Functional status of elderly people treated for asthma-related symptoms: a population based case-control study

C. Nejjari, J.F. Tessier, P. Barberger-Gateau, H. Jacqmin, J.F. Dartigues, R. Salamon

Functional status of elderly people treated for asthma-related symptoms: a population based case-control study. C. Nejjari, J.F. Tessier, P. Barberger-Gateau, H. Jacqmin, J.F. Dartigues, R. Salamon. ©ERS Journals Ltd 1994.

ABSTRACT: There are few data on the disability caused by asthma in elderly subjects. The aim of this survey was to assess the functional status of a population aged 65 years or more, being treated for asthma-related symptoms.

A representative sample of 3,777 elderly people, living at home in the South-West of France, was surveyed using a standardized questionnaire on factors of ageing and their consequences. To assess the functional status, five scales were used: Activities of Daily Living (ADL); Instrumental Activities of Daily Living (IADL); Rosow and Breslau scale; Mobility; and a Subjective Health Scale. Patients treated for asthma-related symptoms were identified by means of their use of the anti-asthma drugs mentioned in the questionnaire. In a second stage, the presence of asthma-related symptoms was further established by enquiring from their general practitioners and by direct questioning of the patients.

Among 135 subjects taking anti-asthma drugs, 83 (61%) had positive responses to specific questions, either from their doctors or from themselves, allowing them to be identified as "asthmatic".

In comparison with a control group matched for age and sex (n=166; two controls for each patient), asthmatic patients had a higher dependence in the IADL scale, a greater self-assessment of poor health, and a greater handicap in mobility. However, they had the same level of ADL disability as controls. Despite adjustment for residential area, depressive symptoms, Mini Mental Status (MMS) Exam score, visual and auditory impairment, and joint pain, patients treated for asthma still had a higher risk of disability in daily life, and a poorer subjective health than controls. Dyspnoea appears to be the main factor of disability in subjects treated for asthma.

In conclusion, these data indicate the poor functional status of subjects treated for active asthma. This appears, for a large part, to be the consequence of their dyspnoea.
Eur Respir J., 1994, 7, 1077–1083.

INSERM U 330, Université de Bordeaux II, Bordeaux, France.

Correspondence: J.F. Tessier
146, rue Léo Saignat
F 33 076 Bordeaux Cedex
France

Asthma is a disabling disease [1–3] both in children and adults. It can be responsible for school absence and lower school results in children [4, 5], and create difficulties in conducting some occupations in adults, and it sometimes causes invalidity [1, 6, 7].

There are few data on disability caused by asthma in elderly people, despite the increase in longevity and the importance of maintenance of autonomy. Asthma is not an uncommon disease in subjects aged 65 yrs and over, prevalence varying between 3–6% [8, 9]. Identification of asthma by epidemiological tools appears to be more difficult in the elderly than in young people, because of the association with other respiratory problems. Some authors, such as BURROWS *et al.* [10], have stressed these difficulties [11].

In elderly people, functional status has a great influence on everyday life [12], particularly when they have a chronic disease. Whatever the difficulties of asthma diagnosis, delaying the onset of dependency and disability is essential to improving the quality of life of older patients with asthma-related symptoms. In this way, dyspnoea, a symptom often associated with asthma at this age [13], has been found to be an important aggravating factor of disability, even when data are adjusted for other disabling factors [3, 14, 15].

In the South West of France, there is an epidemiological programme including 3,777 French community residents, aged 65 yrs and over, which aims to describe the physical and mental features of ageing. This programme is called PAQUID ("Personnes âgées QUID"). Data are available on functional status, ageing factors, smoking habits and medication in this large elderly population [16, 17].

This cohort provides a population for a specific comparative study. In this study we wanted to determine whether PAQUID subjects, aged 65 yrs and over, take

anti-asthma drugs. We also wanted to assess whether those with a confirmed history of asthma-related symptoms were more disabled than cohorts matched for age, sex, and other factors known to influence functional status.

Methods

Population and collection of data

The population studied was a cohort of 3,777 subjects, aged 65 yrs and over, taken at random from the electoral list of the Gironde and Dordogne "departments" in South-West France, and living at home (PAQUID Population). The general methodology of PAQUID has been described previously [14, 16, 17].

A sample of 75 districts was randomly selected in these two departments, with stratification upon the size of urban units (>100,000 inhabitants; 50,000–99,999; 10,000–49,999; 2,000–9,999; <2,000). Subjects were then chosen randomly from the electoral lists of each district, with stratification upon age and sex, and a homogeneous sampling ratio. From the 5,555 individuals of the resulting list, 3,777 (68%) agreed to be followed regularly, and the mental and physical features of ageing were studied.

Data were collected by a questionnaire filled in at home by specifically trained psychologists. The variables included sociodemographic items (age, sex, living arrangements, loneliness, social support, social activities, past occupation, educational level), assessment of functional disability and health status, present medication, and a set of psychometric tests assessing cognitive functioning and depression.

All the assessments, with the exception of subjective estimates of health judgements, were made by the interviewer. They were specifically trained not to give directive advice to the patients.

Patients and controls

All drugs taken by the elderly subject of the PAQUID cohort were listed by the fieldworkers in the general questionnaire. We considered as anti-asthma drugs: β_2-mimetics, theophyllines, corticosteroids, cromoglycate and anticholinergics. Initially, it had been decided that the presence of asthma in subjects taking anti-asthma drugs would be confirmed by a phone inquiry with the practitioners.

Each subject's general practitioner (GP) was closely associated to PAQUID and regularly received information on the survey. The GPs were asked if the patient had experienced asthma attacks in the 12 previous months. However, it was decided that it was also necessary to have confirmation from the patients themselves. Two questions on asthma were added to the general PAQUID questionnaire. Patients were asked: "Have you ever had asthma?"; and "Have you had attacks of asthma in the 12 last months?".

Among the 3,777 subjects living at home and involved in the PAQUID survey, 135 had received anti-asthma drugs. For 83 of them, the diagnosis of asthma was confirmed both by GPs, and the patients themselves. One hundred and sixty six control subjects were randomly selected among other PAQUID subjects. They were matched with asthmatics by age and sex (two controls for each patient).

The present study concerns a sample of 249 subjects (83 patients and 166 controls).

Measurement of functional status

To assess functional status, five measures were used. The Katz Activities of Daily Living Scale (ADL) includes six hierarchically related functions: bathing, dressing, toileting, transferring, continence, and eating [18].

The Lawton Instrumental Activities of Daily Living scale (IADL) involves: telephone use, shopping, transportation, budget management, responsibility for medication, cooking, housekeeping and laundry [19]. For example, for telephone use, subjects had to choose between four possibilities: 1) I use the phone without any problems; 2) I only dial numbers I know well; 3) I only answer the phone, but cannot dial a number; and 4) I am unable to use a phone. For this item, the subject was "dependent" according to Lawton classification, if he responded with answer 4.

Functional self-assessment [20] (Rosow and Breslau scale) was tested by means of the following question: "Which of the following tasks can you still perform without help: heavy work in the house; walking about half a mile; walking up and down two-floors; participating in social activity?"

Subjects were classified as "dependent" for each item of ADL and IADL according to the thresholds defined by KATZ *et al.* [18] and LAWTON and BRODY [19], respectively; and for the Rosow and Breslau scale, if they said that they were unable to do the activity without help [20].

Mobility was assessed by a six level scale from bedridden to no restriction in mobility [21]. Subjects were considered as "dependent" if they were restricted to their bed or to their house.

In a global self-perceived health scale [22], subjects were classified as having a poor opinion of their health status if they rated themselves in "bad" or "very bad" health.

Other variables

Other variables, which had previously been demonstrated to be associated with disability in the PAQUID cohort [11], and which would, potentially, be able to interfere in the functional differences between treated asthmatic patients and their controls, were also registered. Sociodemographic items included: age, sex, place of residence (rural <2,000 inhabitants *vs* urban). Dyspnoea was defined in a similar fashion to the Fletcher's

five degrees scale, according to the following question: Do you feel out of breath in some of the following circumstances: never (level 1); during major efforts such as climbing one flight of stairs (level 2); during minor efforts such as walking with other people of your own age on the flat at a normal pace (level 3); during everyday activities such as dressing or undressing (level 4); or when confined to bed (level 5)? [23]. Subjects who had given a positive response for levels 3, 4 or 5 were classified as dyspnoeic, as recommended by VESTBO et al. [24], [17].

The importance of co-morbidity in the elderly needed to be considered as a potential counfounding factor. The most frequently observed diseases in elderly people have been registered: diabetes, cardiac diseases, strokes, fractures in the 10 last years, slowness, tremors or Parkinson's disease.

More specifically, some other diseases have been taken into account because of their effect on functional status, hearing or visual impairment, joint pain, depressive symptomatology, and cognitive impairment [14, 25]. Depressive symptoms were assessed by the CES-D scale: a man was classified as having depressive symptomatology if he scored greater than 16 and a woman greater than 22 [14, 26]. Cognitive functioning was assessed by the Mini Mental Status Exam score: a patient was considered as cognitively impaired if he scored less than 24 [27].

Statistical analysis

By univariate analysis, the demographic, clinical characteristics, and co-morbidity of asthmatic subjects were compared to controls using Chi-squared tests.

The percentage of subjects classified as dependent was determined by asthmatics and controls for each item, in each scale of functional status, and then compared using Chi-squared test.

To estimate the risk (odds ratio) of dependence defined above in treated asthmatic patients compared with their controls, unconditional logistic regressions were made for each item. In each regression, the dependent variable was the corresponding item, the explicative variable was treated asthma (1 vs 0), taking into account the covariates significantly associated with dependence in the univariate analysis.

Firstly, dyspnoea was excluded from analyses. Then, in order to evaluate its specific effect, dyspnoea was introduced in logistic regression models retaining all the other factors.

Results

Sociodemographic data

Sex ratio was 1.6 (table 1). Despite stratification of the PAQUID sample upon living area, more patients lived in a rural setting, than did control subjects (p<0.005). Smoking history was similar for patients and controls.

Table 1. – Sociodemographic data of patients and controls: PAQUID 1987–1989

	Patients n=83	Controls n=166	p-value
Age* yrs	75±6	75±6	-
Sex %			
Male	62	62	-
Female	38	38	-
Living area %			
Rural	22	44	<0.0005
Urban	78	56	
Smoking history %			NS
Current smokers	11	12	
Ex-smokers	22	21	
Lifetime nonsmokers	67	67	

*: mean±SD. PAQUID: "Personnes âgées QUID"; NS: nonsignificant.

Nonrespiratory co-morbidity

For all diseases or impairments listed, the percentage of subjects with potential confounding factors was not significantly different between the two groups (table 2).

Respiratory data

Patients treated for asthmatic attacks had higher rates of dyspnoea than controls, 72 vs 25% (p<0.001). According to the information obtained from the doctors, 50% of the patients had other respiratory diseases associated to asthma: 25% were considered as having chronic bronchitis; 20% "emphysema" (diagnosis not controlled); and 5% another respiratory disease. All of these patients had consulted on average twice during the previous three months, 32% usually had moderate or severe attacks, 82% were treated with theophylline, either isolated or associated with β_2-mimetics, and 18% with corticosteroids, alone or in association with bronchodilators.

Table 2. – Nonrespiratory co-morbidity data in asthmatics and controls: PAQUID 1987–1989

	Asthmatics n=83 %	Controls n=166 %	p-value
Depressive symptomatology	18	12	NS
Cognitive impairment	25	30	NS
Diabetes	6	15	NS
Cardiac diseases	24	29	NS
Strokes	3	6	NS
Fractures (last year)	10	9	NS
Slowness	12	12	NS
Tremor or Parkinson	11	8	NS
Visual impairment	24	14	NS
Hearing impairment	34	39	NS

NS: nonsignificant; PAQUID: "Personnes âgées QUID".

Table 3. – Percentage of asthmatics and controls classified as "dependent" in ADL, IADL, and Mobility scales

	Asthmatics n=83 %	Controls n=166 %	p-value
ADL of KATZ et al. [18]			
Bathing	11	9	NS
Dressing	13	6	NS
Toileting	1	3	NS
Transferring	6	4	NS
Continence	16	9	NS
Eating	3	1	NS
IADL of LAWTON and BRODY [19]			
Telephone use	23	8	<0.003
Shopping♦	46	22	<0.0001
Cooking♦	30	15	<0.01
Housekeeping♦	44	28	<0.01
Laundry	43	25	<0.003
Transportation	42	18	<0.0001
Budget management	29	15	<0.05
Medication management	13	4	<0.04
Mobility [21]			
Restriction (to bed or home)	26	9	<0.007
Dyspnoea	70	25	<0.0001

♦: in female only. NS: nonsignificant; ADL: Activities of Daily Living; IADL: Instrumental Activities of Daily Living.

Measure of functional status

Table 3 shows the univariate analysis comparing treated asthmatics with their controls for the Katz, Lawton, and Mobility scales. For each ADL item, there, was no significant difference between the two groups. For each IADL item, a higher proportion of dependent subjects was observed in patients than in controls. The greatest differences are for shopping, housekeeping and transportation (p<0.0001). Twenty six percent of patients were also limited to their bed or house, compared to only 9% of controls (p<0.07).

Table 4 compares patients to their controls for the Rosow and Breslau scale and subjective health. The former were much more dependent for each item than the latter. For Subjective Health, 77% of the cases have a poor opinion of their health against 48% for controls.

Table 5 gives the results of the logistic regression analyses made to assess the risk of dependency in patients for each item of the disability and handicap scales, adjusting for the covariates: age, sex, district, depressive symptomatology, cognitive impairment, and other pathologies.

Table 4. – Percentage of asthmatics and controls classed as "dependent" in ROSOW and BRESLAU [20] and Subjective Health scales, PAQUID 1987–1989

	Asthmatics n=83 %	Controls n=166 %	p-value
Rosow and Breslau scale			
Heavy work in the house	90	73	<0.001
Walk about half a mile	30	16	<0.03
Walk up and down a two floor step	44	25	<0.007
Social activity	33	17	<0.007
Subjective Health (bad and very bad)	77	48	<0.0001

PAQUID: "Personnes âgées QUID".

Table 5. – Logistic regressions on the classification as "dependent" for each handicap item: odds ratios (OR) for patients *versus* controls: PAQUID 1987–1989

Dependent variables	Adjusted OR[†]	95% CI	p-value	Dyspnoea adjusted OR[††]	95% CI	p-value
IADL						
Telephone use	3.1	(1.2–8.2)	<0.01	1.3	(1–3.2)	NS
Shopping♦	2.8	(1.4–5.5)	<0.002	1.1	(0.9–2.5)	NS
Cooking♦	2.3	(1.02–5.1)	<0.02	1.2	(0.8–2.8)	NS
Housekeeping♦	3.1	(1.6–5.9)	<0.0006	1.1	(1.1–3)	NS
Laundry	1.9	(1.01–3.8)	<0.04	0.8	(0.7–2)	NS
Transportation	3.2	(1.5–6.6)	<0.001	1.0	(0.9–2.9)	NS
Budget management	1.9	(1.02–1.4)	<0.05	0.9	(0.7–3)	NS
Medical management	2.0	(1.01–4.3)	<0.04	0.9	(0.7–2.6)	NS
Mobility						
(bed or home bound)	3.2	(1.3–7.8)	<0.01	1.5	(1–4)	NS
Rosow and Breslau						
Heavy work in the house	3.3	(1.3–8.5)	<0.009	1.4	(1–3.8)	NS
Walk about half a mile	2.0	(1.1–4.4)	<0.05	0.8	(0.7–2.7)	NS
Walk up and down two flights of stairs	1.9	(1–3.6)	<0.05	0.9	(0.8–3.2)	NS
Social activity	1.8	(0.9–3.6)	NS	0.8	(0.7–2.9)	NS
Subjective Health						
(bad or very bad)	5.2	(1.9–14.1)	<0.001	1.7	(0.9–3.5)	NS

♦: in female only; †: odds ratio adjusted for age, sex, district, depressive symptomatology, cognitive impairment and co-morbidity; ††: adjusted for dyspnoea, retaining other variables. NS: nonsignificant; 95% CI: 95% confidence interval; PAQUID: "Personnes âgées QUID".

All items of the Lawton, Rosow and Breslau, Mobility, and Subjective Health scales were significantly related to asthma symptoms. For the Lawton scale, patients with symptoms had a significantly higher risk of dependency in three items: housekeeping (OR=3.1), transportation (OR=3.2) and telephone use (OR=3.1). The risk of dependency was also greater for shopping (OR=2.8), cooking (OR=2.3), budget management and laundry (OR=1.9). For the Mobility scale, treated asthmatics had a greater risk of being limited to their bed or house, than controls (OR=3.2). The poorer opinion of personal health in asthmatic patients than in the controls remained after adjustment (OR=5.2). Finally, patients had a higher risk of dependency for three items of the Rosow and Breslau scale: heavy work in the house (OR=3.3), walking about half a mile (OR=2), and walking up and down two floors (OR=1.9). Social activities were unaffected.

After introduction of dyspnoea (level 0 and 1 vs 2–4) into the model, retaining the previous covariates, all of the correlations between asthma symptoms with different items of disability and handicap scales disappeared, even the most significant. Hence, the difference in disability observed between patients and controls is fully explained by their dyspnoea level.

Discussion

In our elderly population we observed a relationship between asthma-related symptoms requiring treatment and disability, except for activities of daily living, independently from other disabling factor; this relationship was largely dependent on the presence of dyspnoea. The main interest of this approach was to focus on a representative sample of people aged 65 yrs and over and living at home, since most earlier studies on disability associated with respiratory disease had been limited by the size and representativeness of the sample [28, 29].

The present study was based on the treatment data of the PAQUID cohort; and we selected subjects who were taking anti-asthma drugs at the time of the interview. This condition was considered by BURROWS et al. [10] as one of the four criteria to identify asthmatic patients in the Tucson cohort. However, some of these drugs, such as bronchodilators or steroids could have been prescribed for other chronic obstructive lung diseases. For this reason, it was decided to ask the practitioners if they could confirm which patients had been treated for asthma attacks. As shown in the results, 61% of the patients were taking anti-asthma drugs. Although some authors, such as FERRIS and ANDERSON [30], and CAIRD and AKHTAR [31] have accepted GP diagnosis as a valuable identification criterion in an epidemiological survey, such diagnosis is considered by some epidemiologists as unreliable for the purpose of a scientific study. We therefore decided to obtain additional information directly from the patients, by asking them two classical questions on asthma used in other epidemiological surveys [10, 32, 33]. For all the patients,

GPs diagnosis and self-reported symptoms were in agreement.

Is this sufficient to identify our patients as asthmatics? Results show that 50% of them are considered as simultaneously suffering from chronic bronchitis, or what doctors call "emphysema"; however, it was not possible for us to check these diagnoses.

Another possible cause of confusion, as indicated by some authors, is lung congestion (cardiac asthma); since 24% of the patients had a history of cardiac diseases. Despite the fact that the same proportion was observed in controls, we cannot exclude the possibility that respiratory symptoms reported in some patients were related to left heart failure [9]. All these diagnostic difficulties explain the great discordance in the figures reported in epidemiological studies on the prevalence of asthma in the elderly [9].

In the assessment of the functional status, each scale was considered item by item, in order to obtain the specific performance of asthmatic subjects. Despite their higher frequency of dyspnoea, elderly patients treated for asthma were impaired in basic activities of daily life to the same degree as the control group. However, they were more disabled than controls in Instrumental Activities of Daily Living and Mobility, and they considered their health to be poorer.

Differences concerning more elaborate activities and subjective health, demonstrate the role of social variables in chronic respiratory diseases [1], as many authors have suggested. From the findings of the Tucson cohort, BURROWS [34] has already suggested that in chronic obstructive pulmonary disease (COPD), clinical symptoms and disability seem to appear only later in life.

Does disability depend only on respiratory status, or also on other factors, such as social and psychosocial conditions? In this survey, the frequency of dyspnoea in asthmatic patients was rather high. We observed a dyspnoea level of 2, 3 or 4 in 72% of asthmatic patients, and in only 25% of controls. Our patients selection criteria explain this higher rate of dyspnoea. The role of dyspnoea may have been particularly important for disability [35, 36], and in our population the adjustment for this factor by logistic regression models eliminated the relationship between handicap and treated asthma-related symptoms.

Some authors have shown that psychological and social factors are important, even when severe pulmonary disease is present [37]. Most of these studies focused on patients with COPD and not on elderly asthmatics. However, some conclusions of these authors are in agreement with our results. AGLE and co-workers [38–40] assessed, in respiratory patients, the effectiveness of a 4 week rehabilitation programme, that included some graduated and voluntary exercises. They demonstrated that an improvement in exercise tolerance and disability can occur in some patients, without demonstrable improvement in physiological factors. This improvement mainly concerned disability in performing activities of daily living (ADL). Similarly, GUYAT et al. [41], KINSMAN et al. [42] and SALATA and BERMAN

[43] found a weak correlation between levels of measures of pulmonary function and impairment of the quality of life in COPD patients.

For several authors, depression appears to be a common psychological status among asthmatic patients [44]. In a general review, GRANT and HEATON [45] note that some research indicates a tendency for patients with COPD to avoid social interaction, to be socially isolated, lonely and anxious. Other studies show that, in the elderly, emotional problems are greater than in younger subjects, and could be responsible for loss of self-esteem when they have chronic diseases [1]. Recently, McSWEENY et al. [29] attempted to systematically assess quality of life and psychological functioning using the Sickness Impact Profile (SIP), an instrument designed for assessing the quality of life of the general population. After adjustment for age, items particularly affected included household management, physical mobility, and social interaction. As we found in the present study, elementary functions were less affected. In our survey, depression does not seem to play an important role. We found a weak difference in the rate of this symptom between patients and controls. After adjustment for depression, the relationship between symptoms and handicap was not modified. CAMPBELL [46] suggests that there could be an interaction between psychosocial factors and severity of pulmonary impairment. More recently, several authors pointed out the effects of asthma on quality of life, which includes psychological and social aspects of the disease. Some specific scales were validated for this [47–50].

In conclusion, this epidemiological survey indicates that elderly subjects treated for asthma-related symptoms have an impaired quality of life, mainly attributable to their dyspnoea. Obviously, these findings could be explained by the presence of COPD, either instead of asthma or in association with it. Further simultaneous assessment of clinical and functional status, as well as quality of life, is necessary to complete our findings.

References

1. Williams SJ. Chronic respiratory illness and disability: a critical review of the psychosocial literature. *Soc Sci Med* 1989; 28: 791–803.
2. Jones PW. Measurement of quality of life in chronic obstructive lung disease. *Eur Respir Rev* 1991; 1: 5, 445–453.
3. Comstock GW, Sone RW, Tonascia JA, Johnson DH. Respiratory survey finding as predictors from respiratory diseases. *Am Rev Respir Dis* 1981; 124: 367–371.
4. Tessier JF, Bollineli R, Gachie JP, Bernadou M, Fréour P. Asthme et absentéisme scolaire de l'enfant. *Rev Fr Mal Respir* 1979; 7: 165–174.
5. Hill R, Standen C, Tattersfield A. Asthma, wheezing and school absence in primary schools. *Arch Dis Child* 1989; 64: 246–251.
6. Bollineli R, Tessier JF, Fournial F, Refregier M, Rouch Y, Laylavoix F. Asthme, handicap et invalidité chez l'adulte. *Rev Fr Mal Respir* 1979; 7: 159–164.
7. Tessier JF, Grillat JP, Kohler Ch, Mayeux D, Freour P. L'asthmatique et son travail. *Rev Fr Allergol* 1984; 24: 187–192.
8. Burr ML, Charles TJ, Rooy K, Seaton A. Asthma in elderly: an epidemiological survey. *Br Med J* 1979; 1041–1044.
9. Tessier JF, Nejjari C, Barberger-Gateau P, Dartigues JF. Epidémiologie de l'asthme du sujet âgé: à propos d'une revue de la littérature. *Rev Mal Resp* 1993; 10: 423–431.
10. Burrows B, Barbee RA, Cline MG, Knudson RJ, Lebowitz MD. Characteristics of asthma among elderly adults in a sample of the general population. *Chest* 1991; 100: 935–942.
11. Lebowitz MD, Spinaci S. The epidemiology of asthma. *Eur Respir Rev* 1993; 3: 14, 415–423.
12. Kovar MG, Feinleb M. Older Americans present a double challenge: preventing disability and providing care. *Am J Public Health* 1991; 3: 287–288.
13. Fréour P. La pathologie respiratoire au troisième âge. Edition Monographie du Collège de Médecine des Hôpitaux de Paris, 1979; p. 150.
14. Baberger-Gateau P, Dartigues JF, Commenges D, Gagnon M, Salamon R. Health measures correlates in a French elderly community population. The PAQUID study. *J Gerontol: Social Sci* 1992; 47: S88–95.
15. Colvez A, Robine JM, Jouan-Flalhaut CH. Risque et facteur de risque d'incapacité aux âges élevés. *Rev Epidémiol Santé Publique* 1985; 35: 257–269.
16. Dartigues JF, Baberger-Gateau P, Gagnon M, *et al*. PAQUID: étude du vieillissement normal et pathologique. *Rev Gériar* 1991; 16: 5–15.
17. Nejjari C, Tessier JF, Dartigues JF, Barberger-Gateau P, Letenneur L, Salamon R. The relationship between dyspnoea and main lifetime occupation in elderly community dwellers. *Int J Epidemiol* 1993; 22: 848–853.
18. Katz S, Downs TD, Cash HR, Grotz RC. Progress in development of the index of ADL. *Gerontologist* 1970; 10: 20–30.
19. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. *Gerontologist* 1969; 9: 179–186.
20. Rosow I, Breslau N. A Guttman Health Scale for the aged. *J Gerontol* 1966; 21: 556–559.
21. Classification internationale des handicaps: déficience, incapacités et désavantages. CTNERHI-INSERM, 1988.
22. Idler I, Kasl SV, Lemke JH. Self-evaluated health and mortality among the elderly in New Haven, Connecticut, and Iowa Washington counties, Iowa, 1982–1986. *Am J Epidemiol* 1990; 131: 91–103.
23. Fletcher CM, Peto R, Tinker CM, Speizer FE. *In*: The Natural History of Chronic Bronchitis and Emphysema. New York, Oxford University Press, 1976.
24. Vestbo J, Knudsen KM, Rasmussen FV. Should we continue questionnaires on breathlessness in epidemiologic surveys? *Am Rev Respir Dis* 1986; 137: 1114–1118.
25. Chiricos T, Nestel G. Longitudinal analysis of functional disabilities in older men. *J Gerontol* 1985; 40: 426–433.
26. Radloff S. The CES-D Scale: a self-report Depression Scale for Research in the general Population. *J Appl Psychol Meas* 1977; 1: 385–401.
27. Folstein MF, Folstein SE, Hugh PR. Minimental State: a practical method for grading the cognitive state of patients for the clinicians. *J Psychiatr Res* 1975; 12: 189–198.

28. Lustig FM, Hass A, Castillo D. Clinical and rehabilitation regimen in patients with COPD. *Arch Phys Med Rehabil* 1972, 53: 315–322.

29. McSweeny AJ, Grant I, Heaton RK, Adams KM, Timms R. Life quality of patients with chronic obstructive pulmonary disease. *Arch Intern Med* 1982; 142: 473–478.

30. Ferris BG, Anderson DO. The prevalence of chronic respiratory disease in a new Hampshire town. *Am Rev Respir Dis* 1962; 86: 165–177.

31. Caird FI, Akhtar AJ. Chronic respiratory disease in the elderly. A population study. *Thorax* 1972; 27: 764–768.

32. Dodge RR, Burrows B. The prevalence and incidence of asthma-like symptoms in a general population sample. *Am Rev Respir Dis* 1990; 122: 567–575.

33. Tessier JF, Nejjari C, Decquae L, Barberger-Gateau P, Dartigues JF. Epidemiologie de l'asthme du sujet âgé: premiers résultats d'une enquête par questionnaire. *Rev Mal Respir* 1992; 9: R196 (Suppl. 3).

34. Burrows B. Course and prognosis in advanced disease. *In*: Petty TL, ed. Chronic Obstructive Pulmonary Disease. 2nd edn. New-York, Dekker, 1985.

35. Shim CS, Williams MH. Evaluation of the severity of asthma: patients *versus* physicians. *Am J Med* 1980; 68: 11–13.

36. Mahler DA, Faryniarz K, Tomlinson D, *et al.* Impact of dyspnoea and physiologic function on general health status in patients with chronic obtructive pulmonary disease. *Chest* 1992; 102: 395–401.

37. Rosser R, Guz A. Psychological treatments for breathlessness. *J Psychosom Res* 1981; 25: 439–447.

38. Agle DP, Baum GL. Psychological aspects of obstructive pulmonary disease. *Med Clin North Am* 1977; 61: 749–758.

39. Baum GL, Agle DF, Chester EN. Multidiscipline treatment of chronic pulmonary insufficiency: functional status at one-year follow-up. *In*: Johnson RF, ed. Pulmonary Care. New York, Grune & Stratton. 1973.

40. Agle DF, Baum GL, Chester EH. Multidiscipline treatment of chronic pulmonary insufficiency: psychologic aspects of rehabilitation. *Psychosom Med* 1973; 35: 41–49.

41. Guyat GH, Townsend M, Berman L, Pugsley SO. Quality of life in patients with chronic airflow limitation. *Br J Dis Chest* 1987; 81: 45–54.

42. Kinsman RA, Yaroush RA, Fernandez E, Dirks JF, Schocket M, Fukahara J. Symptoms and experiences in chronic bronchitis and emphysema. *Chest* 1983; 83: 755–761.

43. Salata PA, Berman LB. Variables which distinguish good and poor function outcomes following respiratory rehabilitation. *Am Rev Respir Dis* 1981; 123: 117–124.

44. Dudeley DL, Glaser EM, Jorgenson BN, Logan DL. Psychological concomitants to rehabilitation in chronic pulmonary disease. Part 1. Psychosocial and psychological considerations. *Chest* 1980; 77: 413–420.

45. Grant I, Heaton R. *In*: Petty TL, ed. Neuropsychiatric Abnormalities in Chronic Obstructive Pulmonary Disease, 2nd edn. New York, Dekker, 1985.

46. Campbell M, Guz A. *In*: Hornbein TS, ed. Breathlessness in Lung Biology in Health and Disease. New York, Dekker, 1981.

47. Hyland M, Finnis S, Irvine S. A scale for assessing quality of life in adult asthma sufferers. *J Psychosom Res* 1991; 35: 99–110.

48. Jones P. Quality of life measurement for patients with diseases of the airways. *Thorax* 1991; 46: 676–682.

49. Rinsberg K, Wiklund I, Wilhemsen L. Education of adult patients at an "asthma school": effects on quality of life, knowledge and need for nursing. *Eur Respir J* 1990; 3: 33–37.

50. Juniper E, Guyatt G, Epstein R, Ferrie P, Jaeschke R, Hiller T. Evaluation of impairment of health related quality of life in asthma: development of a questionnaire for use in clinical trials. *Thorax* 1992; 47: 76–83.