescription, and specialist referrals for otitis media in children: 1995–2003. *Pediatrics* 2006; **117(6):** 1879–1886.
30. Hak E, Buskens E, Nichol KL, Verheij TJ. Do recommended high-risk adults benefit from a first influenza vaccination? *Vaccine* 2006; **24(15):** 2799–2802.
31. Falguera M, Pifarre R, Martin A, *et al.* Etiology and outcome of community-acquired pneumonia in patients with diabetes mellitus. *Chest* 2005; **128(5):** 3233–3239.
32. Muller LM, Gorter KJ, Hak E, *et al.* Increased risk of common infections in patients with type 1 and type 2 diabetes mellitus. *Clin Infect Dis* 2005; **41(3):** 281–288.
33. Shah BR, Hux JE. Quantifying the risk of infectious diseases for people with diabetes. *Diabetes Care* 2003; **26(2):** 510–513.
34. Fonarow GC. Epidemiology and risk stratification in acute heart failure. *Am Heart J* 2008; **155(2):** 200–207.

Appendix 1. Prediction rule for calculating probability of 30-day hospitalisation or death from lower respiratory tract infection in patients ≥80 years.

Variable	Regression coefficient	Score
Diagnosis		
Acute bronchitis	0	1
Exacerbation of COPD	0.395	4
Pneumonia	1.737	2
Diabetes	0.786	2
Use of oral glucocorticoids	0.978	2
Use of antibiotics in previous month	0.765	2
Hospitalisation in previous year		
0	0	
1	0.752	2
≥ 2	1.990	5

COPD = chronic obstructive pulmonary disease.

Appendix 2. Sensitivity, specificity, PPV, and NPV for the different cut-off points.

Cut-off point	Participant, *n*	Sensitivity	Specificity	PPV	NPV
≥1	644	0.90	0.27	0.15	0.95
≥2	406	0.72	0.56	0.19	0.93
≥3	325	0.69	0.67	0.23	0.94
≥4	244	0.62	0.77	0.28	0.93
≥5	102	0.42	0.93	0.45	0.92
≥6	87	0.40	0.94	0.51	0.92
≥7	29	0.17	0.99	0.66	0.89
≥8	28	0.17	0.99	0.68	0.89
≥9	18	0.13	0.99	0.78	0.89
≥10	11	0.09	1	0.91	0.88
≥11	4	0.04	1	1	0.88
≥12	3	0.03	1	1	0.88
≥13	2	0.02	1	1	0.88

PPV = positive predicted value. NPV = negative predicted value.